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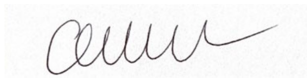
Revised Biodiversity Development Assessment Report
Technical Report 1

Declaration

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

Name: Chani Wheeler *Signature:*  *BAM Accreditation No.: BASS19077* *Date: 26 June 2024*

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Technical Report 1 – Revised Biodiversity Development Assessment Report

Revision 0 | 21 June 2024

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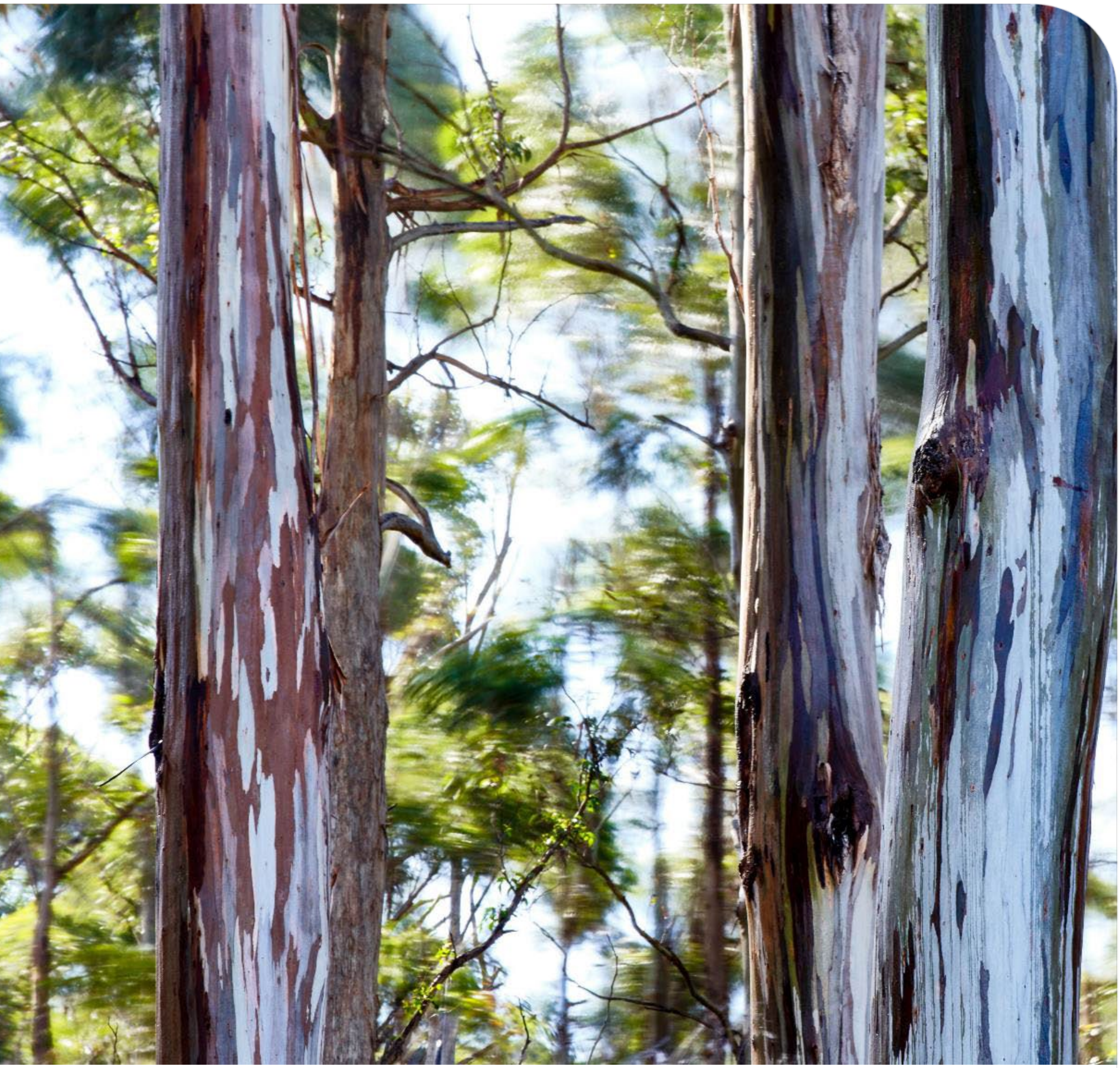
Prepared for Transgrid



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Executive summary

Transgrid proposes the construction and operation of around 365 kilometres of high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle (the amended project). This amended project is collectively referred to as HumeLink. The amended project would be located across six Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire, Yass Valley and Goulburn Mulwaree.

Transgrid is seeking approval for the amended project under Part 5 Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The amended project has been declared Critical State Significant Infrastructure (CSSI) under State Environmental Planning Policy (Planning Systems) 2021. The amended project was also declared a controlled action by the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) and requires a separate approval under the (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). The amended project is subject to the bilateral assessment process that has been established between the Commonwealth and NSW governments.

An Environmental Impact Statement (EIS) was submitted for the project in August 2023 responding directly to the Planning Secretary's Environmental Assessment Requirements (SEARs) and supplementary SEARs. The NSW Biodiversity Offsets Scheme (BOS) applies to State Significant Infrastructure (SSI) projects unless the Secretary of the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly the NSW Department of Planning and Environment (DPE)) and the environment agency head determine that the amended project is not likely to have a significant impact. A Biodiversity Development Assessment Report (BDAR) was prepared and submitted as part of the project EIS, as required under the BOS.

This Revised BDAR is intended to support the amended project Amendment Report and formal response to submissions received as part of the EIS consultation process. It supersedes the BDAR produced for the EIS. It presents the methods and outcomes of the revised biodiversity assessment undertaken for the amended project in line with the Biodiversity Assessment Method (BAM) and relevant State and Commonwealth environmental and threatened species legislation and policy. This BDAR addresses Stage 1 and Stage 2 of the BAM and is structured accordingly.

This report assesses the amended project footprint, the area within which direct impacts could occur from the amended project. The amended project footprint includes an updated indicative disturbance area, updated since the submission of the EIS BDAR, which is an estimated area to be directly disturbed during construction and operation of the amended project including proposed transmission line and associated infrastructure. However, the updated indicative disturbance area may be altered during detailed design to further avoid and minimise biodiversity impacts or for other reasons.

Biodiversity assessment activities (eg vegetation and habitat assessment) have been conducted throughout accessible areas of the amended project footprint with certain targeted survey activities occurring within the updated indicative disturbance area, which is the area used for all clearing and impact calculations. The assessment has been conservative, given limitations such as the access of private properties for survey during suitable survey seasons. Consequently, a high degree of assumed presence of threatened species has been adopted, in accordance with the BAM requirements.

Assessment methods

The assessment was undertaken in accordance with the BAM and associated methodologies as detailed in Section 4.1. Key methodologies adopted as a part of the assessment included:

- a desktop review of available data and existing reports relevant to existing vegetation, threatened flora and threatened fauna within the locality
- field surveys carried out within accessible lands to:
  - verify vegetation communities present and develop a map of vegetation zones
  - assess habitat suitability for threatened fauna including the presence/absence of known habitat constraints
  - carry out BAM plots within vegetation zones to calculate vegetation integrity
  - assess and survey bushfire affected lands
  - undertake targeted surveys for candidate threatened flora
  - undertake targeted surveys for candidate threatened fauna
  - assess aquatic habitat condition and suitability for threatened aquatic biota
- Light Detection and Ranging (LiDAR) survey incorporating high resolution aerial imagery to support vegetation and habitat mapping, vegetation height modelling and the development of avoidance strategies
- over-the-fence surveys from public roads, existing transmission line easements and accessible private landholdings to inform constraints within adjacent lands that could not be directly accessed for survey
- desktop-only assessments on inaccessible lands, which took into account all existing available data and review and extrapolation of field data collected to date.

Landscape

The amended project occurs within three Interim Biogeographic Regionalisation of Australia (IBRA) regions that are comprised of six IBRA subregions, being:

- South-Eastern Highlands region: Bondo subregion, Bungonia subregion, Crookwell subregion, Murrumbateman subregion
- NSW South-Western Slopes region: Inland Slopes subregion
- Australian Alps region: Snowy Mountains subregion.

The Bondo IBRA subregion portion of the amended project footprint is dominated by Tooma Granite Ranges, intermingled with Carabost Hills and Ranges, Adelong Granite Ranges, Young Hills and Slopes and scattered Mt Bundarbo Basalt Caps, Minjary Hills and Ranges, Cabramurra - Kiandra Basalt Caps and Sands, and Cootamundra - Tumut Serpentinite and Ultramafics geologies. The landscape primarily consists of rounded hills, ranges, plateaus and steep hills on volcanics and sediments, particularly Silurian gneissic granite (DECC, 2002; NSW NPWS, 2003a).

The Bungonia IBRA subregion portion of the amended project footprint is dominated by Wollondilly - Bindook Tablelands and Gorges and Rockley Plains geologies. The landscape primarily consists of tablelands, gorges, marginal to steep slopes and low rolling hills on fine-grained Palaeozoic sedimentary and meta-sedimentary rocks (DECC, 2002; NSW NPWS, 2003a).

The Crookwell IBRA subregion portion of the amended project footprint is characterised by Rockley Plains, Crookwell Basalts and Sands, Oberon – Kialla Granites, Gundary Plains and Towrang Ranges geologies (Mitchell landscapes). The landscape primarily consists of low rolling hills on plateaus, tablelands and wide valleys over fine grained Ordovician, Silurian and Devonian sedimentary rocks, with some granites and tertiary basalts (DECC, 2002; NSW NPWS, 2003a).

The Murrumbateman IBRA subregion portion of the amended project footprint is dominated by Dalton Hills, Boorowa Volcanics, Marilba Range, Burrinjuck Ridges and Gunning Hills geologies. The landscape primarily consists of linear ranges, undulating hills, rocky rises and steep ridges on fine-grained Palaeozoic sedimentary and meta-sedimentary rocks (DECC, 2002; NSW NPWS, 2003a).

The Inland Slopes IBRA subregion portion of the amended project footprint is dominated by Young Hills and Slopes, Adelong Granite Ranges, Carabost Hills and Ranges, Adrah Hills and Ranges, Doura Volcanics, Tooma Granite Ranges and Boorowa Volcanics geologies. The landscape primarily consists of rounded hills, steep slopes and rocky ridges on Ordovician to Devonian sedimentary sequences with inter-bedded volcanic rocks (DECC, 2002; NSW NPWS, 2003a).

The Snowy Mountains IBRA subregion portion of the amended project footprint is dominated by Tooma Granite Ranges, and Cabramurra - Kiandra Basalt Caps and Sands geologies. The landscape primarily consists of rounded and basalt-capped hills, ranges and plateaus on block-faulted granites and Palaeozoic metamorphic rocks (DECC, 2002; NSW NPWS, 2003a).

The amended project traverses several landscapes and disturbance profiles. The amended project footprint is dominated by cleared farmland, with scattered discontinuous woodland patches. Some woodland and forest patches in the amended project footprint areas are continuous with native vegetation in national parks and conservation areas. Portions of the amended project footprint traverse woodland, native forests, and pine forests.

The amended project footprint traverses the Hawkesbury-Nepean, Lachlan and Murrumbidgee catchments, intersecting several major waterways, including: Gocup Creek, Tumut River, Murrumbidgee River, Adjungbilly Creek and the Lachlan River.

The landscape features relevant to each IBRA subregion within the landscape assessment area have been used to inform the suitability of habitats for threatened species. As per the BAM, calculations have been broken down by subregion.

Native vegetation cover for BAM landscape calculation purposes has been estimated as:

- Bondo subregion: 2,193.40 hectares
- Bungonia subregion: 1,247.92 hectares
- Crookwell subregion: 1,722.18 hectares
- Murrumbateman subregion: 2,296.78 hectares
- Inland Slopes subregion: 7,182.88 hectares
- Snowy Mountains subregion: 4,736.26 hectares.

All non-woody and the majority (96.5 per cent) of native woody vegetation within the amended project footprint was assigned to the highest patch size class (equal to or greater than 100 hectares). A small proportion (0.3 to 3 per cent) of woody vegetation within the Bungonia, Bondo, Crookwell, Murrumbateman, and Inland Slopes IBRA subregions were assigned to patch sizes less than five hectares and five to 25 hectares. Approximately 2.5 per cent of native woody vegetation in the Crookwell IBRA subregions was assigned to the 25 to 100 hectares patch size class.

Native vegetation and habitats

Native vegetation recorded within the amended project footprint includes 12 vegetation formations, including:

- Alpine Complex
- Dry Sclerophyll Forests (Shrub/grass sub-formation)
- Dry Sclerophyll Forests (Shrubby sub-formation)
- Eastern Riverine Forests
- Forested Wetlands
- Freshwater Wetlands
- Grasslands
- Grassy Woodlands
- Semi-arid Woodlands (Shrubby sub-formation)
- Western Slopes Grassy Woodlands
- Wet Sclerophyll Forests (Grassy sub-formation)
- Wet Sclerophyll Forests (Shrubby sub-formation).

These vegetation formations include 45 Plant Community Types (PCTs) that were mapped within the amended project footprint. PCTs within the amended project footprint were stratified into five condition classes: very high, high, moderate, low and very low.

Five threatened ecological communities (TECs) listed under the BC Act were recorded or considered likely to occur within the amended project footprint:

- 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 Bioregion (critically endangered under the BC Act)
- Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions (endangered under the BC Act)
- Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions (endangered under the BC Act)
- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands and Australian Alps bioregion (endangered under the BC Act)
- Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion (critically endangered under the BC Act).

Two TECs listed under the EPBC Act were recorded within the amended project footprint:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (critically endangered under the EPBC Act)
- Alpine Sphagnum Bogs and Associated Fens (endangered under the EPBC Act).

Groundwater Dependent Ecosystems

Vegetation communities dependent on groundwater were identified using the Atlas of Groundwater Dependent Ecosystems (GDEs) (Bureau of Meteorology (BoM), 2017). The amended project footprint supports 32 PCTs that are identified as moderate to high potential terrestrial GDEs. Proposed construction and operational activities associated with the amended project footprint are unlikely to pose a significant risk to GDEs given there are expected to be minimal impacts to groundwater quality and flow with adequate mitigation measures in place (*Technical Report 12 – Surface Water and Groundwater Impact Assessment Addendum* of the Amendment Report).

Threatened species

In accordance with the BAM, threatened species were assessed as either ecosystem credit (predicted) species or species credit species.

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. Targeted surveys are not required to identify or confirm the presence of ecosystem credit species.

This assessment assumed that all ecosystem credit species may have potential habitat in the amended project footprint. A total of 46 ecosystem credit species were predicted by the BAM-C, 25 of which were assumed present and 21 of which were recorded in the amended project footprint. The 21 ecosystem credit species recorded in the amended project footprint include:

- 15 birds - Varied Sitella (*Daphoenositta chrysoptera*), Olive Whistler *(Pachycephala olivacea*), Dusky Woodswallow (*Artamus cyanopterus)*, Brown Treecreeper (*Climacteris picumnus victoriae*), Diamond Firetail (S*tagonopleura guttata*), Speckled Warbler (*Chthonicola sagittata*), Spotted Harrier (*Circus assimilis*), Scarlet Robin (*Petroica boodang*), Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), Flame Robin (*Petroica phoenicea),* Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), White-bellied Sea-eagle (*Haliaeetus leucogaster*), Little Eagle (*Hieraaetus morphnoides*), Superb Parrot (*Polytelis swainsonii*)
- five mammals - Yellow-bellied Glider (*Petaurus australis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
- one reptile – Rosenberg's Goanna (*Varanus rosenbergi*).

Threatened flora species credit species

A total of 56 candidate threatened flora species were considered to have potential habitat (total of 12,197.87 ha of potential habitat) within the amended project footprint and were the subject of targeted surveys. Eight of these were recorded within and/ or immediately adjacent to the amended project footprint (total of 35.07 ha of confirmed habitat):

- *Ammobium craspedioides* (Yass Daisy) (listed as vulnerable under the BC Act and EPBC Act)
- *Leucochrysum albicans* subsp. *tricolor* (Hoary Sunray) (listed as endangered under the BC Act and EPBC Act)
- *Pimelea bracteata* (listed as critically endangered under the BC Act and EPBC Act)
- *Prasophyllum bagoense* (Bago Leek-orchid) (listed as critically endangered under the BC and EPBC Act)
- *Prasophyllum keltonii* (Kelton's Leek-orchid) (listed as critically endangered under the BC and EPBC Act)
- *Prasophyllum innubum* (Brandy Marys Leek Orchid) (listed as critically endangered under the BC and EPBC Act) (adjacent to the amended project footprint)
- *Thelymitra alpicola* (Alpine Sun-orchid) (listed as vulnerable under the BC Act) (adjacent to the amended project footprint)
- *Xerochrysum palustre* (Swamp Everlasting) (listed as endangered under the EPBC Act).

The extent of confirmed habitat for threatened flora species equates to 35.50 hectares including 0.43 hectares of non-native vegetation (less than one percent of potential flora habitat within the amended project footprint).

At total of 5,717.11 hectares (35%) of potential habitat for threatened flora was sufficiently surveyed across the amended project footprint and excluded from the assessment. All potential habitats for eight candidate flora species were excluded: *Acacia clunies-rossiae* (Kanangra Wattle), *Diuris ochroma* (Pale Golden Moths), *Euphrasia scabra* (Rough Eyebright), *Carex raleighii* (Raheigh Sedge), *Glycine latrobeana, Rytidosperma vickeryae* (Perisher Wallaby-Grass), *Rutidosis leiolepis* (Monaro Golden Daisy) and *Hakea dohertyi* (Kowmung Hakea).

The presence of 48 of the 56 candidate flora species (including a proportion of habitat for five of the eight species directly recorded) has been assumed within the remaining 10,467.55 hectares of potential habitat within the amended project footprint due to a lack of sufficient survey effort during suitable seasonal windows (refer to the limitations noted in Section 4.9). Lack of access to some properties restricted survey effort, thereby leading to a more conservative assessment approach. With the exception of the flora species directly recorded within or adjacent to the amended project footprint, the majority of flora species assumed present are considered to have a low to moderate likelihood of occurring.

Threatened fauna species credit species

A total of 47 candidate threatened fauna species (including dual credit species) were identified by the BAM-C as having a potential to occur within the amended project footprint (across all amended project IBRA subregions). Two endangered populations were also predicted. Sixteen candidate threatened fauna species were excluded due to vagrancy, lack of suitable habitat or degraded habitat, via consultation with NSW DCCEEW Environment and Heritage Biodiversity and Conservation Sciences Group (NSW DCCEEW).

Detailed assessment (including targeted surveys) was conducted for 31 candidate threatened or migratory fauna species and two endangered populations where their habitat was likely to occur within the amended project footprint. Thirteen species credit and dual credit species were recorded in the amended project footprint, being:

- species credit species (eight in total):
    - four mammals, including:

    - one bat - Southern Myotis (*Myotis macropus)*
    - three arboreal mammals - Eastern Pygmy-possum (*Cercartetus nanus*), Greater Glider (*Petauroides volans)*, and Squirrel Glider (*Petaurus norfolcensis)*
- two birds, including:
    - Barking Owl (*Ninox connivens*)
    - Powerful Owl (*Ninox strenua*)
- one reptile – Pink-tailed Legless Lizard (*Aprasia parapulchella*)
- one invertebrate – Key's Matchstick Grasshopper (*Keyacris scurra*)
- dual credit species (five in total):
    - five birds - Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Little Eagle (*Hieraaetus morphnoides*), Superb Parrot (*Polytelis swainsonii*), White-bellied Sea-eagle (*Haliaeetus leucogaster*).

The two species associated with endangered populations were also recorded: Squirrel Glider in the Wagga Wagga City LGA and Yellow-bellied Glider in the Bago Plateau.

All suitable habitats for one candidate fauna species (*Pseudophryne corroboree*) were adequately surveyed and the species excluded from further assessment. A species expert report was prepared for nine candidate fauna species (of which four of these species were directly recorded during field survey). The presence of the remaining 12 candidate fauna species (plus a proportion of habitats for nine of the 13 species directly recorded) has been assumed within the amended project footprint due to seasonal survey requirements not being met or survey coverage limitations. (Note: these species where targeted were surveyed as far as practicable, however presence could not be excluded from the entire amended project footprint through survey, particularly within inaccessible lands).

The justification for inclusion/exclusion from further assessment for each species and/ or population is provided in Section 7.3.2, Table 7-4 of this report. Attachment 1 documents the outcome of more detailed habitat suitability assessments undertaken.

Aquatic biota and habitats

A total of 1,548 stream sections (i.e. including tributaries and separate sections of stream that are intersected at multiple locations) are located within the amended project footprint which traverses the Hawkesbury -Nepean, Lachlan, and Murrumbidgee catchments. Seventy-eight per cent of these waterways are first and second order streams, reflecting the dominance of smaller streams within the amended project footprint. Major rivers that occur within the amended project footprint include the Lachlan River, the Murrumbidgee River, and the Tumut River as well as several major creeks that are tributaries of these major rivers.

The condition assessment informed by the detailed desktop assessment and field inspection across the amended project footprint indicate prevailing poor stream conditions, particularly in predominantly agricultural settings. Prevalent forms of degradation include land clearing, online dam construction, grazing and cropping, as well as existing informal access track and waterway crossing construction. The existing impacts have resulted in deleterious processes such as bank erosion and channel incision and contribute to an overall picture of generally degraded aquatic habitats within the amended project footprint.

Seven threatened aquatic species and one threatened aquatic ecological community listed under the *Fisheries Management Act* 1991 (FM Act) and/or EPBC Act have been identified as having the potential to occur within the amended project footprint. These include:

- Lowland Murray River EEC (*Aquatic Ecological Community in the Natural Drainage System of the Lower Murray River Catchment*)
- Silver Perch (*Bidyanus bidyanus*)
- Murray Crayfish (*Euastacus armatus*)
- Flatheaded Galaxias (*Galaxias rostratus*)
- Southern Pygmy Perch (*Nannoperca australis*)
- Trout Cod (*Maccullochella macquariensis*)
- Macquarie Perch (*Macquaria australasica*)
- Riek's Crayfish (*Euastacus rieki*).

Avoid and minimise

The amended project has been designed to avoid and minimise potential impacts on biodiversity values through:

- route selection criteria and the amended project footprint initially being developed by mapping constraints and identifying opportunities where constraints were grouped as: Tier 1 constraints, which were no-go areas to be avoided and Tier 2 constraints, which were to be avoided if possible and impacts minimised
- co-location with existing transmission lines or areas of disturbance to avoid and minimise additional clearance or fragmentation of vegetation wherever possible
- aiming to minimise the number of waterway crossings and associated impacts to riparian habitat
- targeting narrow crossing points of waterways and their associated riparian habitats
- use of existing access tracks and roads, in preference to the construction of new tracks and roads, to minimise additional disturbance to ecological values within the amended project footprint wherever possible
- inclusion of a partial clearing methodology, thereby retaining vegetation where possible within the easement during the construction and operational phases of the amended project
- route adjustment, which diverted the amended project footprint away from areas supporting intact native vegetation within Bago Stage Forest to largely pine plantation within Green Hills State Forest. This route adjustment reduces the potential biodiversity impacts, requiring less native vegetation clearing, including reduced impacts to TECs and threatened species
- the Green Hills alignment of the amended project footprint was further refined to avoid impacts to native riparian vegetation
- Detailed design has been progressing in parallel with the preparation of the Revised BDAR and, noting the number of threatened species and Serious and Irreversible Impact (SAII) species associated with McPhersons Plain, the opportunities for impact avoidance and minimisation through detailed design has been prioritised in this area (mitigation measure B38):

- The horse-exclusion fencing around the central portion of McPhersons Plain (to prevent impacts to threatened flora species) would be maintained and has been identified as a no-go zone. To avoid impacts to threatened flora species in the no-go zone, an aerial stringing method for the transmission line would be employed between transmission line structures on either side of McPhersons Plain
- Given potential habitat for the threatened species associated with McPhersons Plain extends beyond the fenced area, NSW DCCEEW Environment and Heritage has requested that a 30-metre exclusion buffer from the fenceline be applied for project infrastructure. The transmission line span across McPhersons Plain has been maximised to locate the transmission line structures and associated construction bench outside the 30-metre exclusion buffer
- Some clearing of tall-growing vegetation would be required within the 30-metre exclusion buffer to meet the vegetation clearing requirements for the transmission line easement and transmission line structures. Clearing methods that minimise ground disturbance will be used. Where there are known locations of recorded threatened species (as identified in the Revised BDAR), the associated buffer areas will be demarcated as a biodiversity exclusion zone (mitigation measure B13). Any threatened species identified through additional surveys or captured as an unexpected find, will be dealt with in accordance with the approach outlined in the Biodiversity Management Plan (mitigation measure B3).

Ongoing commitment to avoid and minimise impacts on biodiversity values would be further achieved through micro-siting new transmission line structures, brake and winch sites and access tracks during the finalisation of detailed design, where practicable. To aid this process, detailed constraints mapping has been developed for the amended project footprint, which identifies CEECs and SAII species/habitat as a priority for design avoidance.

Biodiversity impacts

The impact assessment is based on the current understanding of the amended project design and construction methodology and the associated disturbance required for this. The updated indicative disturbance area has been used to assess the likely quantum and type of impacts of the amended project. The final area required for construction and operation of the amended project would be confirmed during finalisation of the design and construction methodology. Finalisation of the amended project design and construction methodology will be further developed and refined with consideration of impact avoidance and minimisation associated with transmission line structure siting, access track design and other measures. As such, the assessed disturbance area is indicative and likely to represent the maximum extent of disturbance for the amended project.

Potential impacts presented for species credit species are conservative and higher than impacts that would occur from the amended project due to the required BAM method employed and survey limitations; and will be reduced taking into account the avoidance and mitigation measures detailed within Chapter 14 of this report.

Unavoidable impacts of the amended project have been assessed in accordance with Stage 2 of the BAM, the relevant SEARs and Matters of National Environmental Significance – Significant impact guidelines 1.1, EPBC Act.

Direct impacts on biodiversity values resulting from the amended project include:

- direct impacts to 45 native PCTs, including five TECs listed under the BC Act and two TECs listed under the EPBC Act
- direct impacts on native vegetation including:
    - removal of 866.16 hectares of native vegetation (excluding Category 1 exempt lands)
    - removal of up to 470.02 hectares of TECs listed under the BC Act (excluding Category 1 exempt lands) in the form of:
        - 0.92 hectares of Montane Peatlands and Swamps listed as endangered under the BC Act
            - 0.58 hectares aligns to Alpine Sphagnum Bogs and Associated Fens (endangered under the EPBC Act)
        - 1.92 hectares of Monaro Tableland Cool Temperate Grassy Woodland listed as critically endangered under the BC Act
        - 3.38 hectares of Coolac Tumut Serpentine Shrubby Woodland listed as endangered under the BC Act
        - 6.62 hectares of Tableland Basalt Forest listed as endangered under the BC Act
        - 457.18 hectares of White Box Yellow Box Blakely's Red Gum grassy woodland and derived native grassland listed as critically endangered under the BC Act
            - 117.15 hectares aligns to White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (critically endangered under the EPBC Act)
- loss of habitat for 46 threatened fauna species identified and/or predicted as ecosystem credit species, 21 of which were recorded and 25 assumed present (refer to Section 7.3.5)
- impacts to 46 threatened flora species credit species (including assumed present species)(detailed in Table ES-1)
- impacts to 30 threatened fauna species credit species (including assumed present species) and two endangered fauna populations (detailed in Table ES-2).

Table ES- 1: Potential impacts to threatened flora species credit species

Species	**Common name**	**BC Act status**	**Area of impact (ha)/count (c)**	**Recorded/assumed present**
Acacia ausfeldii	Ausfeld's Wattle	V	15.86 ha	Assumed present
Acacia bynoeana	Bynoe's Wattle	E	3.89 ha	Assumed present
Acacia flocktoniae	Flockton Wattle	V	10.08 ha	Assumed present
Ammobium craspedioides	Yass Daisy	V	8433 c	Recorded
Baloskion longipes	Dense Cord-rush	V	1.26 ha	Assumed present
Bossiaea fragrans	Bossiaea fragrans	CE	6.23 ha	Assumed present
Bossiaea oligosperma	Few-seeded Bossiaea	V	2.36 ha	Assumed present
Caesia parviflora var. *minor*	Small Pale Grass-lily	E	1.68 ha	Assumed present
Caladenia concolor	Crimson Spider Orchid	E	31.88 ha	Assumed present
Caladenia montana	Caladenia montana	V	208.60 ha	Assumed present
Commersonia prostrata	Dwarf Kerrawang	E	0.82 ha	Assumed present

Species	Common name	BC Act status	Area of impact (ha)/count (c)	Recorded/assumed present
Cullen parvum	Small Scurf-pea	E	16.55 ha	Assumed present
Dillwynia glaucula	Michelago Parrot-pea	E	1.26 ha	Assumed present
Diuris aequalis	Buttercup Doubletail	E	42.43 ha	Assumed present
Diuris tricolor	Pine Donkey Orchid	V	1.27 ha	Assumed present
Eucalyptus aggregata	Black Gum	V	7 c	Assumed present
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	12 c	Assumed present
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	V	2 c	Assumed present
Genoplesium superbum	Superb Midge Orchid	E	9.42 ha	Assumed present
Grevillea iaspicula	Wee Jasper Grevillea	CE	8 c	Assumed present
Grevillea wilkinsonii	Tumut Grevillea	CE	21.00 ha	Assumed present
Kunzea cambagei	Cambage Kunzea	V	7.29 ha	Assumed present
Lepidium hyssopifolium	Aromatic Peppercress	E	64.50 ha	Assumed present
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	E	43443 c	Recorded
Persoonia marginata	Clandulla Geebung	V	4.26 ha	Assumed present
Persoonia mollis subsp. *revoluta*	Persoonia mollis subsp. revoluta	V	1.37 ha	Assumed present
Phyllota humifusa	Dwarf Phyllota	V	10.50 ha	Assumed present
Pimelea bracteata	Pimelea bracteata	CE	4.65 ha	Recorded
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	8.08 ha	Assumed present
Pomaderris delicata	Delicate Pomaderris	CE	1.37 ha	Assumed present
Pomaderris pallida	Pale Pomaderris	V	1.16 ha	Assumed present
Prasophyllum bagoense	Bago Leek Orchid	CE	0.04 ha	Recorded
Prasophyllum innubum	Brandy Marys Leek Orchid	CE	0.02 ha	Assumed present
Prasophyllum keltonii	Kelton's Leek-orchid	CE	0.03 ha	Recorded
Prasophyllum petilum	Tarengo Leek-orchid	E	44.75 ha	Assumed present
Pterostylis alpina	Alpine Greenhood	V	2.14 ha	Assumed present
Pterostylis foliata	Slender Greenhood	V	49.96 ha	Assumed present
Pterostylis oreophila	Blue-tongued Greenhood	CE	0.56 ha	Assumed present
Pultenaea humilis	Dwarf Bush-pea	V	18.43 ha	Assumed present
Senecio garlandii	Woolly Ragwort	V	9.88 ha	Assumed present
Solanum armourense	Solanum armourense	V	0.35 ha	Assumed present
Swainsona recta	Small Purple-pea	E	65.37 ha	Assumed present
Swainsona sericea	Silky Swainson-pea	V	109.16 ha	Assumed present

Species	Common name	BC Act status	Area of impact (ha)/count (c)	Recorded/assumed present
Thelymitra alpicola	Alpine Sun-orchid	V	0.54 ha	Recorded
Thesium australe	Austral Toadflax	V	141.97 ha	Assumed present
Xerochrysum palustre	Swamp Everlasting	-	0.68 ha	Recorded

Table ES- 2: Potential impacts to threatened fauna species credit species

Scientific name	Common name	BC Act status	Area of impact (ha)	Recorded/assumed present
Aprasia parapulchella	Pink-tailed Legless Lizard	V	34.12	Recorded
Burhinus grallarius	Bush Stone-curlew	E	54.25	Assumed present
Callocephalon fimbriatum	Gang-gang Cockatoo	V	430.15	Recorded
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	40.79	Recorded
Cercartetus nanus	Eastern Pygmy-possum	V	229.01	Recorded
Chalinolobus dwyeri	Large-eared Pied Bat	V	2.42	Assumed present
Crinia sloanei	Sloane's Froglet	V	0.66	Assumed present
Cyclodomorphus praealtus	Alpine She-oak Skink	E	30.83	Assumed present
Delma impar	Striped Legless Lizard	V	90.07	Assumed present
Haliaeetus leucogaster	White-bellied Sea-eagle	V	2.91	Recorded
Hieraaetus morphnoides	Little Eagle	V	89.16	Recorded
Keyacris scurra	Key's Matchstick Grasshopper	E	161.89	Recorded
Litoria booroolongensis	Booroolong Frog	E	0.06	Assumed present
Litoria castanea	Yellow-spotted Tree Frog	CE	1.17	Assumed present
Lophoictinia isura	Square-tailed Kite	V	37.31	Assumed present
Mastacomys fuscus	Broad-toothed Rat	V	0.03	Assumed present
Mixophyes balbus	Stuttering Frog	E	13.87	Assumed present
Myotis macropus	Southern Myotis	V	57.93	Recorded
Ninox connivens	Barking Owl	V	240.79	Recorded
Ninox strenua	Powerful Owl	V	227.20	Recorded
Petauroides volans	Greater Glider	E	142.58	Recorded
Petaurus australis - endangered population	Yellow-bellied Glider population on the Bago Plateau	EP	121.32	Assumed present
Petaurus norfolcensis	Squirrel Glider	V	60.15	Recorded
Petaurus norfolcensis - endangered population	Squirrel Glider in the Wagga Wagga City Local Government Area	EP	10.46	Assumed present
Petroica rodinogaster	Pink Robin	V	35.26	Assumed present
Phascogale tapoatafa	Brush-tailed Phascogale	V	162.06	Assumed present
Phascolarctos cinereus	Koala	E	441.09	Assumed present
Polytelis swainsonii	Superb Parrot	V	113.60	Recorded

Scientific name	Common name	BC Act status	Area of impact (ha)	Recorded/assumed present
Pseudomys fumeus	Smoky Mouse	CE	5.78	Assumed present
Synemon plana	Golden Sun Moth	V	27.39	Assumed present
Tyto novaehollandiae	Masked Owl	V	178.43	Recorded
Tyto tenebricosa	Sooty Owl	V	63.08	Assumed present

Prescribed impacts relevant to the amended project include:

- karst, caves, crevices, cliffs, rocks, and other geological features of significance
- human-made structures
- non-native vegetation offering habitat for threatened species
- habitat connectivity, including injury or mortality from transmission line collision, entanglement, or electrocution
- waterbodies, water quality and hydrological processes
- vehicle strikes.

The amended project would result in minor impacts on groundwater during construction and negligible impacts on groundwater during operation. Therefore, the amended project is considered unlikely to lead to any adverse impact on the groundwater availability or status for groundwater dependent ecosystems.

Indirect impacts to avifauna and flying mammals may occur due to the potential for increased risk of collision with transmission lines and electric and magnetic fields associated with the new infrastructure. Sixteen threatened fauna species and two endangered populations potentially affected by this operational indirect impact include:

- Forest Owls and Cockatoos
  - Barking Owl *(Ninox connivens)*
  - Masked Owl *(Tyto novaehollandiae)*
  - Powerful Owl *(Ninox strenua)*
  - Sooty Owl *(Tyto tenebricosa)*
  - Gang-gang Cockatoo *(Callocephalon fimbriatum)*
  - Glossy Black-Cockatoo *(Calyptorhynchus lathami)*
- Raptors:
  - Square-tailed Kite *(Lophoictinia isura)*
  - Little Eagle *(Hieraaetus morphnoides)*
  - White-bellied Sea-eagle *(Haliaeetus leucogaster)*
- Megabats:
  - Grey-headed Flying-fox *(Pteropus poliocephalus)*
- Microbats:
  - Large Bent-winged Bat (*Miniopterus orianae oceanensis*)

    - Large-eared Pied Bat *(Chalinolobus dwyeri)*
    - Southern Myotis *(Myotis macropus).*
- Gliders
    - Southern Greater Glider (*Petauroides volans)*
    - Yellow-bellied Glider (*Petaurus australis*)
    - Yellow-bellied Glider population on the Bago Plateau (endangered population)
    - Squirrel Glider (*Petaurus norfolcensis*)
    - Squirrel Glider in the Wagga Wagga Local Government Area (endangered population).

There are four TECs, 15 flora and five fauna candidate species in the assessment that are also candidate SAII. Seven candidate SAII entities were recorded in the amended project footprint including four TECs and three flora species:

- *White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland*
- *Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions*
- *Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions*
- *Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion*
- *Pimelea bracteata*
- *Prasophyllum bagoense*
- *Prasophyllum keltonii.*

A further 17 SAII entities were assumed present or have been historically recorded within or adjacent to the amended project footprint. These have been assessed against the four SAII principles:

- Principle 1 - The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- Principle 2 - The impact 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.
- Principle 3 - The impact is made 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.
- Principle 4 - 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.

Table ES-3 summarises the candidate SAII relevant to the amended project, the SAII assessment outcomes and the mitigation measures considered. References to the relevant SAII principles from the Biodiversity Conservation Regulation 2017 are also included.

The outcomes of the SAII assessment are as follows:

- One TEC, one flora and one fauna (assumed present) considered likely to have a SAII as a result of the project

- Three TECs, 14 flora and four fauna considered unlikely to result in a SAII as a result of the project.
- Mitigation measures to reduce impacts on SAII candidates are included in the mitigation and monitoring section below and are further outlined in Chapter 14.

Table ES- 3: SAII candidate species, assessment summary and mitigation measures

Candidate SAII TEC/threatened species		SAII Assessment summary and mitigation measures
Scientific name	**Common name**	
Threatened biodiversity SAII candidates where the amended project would result in a Likely SAII		
White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland	-	This TEC is known to occur in the amended project footprint. Relevant SAII Principle 1: The amended project may cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline. Relevant SAII Principle 2: The impact 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. Approximately 3,311.30 ha of this TEC occurs in the amended project footprint. The majority (82%) of this TEC in the amended project footprint is in a low to very low condition, 7% is in moderate condition and 11% is in high to very high condition. A total of 457.18 ha would be directly impacted by the amended project. Of the area that is likely to be directly impacted, 11% (52.57 ha) is in high to very high condition, and the majority is in low to very low condition. The best estimate of the extent of occurrence for this TEC is 263,778 km2 (DPE, pers comm 2022). Given this, less than 0.01% of this TEC's estimated extent of occurrence would be directly impacted by the amended project. Potential indirect impacts would include edge effects and potential for increased weed invasion adjacent to the easement (indirectly impacting approximately 8.00 ha), potential changes to fire regimes in surrounding vegetation as a result of management for asset protection, potential for introduction of weeds, diseases and pathogens in the construction phase and operation phase by use of designated access tracks by unclean vehicles. Further avoidance and minimisation of clearing impacts within higher condition remnants, where facilitated through the detailed design and construction phase, is expected to reduce the overall impacts to this entity Mitigation measures B1, B3, B6, B7, B13, B20, B22, B23 and B26 will be implemented to minimise impacts on to this TEC.,
Pimelea bracteata	-	The species is known known in limited locations and assumed present in remaining suitable habitat in the amended project footprint. Relevant SAII Principle 1: The amended project may cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline. The amended project footprint comprises 15.65 ha of habitat for the species (14.57 ha assumed present and 1.08 ha known habitat), 4.66 ha (30%) of this habitat would be impacted by the amended project, all of which is in high to very high condition. This would equate to 0.04 % of the area of occupancy for the species and less than 0.01 % of the extent of occurrence for the species. The amended project would impact potentially suitable habitat, and at least one known individual of the species. In areas that comprise the species polygon that were not adequately surveyed (totalling 4.38 ha), species presence has been assumed.

Candidate SAII TEC/threatened species		SAII Assessment summary and mitigation measures
Scientific name	**Common name**	
		Further avoidance and mitigation through detailed design and construction is expected to reduce the overall impacts to this species. As well as additional survey in assumed present areas, mitigation measures B1, B3, B6, B7, B13, B20, B22, B23 and B26 will be implemented to minimise impacts to this species.
Tyto tenebricosa	Sooty Owl	Relevant SAII Principle 4: 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. The species was not recorded within the amended project footprint during targeted survey efforts. There are nine nearby records (10 estimated individuals) on BioNet (NSW DCCEEW, 2024a). All records are outside the amended project footprint, with the closest record 650 m from the amended project footprint. The amended project intersects 160 ha of steep sandstone geologies however, no cave environments were identified during field campaigns. Furthermore, no deep excavation or drilling is required within rocky areas or steep slopes that intersect the amended project footprint and spanning of structures across steep gullies and outcropping would occur. Suitable caves and breeding sites have not been detected in the amended project footprint. Based on assumed presence, the total extent of potential habitat that would be impacted by the amended project is 63.08 ha. However, it should be noted that this is likely to be an overestimate of any actual impacts. About 11.94 ha (19%) of impacted habitats are situated within the hazard tree zone adjacent to the transmission line easement. Where active roosts are recorded within this zone, it is likely that these could be avoided through design measures such as increased transmission line structure heights and micro-siting. Further avoidance and mitigation through detailed design and construction is expected to reduce the overall impacts to this species. As well as additional survey to show potential presence and location, mitigation measures B1, B3, B6, B7, B13, B20, B22, B23 and B26 will be implemented to minimise impacts to this species.
Threatened biodiversity SAII candidates where the amended project would result in an Unlikely SAII		
Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	-	The TEC is known to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability.
Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions	-	The TEC is known to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability.
Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion	-	The TEC is known to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability.

Candidate SAII TEC/threatened species		SAII Assessment summary and mitigation measures
Scientific name	**Common name**	
Bossiaea fragrans	-	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is considered unlikely to occur.
Caladenia concolor	Crimson Spider Orchid	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur.
Calotis glandulosa	Mauve Burr-daisy	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur. Further the extent of impacts are limited and are restricted to non-native habitats.
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur. Further the extent of impacts are limited and restricted to areas of assumed presence.
Genoplesium superbum	Superb Midge Orchid	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur.
Grevillea iaspicula	Wee Jasper Grevillea	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is considered unlikely to occur.
Grevillea wilkinsonii	Tumut Grevillea	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is considered unlikely to occur.
Pomaderris delicata	Delicate Pomaderris	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur and direct impacts to potential habitat would be limited in extent.
Pomaderris pallida	Pale Pomaderris	The amended project is considered unlikely to lead to extinction of the species or lead to reduced viability of a local population given it is not considered likely to be present within the amended project footprint.
Prasophyllum bagoense	Bago Leek-orchid	The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution. However, given the limited extent of potential impacts associated with the project (only 0.04 ha of known habitat and direct clearing of individuals would not occur), it is unlikely this would result in an SAII.
Prasophyllum innubum	Brandy Marys Leek-orchid	The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (SAII principle 3). However, given the limited extent of potential impacts associated with the project (only 0.02 ha of potential habitat), it is unlikely this would result in an SAII.
Prasophyllum keltonii	Kelton's Leek-orchid	The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution. However, given the limited extent of potential impacts associated with the project (only 0.03 ha of known habitat and direct clearing of individuals would not occur), it is unlikely this would result in an SAII.

Candidate SAII TEC/threatened species		SAII Assessment summary and mitigation measures
Scientific name	**Common name**	
Pterostylis oreophila	Blue-tongued Greenhood	Principle 2: The impact 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. Principle 3: The amended project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution and small population size. However, it is unlikely this would result in an SAII given the limited extent of potential impacts associated with the amended project (only 0.56 ha of potential habitat). Given the species was not recorded and is only assumed present, and the limited information available on the total population of the species, it is not possible to determine the number of individuals (mature and immature) that would be impacted by the amended project. However, given the limited extent of proposed clearing and opportunity for sensitive design and micro-siting of transmission line structures and access tracks within preferred treeless habitats, it is unlikely that individuals would be directly impacted.
Solanum armourense	-	Given the limited extent of impact on assumed presence habitat, the amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population.
Chalinolobus dwyeri	Large-eared Pied Bat	Confinement of impacts away from potential breeding habitat and no observations of the species from targeted survey suggests an SAII outcome is unlikely.
Litoria castanea	Yellow-spotted Tree Frog	A low likelihood of direct impacts to potential breeding habitat and the limited extent of impact on surrounding foraging habitats mean an SAII outcome is considered unlikely for this species, particularly given mitigation measures to avoid and mitigate impacts to waterbodies (refer to Table 14-1).
Mixophyes balbus	Stuttering Frog	Based on a low likelihood of the species occurrence and low likelihood of direct impacts to breeding habitat and considering appropriate mitigation measures with regard to stream protection (refer to Table 14.1), it is considered that the impacts from the amended project are unlikely to result in a SAII.
Pseudomys fumeus	Smoky Mouse	It is considered that the impacts from the amended project are unlikely to result in a SAII, given the limited impacts to low condition habitat.

The amended project is considered unlikely to lead to a significant impact on any threatened aquatic species, ecological communities or their habitats.

In terms of impacts on Matters of National Environmental Significance (MNES) the amended project would:

- impact on two TECs
- impact on known or assumed habitat for 13 threatened flora species listed under the EPBC Act
- impact on known or potential habitat for 29 threatened fauna species
- impact on potential habitat for ten migratory species listed under the EPBC Act.

The following assessments were undertaken for MNES entities:

- Likelihood of Occurrence in the amended project footprint including a 10 kilometre buffer
- Likelihood of impact by the amended project
- Significant Impact Assessment
- Assessment under the NSW Bilateral Agreement for NSW Biodiversity Offset Scheme suitability.

The MNES assessment is undertaken sequentially. Where an entity is justifiably not likely to occur, no further assessment is required under the EPBC Act (unlike the BC Act which requires assumed presence species to continue to be assessed). A precautionary approach (precautionary principle) must be taken to ensure that entities that have potential to occur progress through to the next assessment. Where a species is likely to be impacted by the project, a Significant Impact Assessment (SIA) is undertaken. Where a SIA shows a significant impact is likely, an assessment is then undertaken under the NSW Bilateral Agreement to confirm if the NSW Biodiversity Offset Scheme will provide sufficient offsetting for MNES impacts. Should this assessment show insufficient NSW offsets will be provided by the project by the NSW Biodiversity Offset Scheme (BOS), additional offsets or conservation measures may be required under the Commonwealth Biodiversity Offset Policy.

No MNES species were found to require Commonwealth offsets as a result of the amended project.

The impact assessment outcomes for MNES concluded that:

- The amended project is likely or has the potential to lead to a significant impact on 12 threatened flora species and/or their habitat, 22 threatened fauna species and/ or their habitat, six migratory species and one threatened ecological community listed under the EPBC Act.
- For five threatened fauna, five threatened flora and six migratory species, conclusions of potentially significant impacts are driven by a precautionary approach given survey limitations and without being able to state unequivocally that impacts could be avoided during detailed design for the amended project. Once additional survey is completed and avoidance measures are undertaken, the risk of a significant impact is expected to be substantially reduced.
- The amended project would not impact on any wetlands of national or international importance.

Under the SIA, the following species/entities are likely to be significantly impacted by the project (refer to Section 13.8 for a comprehensive list):

- White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland:
  - The amended project is proposed to impact approximately 117.15 hectares of Box Gum Woodland, comprising 14% of Box Gum Woodland within the amended project footprint. The national extent of Box Gum Woodland is approximately 416,326 hectares, with 250,729 hectares (60%) occurring in NSW (DECCW, 2010a). The amended project would impact less than 0.03% of extant Box Gum Woodland on a national scale, and 0.05% of extant Box Gum Woodland in NSW. As such, the amended project would impact upon relatively small proportion of Box Gum Woodland present within NSW and across its range.

- The amended project is unlikely to result in the isolation of any Box Gum Woodland remnants (rather, the size of remaining fragments would be further reduced), or cause a substantial change in species composition that may lead to a decline or loss of functionally important species.
- However, in line with the precautionary principle, the amended project is considered likely to have a significant impact on Box Gum Woodland, through the removal of 117.15 hectares of habitat, considered likely to constitute habitat that is critical to the survival of the TEC.
- Opportunities to further avoid and minimise clearing impacts within high condition impacts through the detailed design and construction phase is expected to reduce the overall impacts to Box Gum Woodland. See proposed mitigation measures in Chapter 14 to avoid and minimise impacts to this TEC.

- Yass Daisy (*Ammobium craspedioides*):
  - In total there is 2,118.37 hectares of potential and known habitat for the Yass Daisy, of which 310.12 hectares would be impacted by the amended project (14.6%).
  - Seventy-seven clusters of Yass Daisy were recorded at four separate locations within or directly adjacent to the amended project footprint, representing approximately 9,569 individuals. The assessment assumes the species has the potential to be present in all areas of suitable habitat.
  - While the overall impact to potential habitat covers a significant area, management of the transmission line easement would aim to avoid complete vegetation removal, and hence avoid damage to species in the groundcover layer. After mitigation and avoidance measures have been implemented, such as micro-siting transmission line structure locations and avoiding the large scale clearing of treeless areas, the realised scale of the impact to these species is likely to be much smaller.
  - However, in line with the precautionary principle, the amended project is considered to have the potential to lead to a long-term decrease in these species or a population of the species due to the removal of around 14.6% of known and potential habitat present across the amended project footprint.
  - Subject to the outcomes of additional survey and once avoidance measures are undertaken, the risk of a significant impact is expected to be reduced. Recommendations detailing specific avoidance and mitigation measures to reduce impacts to known and potential habitat for the species have been included in the Chapter 14.
- Hoary Sunray (*Leucochrysum albicans subsp. tricolor*):
  - Has been recorded in the amended project footprint in grasslands, in areas with existing or past disturbance, or on the edges of the existing easement. In total there is 1,272.59 hectares of potential and known habitat for the Hoary Sunray, of which, 195.74 hectares would be impacted by the amended project (15%).
  - Based on the precautionary principle and removal of a relatively large area of known and potential habitat, that likely supports what is likely an important population and habitat that may be critical to the species survival, the amended project is considered likely to have a significant impact on the Hoary Sunray.
  - Subject to the outcomes of additional survey and once avoidance measures are undertaken, the risk of a significant impact is expected to be reduced. Recommendations detailing specific avoidance and mitigation measures to reduce impacts to known and potential habitat for the species have been included in the Chapter 14.

- *Pimelea bracteata*:
  - *Pimelea bracteata* is known within the amended project footprint (with numerous individuals recorded along drainage lines, which the amended project intersects) and has a high likelihood of occurrence within the amended project footprint in the Bondo IBRA subregion, in which three records of the species occur within 5 km of the amended project footprint. As targeted surveys were not conducted within all the mapped potential habitat, presence could not be ruled out. Under the precautionary principle, the species is therefore assumed to have the potential to occur in all areas of potential habitat.
  - A total of 15.65 hectares of potential habitat occurs in the amended project footprint, 4.66 hectares of which (29.7%) would be directly impacted due to the amended project (0.27 hectares of which is known habitat) with the potential to cause associated indirect impacts including edge effects and weed incursion.
  - Therefore, based on areas of known habitat and assumed presence and in line with the precautionary principle, the amended project is likely to have a significant impact on the species.
  - Subject to the outcomes of additional survey and once avoidance measures are undertaken, the risk of a significant impact is expected to be reduced. Recommendations detailing specific avoidance and mitigation measures to reduce impacts to known and potential habitat for the species have been included in the Chapter 14.
- Swamp Everlasting (*Xerochrysum palustre*):
  - Six Swamp Everlastings were recorded within the amended project footprint in the Snowy Mountains IBRA subregion. There is 2.43 hectares of habitat mapped in the amended project footprint within the Snowy Mountains IBRA Subregion, of which 0.68 hectares of potential habitat would be directly impacted by the amended project (28.0%).
  - In line with the precautionary principle, the assessment assumes the species has the potential to be present in all areas of suitable habitat.
  - While the overall impact to potential habitat covers a significant area, management of the transmission line easement would aim to avoid complete vegetation removal, and hence avoid damage to species in the groundcover layer. After mitigation and avoidance measures have been implemented, such as micro-siting transmission line structure locations and avoiding the large scale clearing of treeless areas, the realised scale of the impact to these species is likely to be much smaller.
  - However, in line with the precautionary principle, the amended project is considered to have the potential to lead to a long-term decrease in these species or a population of the species due to the removal of around 28% of known and potential habitat present across the amended project footprint.
  - Subject to the outcomes of additional survey and once avoidance measures are undertaken, the risk of a significant impact is expected to be reduced. Recommendations detailing specific avoidance and mitigation measures to reduce impacts to known and potential habitat for the species have been included in the Chapter 14.
- Koala (*Phascolarctos cinereus*):
  - Not recorded during field surveys but are considered likely to occur based on the high number of local records and the occurrence of Koala feed tree species within the amended project footprint), therefore assumed present.

- Amended project is unlikely to reduce the area of occupancy of the species, disrupt breeding cycles, cause the species to decline, increase risk of disease, or interfere with recovery strategies,
- However, in line with the precautionary principle, the amended project is considered likely to adversely impact habitat critical to the survival of the species due to removal of 441.09 hectares of potentially suitable habitat where the species has been assumed present, and may fragment a local population into two or more populations.
- Mitigation measures include: connectivity corridors and fauna sensitive design to facilitate fauna movement; establishment of exclusion zones and management of construction impacts such light, noise and vibration to ensure disturbance of retained habitats is avoided and minimised; pre-clearance surveys to ensure no individuals will be impacted by construction. Individuals will be relocated in accordance with BMP Fauna Handling Procedures. The area of assumed presence is expected to be reduced following additional survey or expert advice, which is expected to reduce the risk of a significant impact.
- While assumed habitat for Koala will be directly affected, the majority of this assumed habitat falls within the southern section of the alignment in the Inland Slopes and Snowy IBRA regions. The alignment will parallel existing lines or be located through pine harvest plantation.

- Pink-tailed Legless Lizard (*Aprasia parapulchella*):
  - The species was recorded during field surveys in the Murrumbateman (five individuals) IBRA subregion. It is also assumed present in the Bungonia and Crookwell IBRA subregions as it has a high likelihood of occurrence due to the presence of suitable habitat and records within five kilometres of the amended project footprint (one in Bungonia and two in Crookwell).
  - The amended project footprint would directly impact on approximately 39.56 hectares of known and potential habitat (including 5.44 hectares of prescribed impacts).
  - In line with the precautionary principle, the amended project is considered likely to have a significant impact on the Pink-tailed Legless Lizard, due to the risk of reduced habitat connectivity, and the potential to directly impact individuals and their habitats through the removal of grassland habitats, and surface rock from the updated indicative disturbance area.
  - Once additional survey is completed and avoidance measures are undertaken, the risk of a significant impact is expected to be reduced. Recommendations detailing specific avoidance and mitigation measures to reduce impacts to potential habitat for the species have been included in the Chapter 14.

The entities considered likely to be significantly impacted have been assessed under the NSW Bilateral Agreement and offsets being provided under the NSW BOS have been shown to be sufficient to offset impacts to the entities. Additional surveys are proposed to confirm the presence/absence of species credit species and reduce the area of assumed presence (where this is permissible under the BC Act). Avoidance and mitigation measures to further reduce impacts are outlined in Chapter 14.

The following species are listed under the EPBC Act, however not under the BC Act. An assessment under the NSW Bilateral Agreement has also shown they are able to be offset under the NSW BOS. These are listed below and include the proposed offset mechanism:

- Swamp Everlasting (*Xerochrysum palustre*) – species credits generated under the BOS

- Southern Whiteface – ecosystem credits generated under the BOS
- Pilotbird – ecosystem credits generated under the BOS
- Fork-tailed Swift – ecosystem credits generated under the BOS
- Sharp-tailed Sandpiper – ecosystem credits generated under the BOS
- Red-necked Stint – ecosystem credits generated under the BOS
- Latham's Snipe – ecosystem credits generated under the BOS
- Common Greenshank – ecosystem credits generated under the BOS
- Marsh Sandpiper – ecosystem credits generated under the BOS.

Mitigation measures to reduce impacts to MNES candidates are included in the mitigation and monitoring section below and are further outlined in Chapter 14.

Aquatic biota and habitats

The proposed construction methodology for the transmission line structures themselves avoids direct impacts to streams and waterways, including major streams and those with Key Fish Habitat (KFH) mapping within the updated indicative disturbance area. Rather, it is the construction of waterway crossings for access tracks that have been identified as the primary pathway for potential direct impact to aquatic habitats. The impact of transmission line construction is limited to minor disturbance to tree canopy on waterway banks to facilitate the construction and operation of the transmission lines spanning riparian areas, as necessary. This is not considered to be as impactful on aquatic ecosystem as the potential direct disturbances from establishment of new or upgraded waterway crossings. A total of seven threatened aquatic species and one threatened aquatic ecological community listed under the FM Act and/or EPBC Act have been identified as potentially occurring within the amended project footprint with the potential to be impacted. Assessment of potential impacts (7-part tests under the FM Act and Commonwealth Assessments of Significance under the EPBC Act) concluded that they are unlikely to be significantly impacted.

The amended project is considered unlikely to result in significant environmental impacts to aquatic systems within the amended project footprint, in consideration of the following:

- No significant impacts to any threatened aquatic biota listed under the FM Act or EPBC Act are likely to occur.
- The construction methodology for transmission line structures avoids direct impacts to streams, especially for major streams and KFH.
- The streams assessed at sites where potential waterway crossings occurred within KFH mapping generally had poor riparian and aquatic habitat throughout the updated indicative disturbance area, and where available had "Very Poor" freshwater fish community status grades. The majority of proposed waterway crossings within the updated indicative disturbance area are co-located with existing crossings where it is proposed to use existing tracks. The scale of potential impacts in this context is not considered significant.

- It is anticipated that constructed waterway crossings upgrades associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than any existing informal crossings and would not result in any additional deleterious processes.
- The establishment of new waterway crossings would be necessary in a minority of cases. While this would result in impacts through vegetation clearing and direct modification to establish crossings, this would occur within the context of similar modifications through the locality and would be small scale and localised in the context of surrounding available habitat. The amended project would not significantly increase the operation of any Key Threatening Processes relevant to aquatic environments.
- A standard construction methodology for access tracks and crossings has been developed for the amended project, aligning with the *Policy and guidelines for fish habitat conservation and management Update 2013* (DPI, 2013), to construct the waterway crossings in an environmentally sensitive manner. A suite of mitigation measures relevant to the design of the structures to minimise impacts to fish passage and manage erosion and sedimentation risk have been included.
- The potential for direct and indirect impacts during construction would be further managed through the implementation of a comprehensive suite of mitigation measures specific to aquatic habitats, including the avoidance of sensitive habitat features, erosion and sediment control, and the reinstatement of bank forms following work.
- An additional suite of mitigation measures has been established to focus on the minimisation of potential impacts to CLASS 1 Key Fish Habitat streams that may support threatened aquatic species, including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 Key Fish Habitat

In light of the factors listed above, no net loss of KFH, or significant impacts to threatened aquatic species are anticipated to occur as a result of the amended project. Therefore, no offsets for aquatic species or KFH under the FM Act are proposed.

Mitigation and monitoring

Implementation of mitigation measures would minimise residual indirect impacts to native vegetation and threatened species throughout construction and operation of the amended project. Mitigation measures include (but are not limited to):

- avoidance of areas of high biodiversity value (such as TEC, SAII candidate species and/or threatened species habitat) through the establishment of 'no go zones' and micro-siting of infrastructure and access tracks during detailed design of the amended project, where possible
- ongoing supplementary surveys (both pre- and post-approvalt) within areas not previously subject to biodiversity survey (inaccessible lands) and where survey effort was not sufficient to rule out species presence, to close out survey gaps where possible, prioritising SAII and TECs, and assess the condition of vegetation and habitats where threatened biodiversity has conservatively been assumed to be present
- proposed Additional and Appropriate Measures to further mitigate impacts to SAII entities
- infrastructure and access tracks would be located and constructed to minimise impacts to riparian corridors and waterways, including prioritising use of existing crossings, targeting narrow crossing points and areas clear of vegetation, protecting shrub and groundcover vegetation within riparian zones where possible, micro-siting to avoid impacts to known threatened species habitat, designing

crossing structures so that the existing nominal flow velocity, low flow conditions and fish passage are maintained wherever possible, progressive stabilisation and rehabilitation of disturbed areas

- development of a Construction Environmental Management Plan (CEMP) which describes the approach to environmental management, monitoring and reporting during construction. Specifically, the CEMP will list the requirements to be addressed by the construction contractors and encompasses sub-plans, and other supporting documentation for each specific environmental aspect including development and implementation of a:
  - Biodiversity Management Plan to minimise and monitor impacts of construction on biodiversity
  - Connectivity Strategy to minimise impacts of fragmentation on biodiversity
  - Biosecurity Management Plan to identify priority weeds, pests and pathogens and stipulate management and monitoring requirements
  - Supplementary Hollow and Nest Strategy to provide alternative roosting and/or nesting habitat for threatened fauna displaced during clearing
  - Adaptive Management Plan for uncertain impacts, such as those associated with inaccessible lands and unexpected finds
  - Bush Fire Emergency Management and Evacuation Plan, to manage any increased risk of bushfire
- development and implementation of a Soil and Water Management Plan, Erosion and Sediment Control Plan and Water Quality Monitoring Plan to further minimise biodiversity impacts.

Offset requirements

A total requirement of 13,870 ecosystem credits and 200,174 species credits (for species listed under the BC Act and EPBC Act) has been generated by the Biodiversity Assessment Method Calculator (BAM-C) for unavoidable impacts from the amended project within the six IBRA subregions assessed:

- Bungonia:
  - 992 ecosystem credits
  - 21,114 species credits
- Crookwell:
  - 1,513 ecosystem credits
  - 59,529 species credits
- Murrumbateman:
  - 1,501 ecosystem credits
  - 32,043 species credits
- Inland Slopes:
  - 4,700 ecosystem credits
  - 35,737 species credits
- Bondo:
  - 799 ecosystem credits
  - 4,830 species credits
- Snowy Mountains:
  - 4,365 ecosystem credits
  - 46,921 species credits.

This Revised BDAR has assessed impacts to biodiversity based on a likely maximum extent of disturbance. Once detailed design is complete, further analysis of vegetation impact will be undertaken and where applicable the adjusted biodiversity offset liability would be updated post-approval. A Biodiversity Offset Package will be submitted for approval that will outline how the amended project's biodiversity offset liability will be acquitted.

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Glossary and list of abbreviations

Term or abbreviation	Definition
amended project (the)	The CSSI project "HumeLink", which is the subject of the Amendment Report and inclusive of the proposed amendments and project refinements to the project as described in the EIS. The project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.
Amended project footprint	The area that has been assumed for the purpose of the Amendment Report to be directly affected by the construction and operation of the amended project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. Amended project footprint has the same meaning as 'Development Site' as defined by the BAM.
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Credit Calculator
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	*Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015*
BOS	NSW Biodiversity Offsets Scheme
BoM	Bureau of Meteorology
Brake and winch sites	A brake and winch site is a temporarily cleared area where plant and equipment are located to spool and winch conductors into place on transmission line structures. The locations of the brake and winch sites may or may not be within the nominated transmission line easement. These sites are only required for construction of the amended project and do not need to be maintained during operation.
Category 1 land	Land that was cleared of native vegetation as of 1 January 1990, or land that was lawfully cleared between 1 January 1990 and 25 August 2017.
Category 2 land	Land that was not cleared as of 1 January 1990, was unlawfully cleared after 1 January 1990, or is a prescribed area with an identified environmental value.
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
cm	Centimetre/s
Commonwealth DCCEEW	Commonwealth Department of Climate Change, the Environment, Energy and Water
Construction compounds	Main construction compounds proposed for construction of the amended project. Each main construction compound would accommodate a range of facilities which may include (but not be limited to): • laydown areas • site offices • amenities • construction support facilities such as vehicle and equipment storage, maintenance sheds, chemical/fuel stores and stockpile areas • concrete batching plants • helipads • crushing/screening plants • parking.

Term or abbreviation	Definition
CSSI	Critical State Significant Infrastructure
DAWE	Commonwealth Department of Agriculture, Water and the Environment (now the Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW))
DBH	Diameter at Breast Height
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water (formally the Department of Agriculture, Water and Environment)
DEM	Digital Elevation Model
DPE	NSW Department of Planning and Environment (now the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW); and NSW Department of Planning, Housing and Infrastructure (NSW DPHI))
DPHI	Department of Planning, Housing and Infrastructure
DPI	Department of Primary Industries
ECZ	Easement clearing zone
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EIS project (the)	The CSSI project "HumeLink", which was the subject of the Environmental Impact Statement. The project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.
EIS project footprint (the)	The area that was assumed for the purpose of the EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.
ELA	Eco Logical Australia
EMM	Environmental Management Measure
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FESM	Fire Extent Severity Mapping
Field survey extent	Land within the amended project footprint that was accessed during the assessment for the purpose of field survey. The field survey extent is detailed in Table 4-21 and shown in Figure 4-4 relative to the amended project footprint and associated Interim Biogeographic Regionalisation for Australia (IBRA) subregions.
FM Act	*Fisheries Management Act 1994*
FMZs	Forestry Management Zones
Forestry Act	*Forestry Act 2012*
Future Maragle 500 kV substation	The future Maragle 500/330 kV substation that would be built under the Snowy 2.0 Transmission Connection Project, which is subject to separate planning approval (reference SSI-9717, EPBC 2018/836).
GDEs	Groundwater Dependent Ecosystems
GIS	Geographic information system
ha	Hectare/s
HV	High voltage electricity
HTZ	Hazard tree zone
HTW	High threat weeds

Term or abbreviation	Definition
HumeLink	The amended project
IBRA	Interim Biogeographic Regionalisation for Australia
IDE	Inflow-dependent ecosystems
KFH	Key Fish Habitat
km	Kilometre/s
Koala SEPP 2021	State Environmental Planning Policy (Koala Habitat Protection) 2021
KPoM	Koala Plans of Management
KTP	Key Threatening Process
kV	Kilovolt/s
Landscape assessment area	The amended project footprint and adjacent lands (ie, land within 500 m of the amended project footprint).
LGA	Local Government Area
LiDAR	Light Detection and Ranging
LLS Act	*Local Land Services Act 2013*
Local population	The population of a particular threatened species that occurs in the locality
Locality	The amended project footprint and surrounds, nominally a 20 km radius from the amended project footprint
LWD	Large woody debris
m	Metre/s
mAHD	Metres above Australian Height Datum
Matters of biodiversity conservation significance	Biodiversity listed as threatened under the BC and/or EPBC Acts
mL	Millilitre/s
MNES	Matters of National Environmental Significance (from the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*)
Native Vegetation	As described in the BAM (DPIE, 2020a): 1. 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. 2. A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible. 3. For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if: • the plant is situated on land that is shown on the native vegetation regulatory map as category 2-vulnerable regulated land, and • it would be native vegetation for the purposes of this Part if it were native to New South Wales. 4. For the purposes of this Part, native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under Section 14.7 of the BC Act that specified vegetation is or is not marine vegetation also has effect for the purposes of this Part.
NEM	National Electricity Market

Term or abbreviation	Definition
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NSW DCCEEW	NSW DCCEEW Environment and Heritage Biodiversity and Conservation Sciences Group
NTG	Natural Temperate Grassland
OPGW	Optical Fibre Ground Wire
PCT	Plant Community Type, classified according to the BioNet Vegetation Classification database.
PMST	Protected Matters Search Tool
Proposed Gugaa 500 kV substation	The new 500/330 kV substation proposed near Wagga Wagga.
SAII	Serious and Irreversible Impacts
SEARs	Planning Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SPRAT	Species Profile and Threats
SSI	State Significant Infrastructure
Strahler stream order	The Strahler stream order classification is a 'top down' system in which streams of the first order have no upgradient streams flowing into them (DPE, n.d). If two streams of the same order merge, the resulting stream is given a number that is one higher. If two rivers with different stream orders merge, the resulting stream is given the higher of the two numbers. Under the Strahler stream order classification, first to third order streams are typically headwater streams. Streams classified as fourth through to sixth order are typically medium streams, and streams that are seventh order or larger are typically rivers.
Subject land	This is the same area as the indicative disturbance area.
TBDC	Threatened Biodiversity Data Collection
TCZ	Total clearing zone
The Fund	Biodiversity Credit Supply Fund
The Taskforce	Credit Supply Taskforce
TEC	Threatened Ecological Community
Transgrid	The project is proposed to be undertaken by NSW Electricity Networks Operations Pty Ltd (referred to as Transgrid). Transgrid is the operator and manager of the main high voltage transmission network in NSW and the ACT, and is the Authorised Network Operator for the purpose of an electricity transmission or distribution network under the provisions of the *Electricity Network Assets (Authorised Transactions) Act 2015*.
Transmission line easement	A legal right attached to a parcel of land that enables the non-exclusive use of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area where the lines are located and that allows access, construction and maintenance work to take place. The easements for the 500 kV transmission lines would typically be 70 metres wide. However, a few select locations would require wider easements up to 130 metres wide for specific engineering or property reasons. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets.
Transmission line route	The location of the transmission line structures along the middle of the transmission line easement.
Updated indicative disturbance area	An indicative area assumed for the purpose of the Amendment Report that would be temporarily or permanently cleared during amended project construction and operation. This includes land

Term or abbreviation	Definition
	within and adjacent to the proposed transmission line subject to varying levels of physical disturbance, as follows: • Total Clearing Zone (TCZ); lands subject to total clearing and ground disturbance. Permanent structures such as transmission line structures, access tracks and substations would be situated within these lands as well as temporary brake and winch sites. Temporary construction compounds are also included in the TCZ. • Easement Clearing Zone (ECZ); includes lands within the proposed transmission line easement where clearing and ongoing maintenance of tall growing vegetation would be undertaken. Earthworks are not required within this zone except in limited circumstances. • Hazard Tree Zone (HTZ); includes lands within and immediately adjacent to the transmission line easement where selective tree removal, trimming or lopping would be undertaken to manage any risk of damage to transmission lines and structures in the event of tree fall. Earthwork is not required within this zone. Updated indicative disturbance area has the same meaning as 'Development Footprint' as defined by the BAM.
VI	Vegetation Integrity as calculated by the BAM Calculator
VRZ	Vegetated riparian zone
Wagga 330 kV substation	The existing 330/132 kV substation located at Wagga Wagga.
WM Act	*Water Management Act 2000*
WoNS	Weeds of National Significance
Worker accommodation facilities	Temporary worker accommodation facilities that would be established for the construction workers.

Environment and Heritage

Stage 1: Biodiversity assessment

1 Introduction

This chapter provides an overview of the amended project, relevant biodiversity assessment requirements and the purpose and structure of this report.

1.1 Background

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of around 365 kilometres (km) of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle. This project is collectively referred to as HumeLink. The project would be located across six Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire, Yass Valley and Goulburn Mulwaree. HumeLink is a priority project for the Australian Energy Market Operator (AEMO) and the Commonwealth and NSW governments and has been declared as Critical State Significant Infrastructure (CSSI). The project would deliver a cheaper, more reliable and more sustainable grid by increasing the amount of renewable energy that can be delivered across the national electricity grid, helping to transition Australia to a low carbon future.

An EIS was prepared in accordance with the requirements of Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The EIS was placed on public exhibition by the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly the NSW Department of Planning and Environment (DPE)) for a period of 42 days, between 30 August 2023 and 10 October 2023.

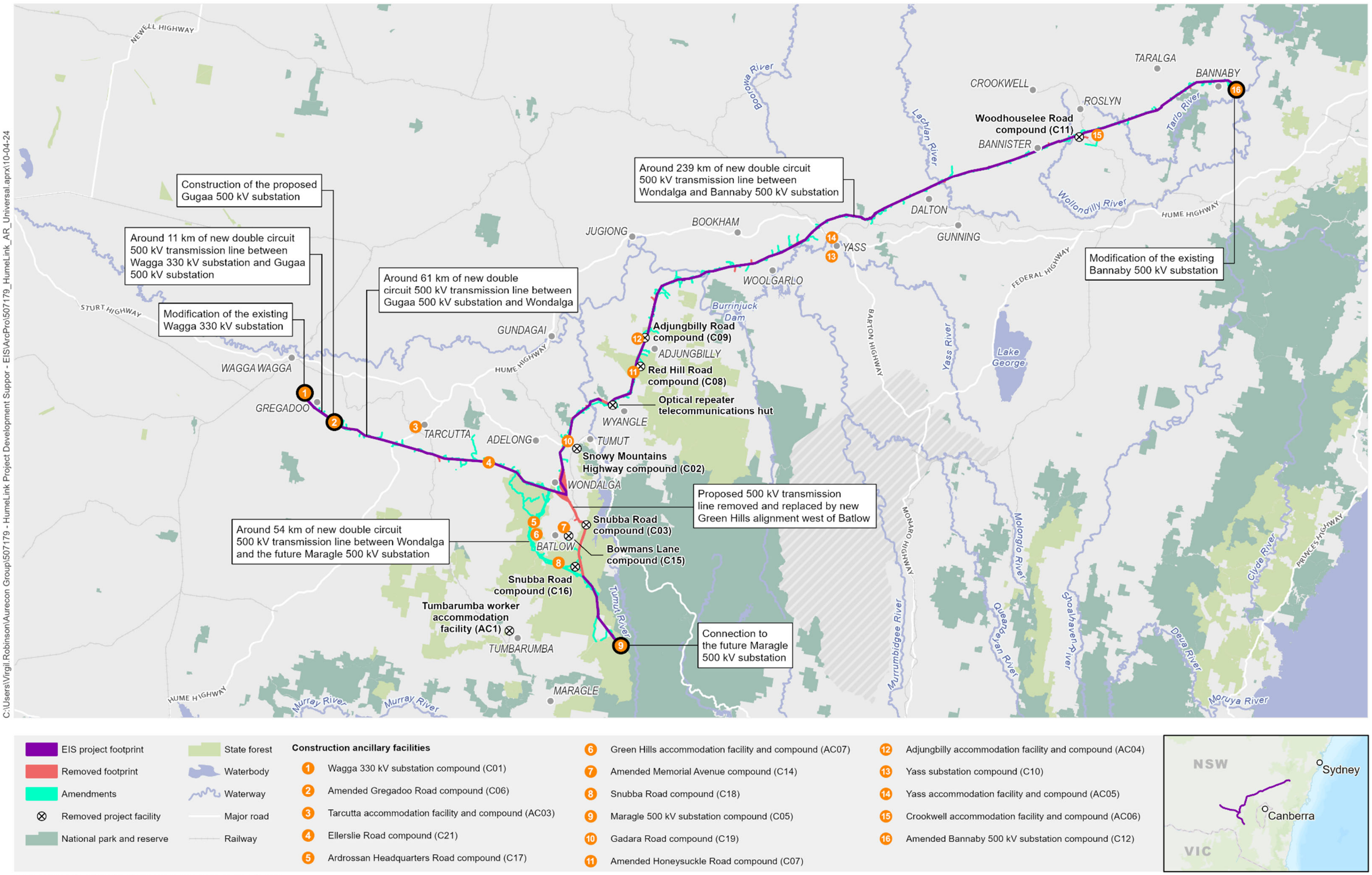
Transgrid has proposed amendments and refinements to the project as described in the EIS. The amendments provide functional improvements to the design and construction methodology of the project. The proposed amendments take into account submissions received during the public exhibition of the EIS and ongoing design and construction methodology development following the selection of the construction contractors. Project refinements have also been made as part of the ongoing design and construction methodology development since the EIS was exhibited. These amendments and refinements have been described and considered in relevant impact assessments.

1.2 Key features of the project (as publicly exhibited)

The key components of the project as outlined and assessed in the EIS included:

- construction and operation of around 360 kilometres of new double circuit 500 kV transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle
- construction of a new 500/330 kV substation at Gregadoo (Gugaa 500 kV substation) approximately 11 kilometres south-east of the existing Wagga 330/132 kV substation (Wagga 330 kV substation)
- demolition and rebuild of a section of Line 51 (around two kilometres in length) as a double circuit 330 kV transmission line connecting into the Wagga 330 kV substation
- modification of the existing Wagga 330 kV substation and Bannaby 500/330 kV substation (Bannaby 500 kV substation) to accommodate the new transmission line connections
- connection of transmission lines to the future Maragle 500/330 kV substation (Maragle 500 kV substation, approved under the Snowy 2.0 Transmission Connection Project (SSI-9717))
- provision of one optical repeater telecommunications hut and associated connections to existing local electrical infrastructure
- establishment of new and/or upgraded temporary and permanent access tracks
- ancillary works required for construction of the project such as construction compounds, worker accommodation facilities, utility connections and/or relocations, brake and winch sites, and helipad/helicopter support facilities.

Figure 1-1: Overview of amended project location



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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1:925,000

0 20 40km

Projection: GDA 1994 MGA Zone 55

Figure 1-2: Key components of the amended project

1.3 Overview of the proposed amendments

Since the public exhibition of the EIS, several amendments and refinements to the project have been proposed.

The proposed amendments to the project include:

- changes to the transmission line corridor, including the realignment of the route through Green Hills State Forest to the west of Batlow
- change to the number and location of construction ancillary facilities, including worker accommodation facilities and construction compounds
- nomination of access tracks to support the construction and operation of the project
- additional telecommunications connections to existing substations.

The proposed refinements to the project include:

- transmission line and substation design refinements at Gregadoo
- identification of areas where controlled blasting may be required
- use of approved water sources
- use of helicopters and drones.

Refer to Chapter 2 of this report for a detailed description of amendments and refinements relevant to this assessment.

Figure 1-1 shows the location of the amended project and Figure 1-2 shows the key components of the amended project.

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1.4 Overview of avoidance and minimisation of impacts

The development of HumeLink has aimed to avoid and minimise impacts on biodiversity values where possible. The process for selecting the preferred transmission line corridor for HumeLink has included several biodiversity related criteria to avoid and minimise impacts. These included avoiding wilderness protection areas and national parks and, where possible, minimising impacts on wetlands, ecological conservation areas (eg national parks and nature reserves), threatened ecological communities and, more broadly, native vegetation and major waterway crossings. This process resulted in the transmission line corridor avoiding:

- all national parks in the vicinity of the project including Kosciuszko National Park, Minjary National Park and Tarlo River National Park
- Mudjarn Nature Reserve, Bango Nature Reserve, Back Arm Nature Reserve and Burrinjuck Nature Reserve
- a biodiversity offset area east of Bango Nature Reserve.

Biodiversity impacts have been further minimised by using a double-circuit transmission line (which reduces the overall transmission line length), co-locating the transmission line route with existing areas of disturbance where possible, and locating construction compounds in areas that have previously been disturbed or would require disturbance as part of the construction of the project.

Minimising biodiversity impacts has continued with the development of amendments and refinements described in Section 1.3. This has included the amendment of the transmission line corridor away from areas supporting intact native vegetation within Bago State Forest and on private land to largely pine plantations within Green Hills State Forest. The amended project also prioritises the use and upgrade of existing access tracks over the creation of new access tracks, where possible.

Chapter 12 further discusses how project development has avoided and minimised biodiversity impacts. Implementing mitigation measures described in Chapter 14 would continue to avoid and/or minimise impacts where practicable during the finalisation of detailed design and through to construction. This is evidenced through the efforts made during finalisation of this Revised Biodiversity Development Assessment Report and ongoing detailed design to avoid and minimise impacts to McPhersons Plain.

In addition, adopting a partial clearing methodology for managing the transmission line easement during construction and operation instead of full continuous clearance of the easement will further minimise direct impacts on native vegetation compared with the impacts assessed in this Revised Biodiversity Development Assessment Report.

1.5 Purpose of this report

This report forms a revised *Technical Report 1 –Biodiversity Development Assessment Report* prepared for the EIS. The purpose of this *Technical Report 1 – Revised Biodiversity Development Assessment Report* (BDAR) is to use the guidelines and methodology provided in the NSW Biodiversity Assessment Method 2020 (BAM) (DPIE, 2020a) to determine the impact the amended project would have on biodiversity, to provide avoidance and minimisation measures, and to identify the need and calculate the amended project's biodiversity offset requirement. The BDAR aims to strike a balance between a conservative assessment regarding assumed presence of biodiversity values and habitat constraints within inaccessible lands, and prioritising targets for post consent survey to confirm assumptions and refine the biodiversity offset requirement for the amended project.

This revised report is intended to address:

- the Planning Secretary's Environmental Assessment Requirements (SEARs) issued for the project on 14 March 2022 (refer to Table 1-1).
- Supplementary SEARs issued for the amended project by the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) (refer to Table 1-1)
- proposed project amendments and design changes following EIS submission (refer to Chapter 2)
- revised methods and assessment outcomes implemented to address agency submissions received through EIS consultation.

Table 1-1: Project SEARs reconciliation table

Assessment requirement	How addressed in the Biodiversity Development Assessment Report (BDAR)
NSW Department of Planning and Environment (14 March 2022)	
Key Issues- Biodiversity The level of assessment of key matters must be proportionate to the likely significance of the impacts on the matter. In particular, the EIS must address the following specific matters:	Chapter 4 and Attachment 1 detail the approach to the assessment including survey coverage, effort and supplementary approaches to address remaining information gaps relating to key matters. Given the nature of the proposed project, land clearing and associated fragmentation of habitats is considered to pose the greatest risk to biodiversity. This risk is greatest within intact landscapes (such as Snowy Mountains and Bondo IBRA subregions) or where intact habitat fragments (such as conservation lands) remain within more disturbed landscapes.
An assessment of the biodiversity impacts of the project, in accordance with the NSW *Biodiversity Conservation Act 2016*, the BAM 2020, the guideline for applying the Biodiversity Assessment Methods at severely burnt sites 2020 and documented in a BDAR.	Chapter 4 of this BDAR documents the methods implemented as a part of this assessment. These are generally consistent with the BAM 2020 and the Guideline for applying the BAM at severely burnt sites (where relevant). Project impacts to biodiversity are addressed in Stage 2 of this BDAR.
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	Chapter 12 of this BDAR identifies measures implemented to avoid and minimise impacts to biodiversity. Chapter 14 identifies mitigation and management measures that would be implemented to further reduce and manage impacts to biodiversity during project construction and operation. Chapter 15 documents project offset requirements to address any residual biodiversity impacts.
An assessment of the impacts of the project on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, and a description of the measures to minimise and rehabilitate impacts.	An assessment of impacts to aquatic threatened species, populations and ecological communities was undertaken in accordance with the methodology outlined in Section 4.8 of this document. The results of the assessment are documented in Chapter 10 and an assessment of project impacts presented in Section 13.7.
If an offset is required, details of the measures proposed to address the offset obligations.	Chapter 16 outlines the proposed measures to address the amended project offset obligation.
Supplementary SEARs- Department of Climate Change, Energy, the Environment and Water	
Key Issues- Biodiversity (threatened species and communities and migratory species) 15. The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project footprint or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	Matters of National Environmental Significance (MNES), including threatened species and ecological communities and migratory species likely to be impacted by the amended project, are identified in Chapter 11 of this document and impacts are assessed in Section 13.8. Species with potential to occur within the amended project footprint and broader locality were also considered and are addressed in Attachment 2 and Attachment 3.
16. Further analysis of the impacts of the 2019-20 bushfires on the EPBC Act listed threatened species and communities should be undertaken during the assessment. Further assessment would determine whether the remaining habitat within the proposed action area is of substantially greater	Section 11.8 and Attachment 4 presents the analysis of bushfire impacts on MNES and any implications for the amended project avoidance, mitigation and offsets.

Assessment requirement	How addressed in the Biodiversity Development Assessment Report (BDAR)
importance to the survival of listed threatened species following the fires and/ or whether the population of the species in the area is considered an important population. This information, once obtained, can be considered when determining avoidance, mitigation and offset measures for these species.	
17. For each EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action the EIS must provide a separate:	Addressed in Chapter 11, Section 13.8 and Attachment 3 of this BDAR.
Description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical to their survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans;	Addressed in Chapter 11, Section 13.8 and Attachment 3 of this BDAR.
Details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements;	Addressed in Chapter 4 and Attachment 3 of this BDAR.
Description of the relevant impacts of the action having regard to the full national extent of the species or community's range;	Addressed in Section 13.8 and Attachment 3 of this BDAR.
Description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action;	Addressed in Chapter 12, Chapter 14 and Attachment 3 of this BDAR.
Identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account;	Addressed in Section 13.8 and Attachment 3 of this BDAR.
A description of any offsets proposed to address residual adverse significant impacts and how these offsets would be established;	Addressed in Chapter 15 and Chapter 16 of this BDAR.
Details of how the current published NSW BAM has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts	Addressed in Section 16.5 of this BDAR.
Details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/ or mapping and descriptions of the extent and condition of the relevant habitat and/ or threatened communities occurring on the proposed offset sites.	Addressed in Chapter 15 and Chapter 16 of this BDAR.
18. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy (DSEWPC, 2012a).	Addressed in Section 16.5 of this BDAR.
Key Issues- Heritage (National Heritage places) 19. The EIS must provide a detailed Heritage Impact Assessment conducted by an experienced and qualified heritage expert. The assessment must also include a visual impact assessment and detailed species assessment on potential impacts to the Bogong moth (which is a value of the heritage place). Whilst not an EPBC Act listed threatened species, the Bogong moth's assessment should follow the information requirements for EPBC listed species that is listed under paragraph 17.	The impact assessment and results for the Bogong Moth are addressed in Section 13.8.6 and Attachment 3 of this BDAR as well as *Technical Report 2 – Revised Aboriginal Cultural Heritage Assessment Report*.

1.6 Report structure

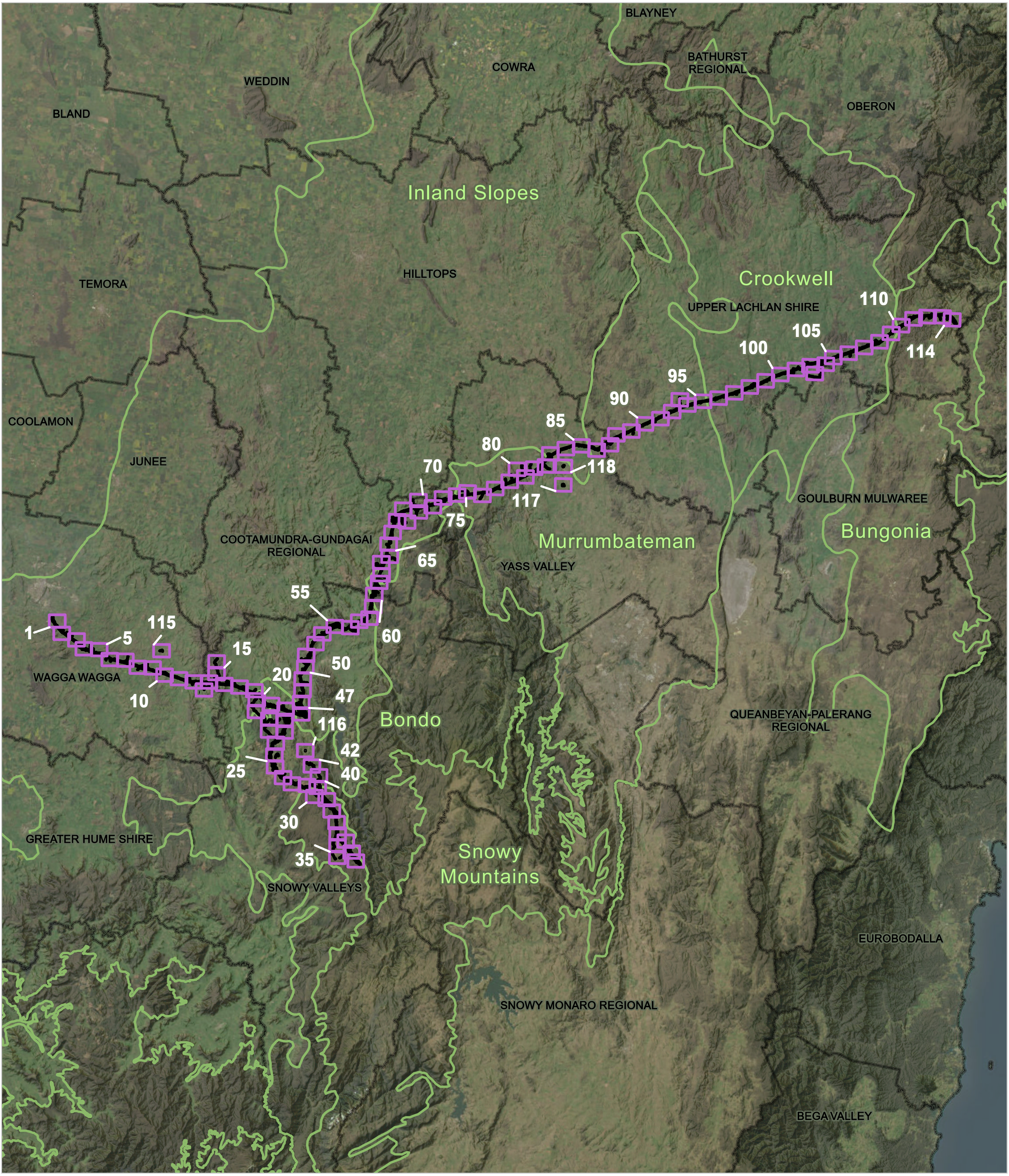
The structure and content of this report is detailed in Table 1-2 below.

The spatial data captured within BDAR figures is presented across a series of map reference pages as shown in Figure 1-3. The numbering, sequence and spatial extent of each map reference page remains consistent across all figure sets. Map reference pages are only included in a figure set where spatial data needs to be displayed for that location. For this reason, map reference page numbers may not follow a chronological sequence. BDAR figures are provided in Attachment 5. A checklist against the requirements of the BAM is included in Attachment 6.

Table 1-2: BDAR structure and content

Chapter	Summary
Stage 1 Biodiversity Assessment	
Chapter 1: Introduction	Provides an overview of the amended project, relevant biodiversity assessment requirements and the purpose and structure of this report.
Chapter 2: Project description	Describes key components of the amended project's design specifications and construction methodology.
Chapter 3: Legislation and policy context	Provides an outline of the key biodiversity legislative requirements and policy guidelines relating to the amended project.
Chapter 4: Assessment methods	Details the methodology adopted as a part of the assessment.
Chapter 5: Landscape context	Addresses the landscape context of the amended project in accordance with Section 3 of the BAM.
Chapter 6: Native vegetation	Addresses native vegetation in accordance with Section 5 of the BAM and matters relating to the NSW *Biodiversity Conservation Act 2016* (BC Act).
Chapter 7: Threatened species	Addresses threatened species in accordance with Section 6 of the BAM and matters relating to the BC Act.
Chapter 8: Identifying prescribed impacts	Documents site features recorded within the amended project footprint relevant to the assessment of prescribed impacts, as per clause 6.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation).
Chapter 9: Bushfire impacts and assessment considerations	Documents the extent of severely burnt lands, impacted threatened species and ecological communities and the adopted assessment approach.
Chapter 10: Aquatic species and habitats	Addresses matters relating to the *Fisheries Management Act 1994* (FM Act) including threatened aquatic species, populations and ecological communities.
Chapter 11: Matters of National Environmental Significance	Addresses relevant MNES under the EPBC Act.
Stage 2 Impact assessment	
Chapter 12: Avoid and minimise impacts	Addresses proposed measures to avoid and minimise impacts to biodiversity in accordance with Section 8 of the BAM.
Chapter 13: Impact assessment-	Addresses likely impacts associated with project construction and operation in accordance with Section 9 of the BAM.
Chapter 14: Mitigation and management measures	Addresses the mitigation and management measures to be implemented during the construction and operation phases of the amended project.
Chapter 15: Offset requirements-	Details offset requirements necessary to address any residual biodiversity impacts associated with the amended project in accordance with Section 10 and 11 of the BAM.
Chapter 16: Biodiversity Offset Strategy-	Outlines the proposed approach for offset delivery.
Chapter 17: Conclusion	Summarises key outcomes of the assessment.

Chapter	Summary
Chapter 18: References	Details information and data sources informing the assessment.
Attachments	
Attachment 1	Candidate species habitat mapping and polygon development
Attachment 2	Threatened species likelihood of occurrence
Attachment 3	EPBC Act Significant Impact Assessment and NSW Assessment Bilateral Requirements
Attachment 4	Assessment of bushfire impacts to EPBC Act species and communities
Attachment 5	BDAR figures
Attachment 6	BAM Checklist
Attachment 7	NSW DCCEEW consultation meeting log
Attachment 8	Vegetation within Category 1 - exempt land
Attachment 9	Assessment of bushfire affected lands
Attachment 10	Floristic plot data
Attachment 11	BAM plot function, structure and composition scores
Attachment 12	BAM plot data used for plot shortfalls
Attachment 13	Survey dates and weather conditions
Attachment 14	Golden Sun Moth expert report
Attachment 15	Plant Community Type descriptions
Attachment 16	Planted native vegetation streamlined assessment module
Attachment 17	Serious and irreversible impacts
Attachment 18	Fauna species recorded during field surveys
Attachment 19	Assessment of BC Act candidate species within severely burnt vegetation
Attachment 20	Striped Legless Lizard expert report
Attachment 21	Key's Matchstick Grasshopper expert report
Attachment 22	Owl and Raptor species expert report
Attachment 23	Ecosystem and species credits required (Biodiversity Assessment Method Credit Calculator (BAM-C) credit report).
Attachment 24	Prescribed impacts assessment
Attachment 25	EPBC Act Protected Matters search results
Attachment 26	Aquatic assessments of significance
Attachment 27	Supplementary surveys



HumeLink project areas

Amended project footprint

Map reference number

IBRA subregion

Administrative and Property Boundaries

Local Government Area

Environment and Heritage

0 20 km

GDA2020 MGA Zone 55

Niche PM: Chani Wheeler
Niche Proj. #: 8196
Client: Aurecon

Overview map

HumeLink Revised BDAR

Figure 1-3

HS: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community/World Imagery: Earthstar Geographics/Terrain: Multi-Directional Hillshade: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community/elevation mist: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to GDA2020 MGA Zone 55 is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020 MGA Zone 55.

Drawn by: SuzanneNaidoo Last updated: 23/02/2024 File: C:\OneDriveSyncFolder\Niche\8196 - HumeLink - General\Figures\Spatial folder\Editing APRXs\a8196_Humelink_BDAR_Stage3_A.aprx

1.7 Key project terms

Table 1-3 outlines key project terms relevant to the assessment and application of the BAM 2020. Important project infrastructure and construction elements are also defined.

Table 1-3: Key project terms

Term or abbreviation	Definition
Amended project (the)	The CSSI project "HumeLink", which is the subject of the Amendment Report and inclusive of the proposed amendments and project refinements to the project as described in the EIS. The amended project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.
Amended project footprint	The area that has been assumed for the purpose of the Amendment Report to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. The amended project footprint includes an updated indicative disturbance area, updated since the EIS BDAR submission, which is an estimated area to be directly disturbed during construction and operation of the proposed transmission line and associated infrastructure. Amended project footprint has the same meaning as 'Development Site' as defined by the BAM.
EIS project (the)	The CSSI project "HumeLink", which was the subject of the Environmental Impact Statement. The amended project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.
EIS project footprint (the)	The area that was assumed for the purpose of the EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.
Field survey extent	Land within the amended project footprint that was accessed during the assessment for the purpose of field survey. The field survey extent is detailed in Table 4-21 and shown in Figure 4-4 (Attachment 5) relative to the amended project footprint and associated Interim Biogeographic Regionalisation for Australia (IBRA) subregions.
Landscape assessment area	The amended project footprint and adjacent lands (ie, land within 500 m of the amended project footprint).
Locality	The amended project footprint and surrounds, nominally a 10 km radius from the amended project footprint.
Transmission line easement	A legal right attached to a parcel of land that enables the non-exclusive use of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area where the lines are located and that allows access, construction and maintenance work to take place. The easements for the 500 kV transmission lines would typically be 70 metres wide. However, a few select locations would require wider easements up to 130 metres wide for specific engineering or property reasons. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets.
Updated indicative disturbance area	An indicative area, updated since the EIS BDAR submission, that would be temporarily or permanently cleared during project construction and operation. This includes land within and adjacent to the proposed transmission line corridor subject to varying levels of physical disturbance, as follows: • Total Clearing Zone (TCZ); lands subject to total clearing and ground disturbance. Permanent structures such as transmission line structures, access tracks and substations would be situated within these lands as well as temporary brake and winch sites. Temporary construction compounds are also included in the TCZ. • Easement Clearing Zone (ECZ); includes lands within the proposed transmission line easement where clearing and ongoing maintenance of tall growing vegetation would

Term or abbreviation	Definition
	be undertaken. Earthworks are not required within this zone except in limited circumstances. • Hazard Tree Zone (HTZ); includes lands within and immediately adjacent to the transmission line easement where selective tree removal, trimming or lopping would be undertaken to manage any risk of damage to transmission lines and structures in the event of tree fall. Earthwork is not required within this zone. The updated indicative disturbance area has the same meaning as 'Development Footprint' as defined by the BAM.

1.8 Assessment resources and assessor qualifications

This BDAR has been prepared by the accredited personnel and support staff identified in Table 1-4.
Eco Logical Australia (ELA) completed the early stages of the biodiversity assessment including collection of field data and some vegetation and habitat mapping. Niche was engaged in October 2021 to complete and deliver the BDAR.

Assessment and survey guidelines used in the development of this BDAR are detailed in Table 1-5.

Table 1-4: Assessor and support staff qualifications

Personnel	Role	Qualifications	Tasks carried out
Niche staff and contractors			
Simon Tweed	Senior Ecologist – Fauna Biodiversity Lead; BAM Accredited Assessor	BEnvSc (Hons) Accredited Biodiversity Assessor (BAAS 18088)	Project management, technical review and quality assurance.
Chani Wheeler	Senior Ecologist; BAM Accredited Assessor	BSc. MConsBiol. Accredited Biodiversity Assessor (BAAS 19077)	Project management, data management, report preparation and quality assurance.
Sian Griffiths	Senior Ecologist; BAM Accredited Assessor	BEnvSc (Hons). Accredited Biodiversity Assessor (BAAS 17066)	Project management, report preparation and quality assurance.
Dr Amanda Griffith	Senior Ecologist; BAM Accredited Assessor	BSc. PHD Science. Accredited Biodiversity Assessor (BAAS 19016)	Quality assurance, quality control.
Jessie Bear	Ecologist	BANatSc(EnvMgt)	Project management, data management and report preparation.
Alex Christie	Senior Ecologist; BAM Accredited Assessor	BEnvSc. Accredited Biodiversity Assessor (BAAS 18131)	BAM plots, threatened flora surveys.
Meredith Leal	Senior Ecologist; BAM Accredited Assessor	BSc. Accredited Biodiversity Assessor (BAAS 22007)	Project management, BAM plots, threatened flora surveys and report preparation.
Kayla McGregor	Senior Ecologist	BEnvSc (Hons) Accredited Biodiversity Assessor (BAAS 24009)	Targeted threatened fauna surveys, data management, frog acoustic recorder analysis and report preparation.

Personnel	Role	Qualifications	Tasks carried out
Isabel Lyons	Senior Ecologist; BAM Accredited Assessor	BSc. Accredited Biodiversity Assessor (BAAS 22002)	BAM plots, threatened flora and fauna surveys, data management, report preparation.
Nathan Browne	Ecologist	BSc (Hons)	Targeted threatened flora and fauna surveys, data management.
Amy Legge	Ecologist	BSc	Targeted threatened flora and fauna surveys, data management.
Annabel Grundy	Ecologist	BSc	Targeted threatened flora and fauna surveys, data management.
Lauren Eade	Ecologist	BSc	Targeted threatened flora and fauna surveys, data management.
Jodie Danvers	Ecologist	BEnvSc	Targeted threatened flora and fauna surveys.
Jai Green-Barber	Ecologist; BAM Accredited Assessor	BNatSc (AnSc). BSc (Hons). PhD Science. Accredited Biodiversity Assessor (BAAS 2002)	Targeted threatened flora and fauna surveys, data management, report preparation.
Kayla Le Gros	Ecologist	BNatSc (AnConsBio). MRes	Targeted threatened flora and fauna surveys, data management, report preparation.
Alana Homewood	Senior Ecologist	BSc, MEnvMgmt,	BAM plots, threatened flora surveys.
Sophia Dunn	Ecologist	BSc. MEScM	BAM plots, threatened flora and fauna surveys, data management, report preparation.
Shannon Baker	Ecologist	BEnvSci (EcolCons)	BAM plots, threatened flora and fauna surveys, data management, report preparation.
Amelia Morling	Ecologist	BEnvMan (Hons)	Field survey planning, BAM plots, threatened flora and fauna surveys, data management, report preparation.
Amanda Melvaine	Ecologist	BAVetBioSc (Hons). MEnvScMgt	BAM plots, threatened flora and fauna surveys, data management, report preparation.
Thea Kane	Ecologist	BSc. MEnvMgmt Accredited Biodiversity Assessor (BAAS 24010)	BAM plots, threatened flora and fauna surveys, data management, report preparation.
Lily Cains	Ecologist	BSc	BAM plots, threatened flora and fauna surveys, data

Personnel	Role	Qualifications	Tasks carried out
			management, report preparation.
Rosemary Hulak	Ecologist	BEnvBio	BAM plots, targeted threatened flora and fauna surveys.
Freya Gordon	Senior Ecologist	BSc (Hons)	Project management, data adequacy review and field survey planning.
Desiree Gowell	Spatial Services Consultant	BSc. MSc	GIS support and figure preparation.
Ishara Kotiah	Spatial Services Manager	BSc (Land Surveying)	GIS support and figure preparation.
Suzanne Naidoo	Spatial Services Consultant	BHortSc (Hons). GradDipGIS	GIS support and figure preparation.
Matthew Zajaczkowski	Spatial Services Consultant	BSc (EnvMgmt) (Hons)	GIS support and figure preparation.
Ariane Weiss	GIS Consultant	BSc (CompSci). MAppSc (EnvSc)	Species polygon model development.
Andrea Sward	GIS Consultant	BA. GradCert GIS	GIS support and figure preparation.
Luke Stone	Principal Aquatic Ecologist	BSc. MRes (Env)	Aquatic desktop assessment.
Matthew Russell	Associate Aquatic Ecologist	BSc	Technical review, aquatic ecology.
Fin Murphy	Casual	BMarineSc	Targeted threatened flora and fauna surveys.
Reilly Todd	Casual	BMarineSc	Targeted threatened flora and fauna surveys.
Courtney Adams	Casual	BSc (Biol)	BAM plots, targeted threatened flora and fauna surveys.
Grant Houston	Casual	BSc (Zoo, Paleobiol)	Targeted threatened flora and fauna surveys.
Amanda Tyrer	Senior Geospatial Analyst and Cartographer – Spatial Vision	AssocDipEng	Spatial services.
George Madani	Fauna Ecologist (Sole Trader)	BSc. MAppSc	Targeted threatened fauna surveys and data management.
Arne Bishop	Director- Ecology EcoResolve; BAM Accredited Assessor	BEnvSc. BLandArch. Accredited Biodiversity Assessor (BAAS 17065)	Vegetation mapping, BAM plots, targeted threatened flora and fauna surveys, report preparation and technical review.
Lucy Dunton	Ecologist- Ecology EcoResolve	BSc (EnvSc)	Targeted threatened flora and fauna surveys.
Stephen Mahony	Ecologist - Ecology EcoResolve	BSc	Targeted threatened flora and fauna surveys.
Kazz Tokek	Ecologist - Ecology EcoResolve	BBioSc (Hons)	Targeted threatened flora and fauna surveys.

Personnel	Role	Qualifications	Tasks carried out
Hugh James	Ecologist - Ecology EcoResolve	BEnvSc.	BAM plots, targeted threatened flora and fauna surveys.
Breanna Heidke	Ecologist - Ecology EcoResolve	BEnvScMgt. MEnvMgt	BAM plots, targeted threatened flora and fauna surveys.
Andrew Carty	Ecologist - Ecopath Consulting; BAM Accredited Assessor	BEnvSc.Accredited Biodiversity Assessor (BAAS 20021)	BAM plots and targeted threatened flora surveys.
Maya Potapowicz	Ecologist (Sole Trader); BAM Accredited Assessor	BenvSc. Accredited Biodiversity Assessor (BAAS 18157)	BAM plots and targeted threatened flora surveys.
Isaac Mammot	Principal Botanist & Director - Sclerophyll Flora Surveys and Research; BAM Accredited Assessor	BSc. BA. Accredited Biodiversity Assessor (BAAS 18008)	BAM plots and targeted threatened flora surveys.
Nigel Cotsell	Principal Ecologist & Director – Songbird Ecology; BAM Accredited Assessor	BSc. MNatRes. Accredited Biodiversity Assessor (BAAS 18026)	BAM plots, targeted threatened flora and fauna surveys.
Torr Cotsell	Assistant to the Ecologist - Songbird Ecology	-	Targeted threatened flora and fauna surveys.
Dr Damian Licari	Principal Ecologist & Director - Ascent Ecology; BAM Accredited Assessor	BSc. MBA. PhD Science. Accredited Biodiversity Assessor (BAAS 18006)	BAM plots, targeted threatened flora and fauna surveys.
Dr Christina Kindermann	Principal Ecologist- Ascent Ecology; BAM Accredited Assessor	BSc (Hons). PhD Science. Accredited Biodiversity Assessor (BAAS23019)	BAM plots, targeted threatened flora and fauna surveys.
Louis Bell	Ecologist - Ascent Ecology	BEnvScMarScMgt	BAM plots, targeted threatened flora and fauna surveys.
Brian Adam	Ecologist - Ascent Ecology	BEnvSc	BAM plots, targeted threatened flora and fauna surveys.
Jordan Peppin	Ecologist - Ascent Ecology	BSc. BA	BAM plots, targeted threatened flora and fauna surveys.
Jennifer Young	Ecologist - Ascent Ecology; BAM Accredited Assessor	BEnvSc.Accredited Biodiversity Assessor (BAAS19036)	BAM plots and targeted threatened flora surveys.
Thomas Burley	Ecologist - Ascent Ecology	BAppSc (ConsBiol)	Targeted threatened fauna surveys.
Richard Davison	Ecologist - Ascent Ecology	BWildConsBiol (Hons)	BAM plots, targeted threatened flora and fauna surveys.
Kaelen Were	Ecologist - Ascent Ecology	DipConsEcosysMgt	BAM plots, targeted threatened flora and fauna surveys.
Natalie Greenland	Ecologist - Ascent Ecology	BSc (MarBiol) (Hons)	BAM plots, targeted threatened flora and fauna surveys.

Personnel	Role	Qualifications	Tasks carried out
Byron Sinclair	Ecologist - Ascent Ecology	DipConsEcosysMgt	BAM plots, targeted threatened flora and fauna surveys.
Skye Rivett	Ecologist - The Environmental Factor; BAM Accredited Assessor	BAppSc (ConsBio). MSc (ConsBio) Accredited Biodiversity Assessor (BAAS 22001)	BAM plots, targeted threatened flora and fauna surveys.
Graham Stirling	Ecologist - The Environmental Factor	BSc (Zool). MSc (EnvMgt)	Targeted threatened flora and fauna surveys.
Anna Uhrig	Ecologist - The Environmental Factor	BWildSc	Targeted threatened flora and fauna surveys.
Ben Perrott	Ecologist - The Environmental Factor	DipEnvSt. BEnvScMgt	Targeted threatened flora and fauna surveys.
Chris Timewell	Senior Ecologist – The Ecology Office	BSc (Hons)	Targeted threatened flora and fauna surveys.
Steve Mueck	Principal Ecologist & Director – Steve Mueck Biodiversity	BSc (Hons). MEnvSc. Victorian Accredited Native Vegetation Asessor (HH173)	Targeted threatened flora and fauna surveys.
Alison Rowell	Principal Ecologist - Alison Rowell Biologist and Environmental Consultant	BSc (Hons). Species expert for Golden Sun Moth	Targeted threatened fauna surveys and Golden Sun Moth Expert Report.
Robert Speirs	Principal Ecologist & Director – Capital Ecology	BAppSc (Ecology). Species expert for Striped Legless Lizard	Targeted threatened fauna surveys and Striped Legless Lizard Expert Report.
Prof Michael Kearney	Species Expert Ecologist - University of Melbourne	Professor Biosciences, BSc (Hons), PhD	Key's Matchstick Grasshopper expert report
Hiromi Yagui Briones	Assistant to Species Expert, PhD Candidate - University of Melbourne	BSc (Biol). MBiodiversity. PhD Candidate BioSc.	Key's Matchstick Grasshopper expert report
Dr Stephen Debus	Species Expert Ecologist – University of New England	BA (Biol/BehavSc). DipNatRs (Wildlife). DipEd (Sc). MSc (Zool). PhD (Zool). Species expert for owls and raptors	Threatened owl (Powerful Owl, Barking Owl, Sooty Owl, Masked Owl) and raptor (White-bellied Sea Eagle, Square-tailed Kite, Little Eagle) expert reports
Lesley Peden	Principal Ecologist & Director – Ecology Consulting; BAM Accredited Assessor	BSc (ConsBio, AppEco). Accredited Biodiversity Assessor – (BAAS19005)	BAM plots, targeted threatened flora surveys.
Emily Zouch	Ecologist - Ecology Consulting	BSc. MSusDev	BAM plots, targeted threatened flora surveys.
Blaine Serafin	Ecologist - Ecology Consulting	BEnvSc	Targeted threatened fauna surveys.
Aurecon staff and contractors			
Dr Kate Hammill	Aurecon Ecologist - Associate	BSc (Hons). PhD (Ecology). GradDip (Bushfire Protection). Accredited Biodiversity Assessor – BAAS18022	Survey planning and field survey lead, data checking and provision, BAM plots, targeted threatened flora surveys.
Dr Adriana Corona Mothe	Aurecon Ecologist - Manager	BSc (Biol). MSc (Biol of Aquatic Systems and Resources). PhD (Science).	BAM plots, field lead for targeted threatened fauna

Personnel	Role	Qualifications	Tasks carried out
		Accredited Biodiversity Assessor – BAAS18113	surveys, targeted threatened flora surveys.
Leah Mann	Aurecon Ecologist - Senior	BSc (Zool&Geol). MEnvSus (EnvSecurity)	Targeted threatened fauna surveys.
Maria Berzunza Sanchez	Aurecon Ecologist - Manager	BSc (MarBiol&Aqua). BSc (MarEcol) (Hons). MAppEcol	Targeted threatened fauna surveys, targeted threatened flora surveys.
Jackie Manders	Aurecon Ecologist - Senior	BEnv(LandMan). MEnv(Cons&Res)	Targeted threatened fauna surveys.
Gerard Dwyer	Contractor	AssDipAppSc (Geoscience)	Targeted threatened fauna surveys.
Eloise Carroll	Aurecon - Consultant	BCreativeIntell&Innov. BASc	Targeted threatened fauna surveys.
Matthew Roach	Aurecon Ecologist - Consultant	BSc (Ecol&ConservBiol). BEnvEng (Hons)	BAM plots.
Eco Logical Australia staff and contractors			
Alicia Scanlan	ELA Staff or Contractor	BSc (Ecology and Biogeography)	Targeted threatened flora and fauna surveys.
Andrew Carty	ELA Staff or Contractor	BEnvSc. Certificate IV Natural Area Restoration and Management	BAM plots, targeted threatened flora and fauna surveys.
Bronwyn Callaghan	ELA Staff or Contractor	BEnvSc (Hons), Accredited BAM Assessor (BAAS) 20019	Coordination of and participation in threatened flora targeted surveys, BAM plots, vegetation validation.
Cameron Radford	ELA Staff or Contractor	BSc (Environmental Science and Biology) University of Sydney (2009), Master of Wildlife Health and Population Management (Wildlife Biology) University of Sydney (2010), PhD Candidate - Human-wildlife Conflict Mitigation, University of Sydney (2019)	Threatened fauna surveys
Carolina Mora	ELA Staff or Contractor	BSc (Advanced) (Honours Class I): Geography. The University of Sydney (2018), Bachelor of Science (Advanced): Marine Science. The University of Sydney (2017)	BAM plots.
Claire Wheeler	ELA Staff or Contractor	Graduate Certificate River Restoration and Management, Charles Sturt University (2016), Bachelor of Environmental Management, Macquarie University (2005), Certificate III Conservation & Land Management, Ryde TAFE (2007)	Threatened fauna surveys.

Personnel	Role	Qualifications	Tasks carried out
Clare Duck	ELA Staff or Contractor	Master of Forest Ecosystem Science, University of Melbourne (2017), BA, University of Melbourne - major in Geography and minor in Philosophy (2014)	BAM plots.
Dan McKenzie	ELA Staff or Contractor	BEnvScMgmt (Honours), University of Newcastle (2011)	Threatened fauna surveys.
Danielle Woodhams	ELA Staff or Contractor	BSc (Wildlife Conservation and Biology) Honours, La Trobe University (2015)	Threatened fauna surveys (mammals, nocturnal birds, reptiles, frogs).
Dee Ryder	ELA Staff or Contractor	BEnvScMgmt	Threatened fauna surveys.
Diane Campbell	ELA Staff or Contractor	BSc, University of Sydney, Accredited BAM Assessor – BAAS 17069	Threatened flora surveys, BAM plots.
Dr Frank Lemckert	ELA Staff or Contractor	BSc, Terrestrial Ecology and Marine Management, University of Sydney (1984), Master of Science, Population biology of the Common Froglet, University of Sydney (1991), PhD, Management of forest frogs in timber production forests of NSW, University of Newcastle (2009)	Threatened fauna technical lead (mammals, nocturnal birds, reptiles, frogs).
Dr Lachlan Copeland	ELA Staff or Contractor	Research PhD in plant systematics, University of New England (Systematic studies in *Homoranthus* (*Myrtaceae: Chamelaucieae*): species limits, phylogeny, and generic boundaries) (2005), Bachelor of Natural Resources (Hons), University of New England (1995)	Threatened flora surveys.
Dr Meredith Henderson	ELA Staff or Contractor	PhD, Victoria University, Melbourne. Vegetation dynamics in response to fire and slashing in remnants of Western Basalt Plains grasslands and the implications for conservation management (2003), Accredited BAM Assessor - BAAS 17001, Bachelor of Science (Honours), University of Wollongong (1991)	Technical Lead.
Griffin Taylor-Dalton	ELA Staff or Contractor	Bachelor of Zoology, Major in Conservational Biology (WSU) (2017)	Threatened flora surveys, BAM plots.
Hugh James	ELA Staff or Contractor	BEnvScMgmt (Hons)	BAM plots.

Personnel	Role	Qualifications	Tasks carried out
James King	ELA Staff or Contractor	Bachelor of Environmental Systems (Honours), University of Sydney, (2018)	Threatened flora surveys, Threatened fauna surveys.
Janene Devereux	ELA Staff or Contractor	BSc (Marine Science), University of Newcastle (2008)	Threatened fauna surveys.
Julia Ryeland	ELA Staff or Contractor	PhD in Ecology and Environment - Western Sydney University (2016 – 2021), BEnvSc (Wildlife and Conservation Biology) (1st Class Hons) - Deakin University (2014)	Threatened fauna surveys.
Karen Spicer	ELA Staff or Contractor	BEnvSc (Biology) Hons 1, University of NSW (1999), WIRES Volunteer	BAM plots.
Katy Wilkins	ELA Staff or Contractor	BSc in Biodiversity and Conservation, Macquarie University (2010)	Threatened flora surveys.
Kazz Tokek	ELA Staff or Contractor	BSc Science with Honours (Ecology), La Trobe University (2002)	Threatened fauna surveys.
Keagan Jones	ELA Staff or Contractor	BEnvScMgmt, Majoring in Earth Systems. University of Newcastle (2020)	Threatened flora surveys.
Kristen Bigland	ELA Staff or Contractor	BAppSc (Ecosystems and Ecology), Charles Darwin University (2014)	PBA author .
Lauren Perkins	ELA Staff or Contractor	BSc (Marine Science), University of Technology Sydney (2017)	Threatened flora surveys, Threatened fauna surveys.
Leura Kowald	ELA Staff or Contractor	Bachelor of Arts and Science (Biodiversity and Physical Geography), University of New England (2019), Certificate III Horticulture (Landscape), Ryde School of Horticulture, Northern Sydney Institute TAFE (2010)	PBA author, BAM Plots, Threatened flora surveys, Threatened fauna surveys.
Loren Appleby	ELA Staff or Contractor	BSc (Ecology & Conservation Biology), Griffith University (2012)	Threatened flora surveys, Threatened fauna surveys.
Melinda Westcook	ELA Staff or Contractor	BSc (Environmental Biology) University of Technology Sydney (2012), Master of Science (Bird foraging behaviour), University of Technology Sydney (2017)	Threatened flora surveys.
Michael Gregor	ELA Staff or Contractor	BSc (Geography) UNSW (2015) Conservation and Land Management Certificate 3	BAM plots, Threatened flora surveys.

Personnel	Role	Qualifications	Tasks carried out
Mike Lawrie	ELA Staff or Contractor	BEnvScMgmt - University of Newcastle (2011), Master of Environment (Specialisation in Environmental Science) – Macquarie University (2016)	Threatened fauna surveys.
Nicole McVicar	ELA Staff or Contractor	Accredited BAM Assessor - BAAS 18077, BEnvSc, Macquarie University, Bush Regeneration Certificate II, Ryde TAFE	BAM plot technical lead.
Nigel Cotsell	ELA Staff or Contractor	Masters of Natural Resources, University of New England (2015), BSc (Zoology/Animal Biology), The Australian National University (1990)	Threatened fauna surveys.
Pearce Thomas	ELA Staff or Contractor	BEnvSc, University of Canberra (2014), Bachelor of Landscape Architecture, University of Canberra (2012)	Threatened flora surveys, Threatened fauna surveys.
Robyn Stevens	ELA Staff or Contractor	Master of Science and Technology in Spatial Information, University of New South Wales (2010), BSc (Evolution and Diversity of the Australian Biota), Sydney University (1997), Certificate III - Conservation and Land Management – Ryde College of TAFE (2010)	GIS analysis.
Roger Lembit	ELA Staff or Contractor	Agricultural Science, University of Sydney (1979)	Threatened flora surveys.
Samantha Patch	ELA Staff or Contractor	Bachelor of Marine Science/Environmental Science and Management, Southern Cross University (2021)	Threatened fauna survey, BAM Plot.
Shawn Ryan	ELA Staff or Contractor	BEnvScMgmt, University of Newcastle (2011)	Threatened flora surveys.
Sophie Montgomery	ELA Staff or Contractor	BEnvScMgmt (Sustainability) University of Newcastle (2020)	Threatened flora surveys.
Stacey Wilson	ELA Staff or Contractor	Master of Environment (Environmental Science) – Macquarie University (2015), Bachelor of Biodiversity and Conservation – Macquarie University (2013), Certificate III Conservation Land Management – Ryde TAFE (2015)	BAM plots.

Table 1-5: Assessment and survey guidelines used

Assessment resources/guideline	
Assessment guidelines	• *Biodiversity Assessment Method* (DPIE, 2020a) • *BAM Operational Manual – Stage 1* (DPIE, 2020b) • *BAM Operational Manual – Stage 2* (DPE, 2023a) • *BAM Calculator User Guide* (DPIE, 2018) • *Guideline for applying the BAM at severely burnt sites* (DPIE, 2020c) • *Interim Grasslands and other Groundcover Assessment Method: Determining conservation value of grasslands and groundcover vegetation in NSW* (OEH, 2017a)
Survey guidelines	• *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020d) • *Species specific survey requirements in the BioNet Threatened Biodiversity Database Collection* (TBDC) (NSW DCCEEW, 2024b) • *'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2021a) • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Working Draft) (DEC, 2004) • *NSW Survey Guide for Threatened Frogs: A Guide for the Survey of Threatened Frogs and their Habitats for the Biodiversity Assessment Method* (DPIE, 2020e). In the absence of specific survey guidelines issued at the state level, Commonwealth survey guidelines were adopted: • *Survey guidelines for Australia's threatened mammals* (DSEWPC, 2011a) • *Survey guidelines for Australia's threatened reptiles* (DSEWPC, 2011b) • *Survey guidelines for Australia's threatened birds* (DEWHA, 2010a) • *Survey guidelines for Australia's threatened frogs* (DEWHA, 2010b) • *Survey guidelines for Australia's threatened bats* (DEWHA, 2010c) • *Relevant Significant Impact Guidelines and Referral Guidelines for EPBC Act listed species* (DoE, 2013a; DEWHA, 2009a; DSEWPC, 2011c; DoE, 2014c) • *Draft survey guidelines for Australia's threatened orchids* (DoE, 2013b).
Similar projects	• *Snowy 2.0 Main works BDAR and Amended BDAR* (EMM, 2019, 2020) • *Snowy 2.0 Transmission Connection Project* (Jacobs, 2021a, 2021b) • *EnergyConnect (NSW-Eastern Section)* (WSP, 2022a, 2022b) • *EnergyConnect (NSW-Western Section)* (WSP, 2020, 2021)

1.9 Excluded impacts

Vegetation clearing impacts associated with the following matters are not addressed and offset under the standard BAM methodology, however assessment of impacts to these areas has been incorporated where appropriate (such as where these areas constitute habitat for threatened species which are species credit species):

- Category 1 exempt lands, as defined under the *Local Land Services Act 2013* (LLS Act)
- Non-native vegetation
- Aquatic species and habitats.

Section 4.2 of this BDAR documents the approach to Category 1 exempt land determination implemented for the amended project. An assessment of prescribed impacts associated with non-native vegetation is presented within Section 13.5.6. An assessment of impacts to aquatic species and habitats has been carried out in accordance with the FM Act and is presented in Chapter 10 and Section 12.7 of this BDAR.

1.10 Agency consultation

1.10.1 Consultation with NSW DCCEEW

Consultation with NSW DCCEEW has been ongoing throughout the development of this BDAR and has included general correspondence, meetings, species-specific workshops, discussion of issues relating to mapping and analysis and presentation of datasets to the NSW DCCEEW for review and comment. Consultation involved key NSW DCCEEW personnel from the southeast and southwest teams. Dates of the 13 meetings and workshops held to date include:

- 14 October 2021
- 18 November 2021
- 16 December 2021
- 24 January 2022
- 1 July 2022
- 24 August 2022
- 19 October 2022
- 25 October 2022
- 8 March 2023
- 19 May 2023
- 27 November 2023
- 7 December 2023
- 13 December 2023.

Regular consultation between Transgrid and NSW DCCEEW has been undertaken between January 2024 and June 2024.

Key items addressed as a part of consultation are detailed in Attachment 7 and summarised below.

Table 1-6: Agency consultation

Consultation items	Details of discussion	Feedback
Field survey approach and survey adequacy	The amended project team consulted with NSW DCCEEW regarding the proposed approach to field surveys, including: • Limitations associated with restricted survey timing for the spring seasonal survey and issues regarding private land access. • Strategies for prioritising field survey efforts given the scale of the amended project, ongoing design refinement and limitations as raised above. • Category 1 lands identification and requirements for field survey. • Survey methods for frogs Data relating to survey effort and type across accessible areas was supplied to NSW DCCEEW and feedback requested regarding any areas of concern: *ie Does NSW DCCEEW have any specific species survey concerns based on data supplied to date?* NSW DCCEEW were provided example data for the indicative disturbance area for Bondo and Bungonia subregions (28 September 2022).	Feedback regarding survey adequacy to date has been general in nature rather than highlighting specific concerns regarding species that require additional information to inform approval or assessment decisions and where survey needs to be targeted. The amended project team outlined that we are not necessarily talking about adequacy of survey to rule out species from polygons/offsetting rather checking that the survey undertaken is adequate from an impact assessment point of view (although both steps have occurred as part of the BDAR impact assessment and survey adequacy review). .
Adequacy of survey coverage	Survey coverage and supporting survey data was provided to NSW DCCEEW along with explanation of access constraints and alternative assessment method options. Specific feedback has been asked of NSW DCCEEW including: "*Transgrid are willing to complete further ecological surveys to verify inputs into the amended project BDAR, however certain properties are unlikely to be accessible until after initial submission of the EIS. We therefore seek to consult on processes that can be included into the approvals process to verify assumptions made within the BDAR, if considered necessary.* *We seek comment on whether the level of survey coverage presented is perceived as adequate, specifically in terms of BAM compliance and any other relevant legislation.*"	A process has been outlined for EnergyConnect (NSW – Eastern Section) for assessment of biodiversity and potential impacts within inaccessible areas. NSW DCCEEW think this could be adopted for HumeLink. It includes best estimation of Plant Community Type (PCT) and condition as well as species presence in a conservative manner with offsets then provided on that basis to a trust fund. Post approval assessment would verify findings with credits adjusted as required. NSW DCCEEW have confirmed support of the precedent set by EnergyConnect and other large linear CSSI projects.
Burnt areas assessment	The amended project team sought feedback from NSW DCCEEW regarding the need for and to confirm the approach to implementing the 'Guideline for applying the Biodiversity Assessment Method at severely burnt sites' (DPIE, 2020c). A workshop with NSW DCCEEW was undertaken on 27 November 2023 to step through the approach to severely burnt area assessments for candidate species, particularly regarding approach to suitability of targeted surveys, and	NSW DCCEEW advised application of the DPIE (2020c) Guideline was required and indicated in -principle support for the proposed approach to Vegetation Integrity (VI) analysis. Some additional acceptance of approaches to species such as owls in burnt lands based on knowledge of the species occurrence and presence of hollows was provided. Post the workshop on 27 November, NSW DCCEEW provided feedback on an approach for candidate species assessment within severely burnt lands, to be considered for the

Consultation items	Details of discussion	Feedback
	to seek NSW DCCEEW feedback on approach to date.	BDAR and species polygon development. The advice details which species where targeted survey is considered suitable within severely burnt lands and where survey is not considered appropriate.
Category 1 exempt lands mapping	The amended project team consulted and received feedback from NSW DCCEEW regarding the Category 1 lands mapping process. Draft mapping was provided to NSW DCCEEW for review (via email, 30/03/2022).	There are some differences in interpretation regarding Category 1 lands (specifically around automatic exclusion of Critically Endangered PCTs) however the amended project is proposing to adopt the stated requirements of NSW DCCEEW in these instances. NSW DCCEEW have not released finalised Category 1 land mapping and are unlikely to do so prior to submission.
Approach to species polygons/ impact assessment	A review of methods was supplied to NSW DCCEEW (June 2022). Some input data layers have been provided (ie native vegetation, patch size and Category 1 lands). BAM-C predicted and candidate species lists have been provided for all IBRA subregions. Details of the species polygon development method was supplied to NSW DCCEEW and presented in a workshop on 13 December 2023. NSW DCCEEW were supplied with details around method species polygon development for all candidate species, a shapefile of the species polygon outputs at each model level and a summary of outputs for each species at each level of the model.	Workshop (October 2022) and feedback on specific threatened species is underway and ongoing with future consultation to include consideration of where offsets may need to be considered in degraded areas. Workshop (13 December 2023) was undertaken, data (species polygon development method, species specific model inputs, species polygon outputs and summary of results for each species) has been supplied to NSW DCCEEW. Feedback was requested from NSW DCCEEW immediately post the workshop (13 December 2023) as to current approach and any recommended adjustments to be considered in the finalisation of the BDAR. Updates to the BDAR and species polygon development to proceed without further NSW DCCEEW feedback post workshop to avoid program delays (as requested by Transgrid) (23 January 2024).
Approach to estimation of threatened flora counts in areas of assumed presence	Guidance provided by NSW DCCEEW on estimating the count for the threatened flora assumed present for the HumeLink assessment. This advice was provided in consultation with the department's threatened species officers and was based on data from known reference site and /or SOS monitoring sites: *"Should Niche choose not to apply guidance provided, NSW DCCEEW would expect the BDAR to provide sufficient evidence based rationale and detail to explain and justify the counts applied to the assessment.* *An alternative option would be to obtain an expert report to estimate the number and location of individuals likely to be present and map the species polygon. Again, the method used to make estimations must be documented in the expert report as part of the BDAR and must include justification of the approach used (e.g.*	There are 12 species for which count estimates needed to be developed. The process has considered data from NSW DCCEEW which has been gathered through consultation. An approach to estimating impacts to count species was provided by NSW DCCEEW for some, but not all of the species required to be considered, and the approach NSW DCCEEW provided was very conservative, based on counts at known reference sites where the species is known to occur and did not account for variation in species presence (i.e., assumed species presence across the entirely of the species polygon and did not account for areas of habitat where the species may not be physically present). Therefore, Niche developed a justifiable methodology to ensure impacts to count species, and their offsetting costs, were not significantly overestimated. These methods are detailed in Attachment 1.

Consultation items	Details of discussion	Feedback
	based on scientific literature, reference populations in the local area).”	
Conservation Agreement site AB563794	Transgrid sought clarification from NSW DCCEEW regarding the extent of Conservation Agreement site AB563794, where it intersects the amended project footprint.	Data was provided to Transgrid regarding the extent of the site and the nature of the agreement. Contacts at DPE (now the NSW DCCEEW) were provided to obtain further specific information on locational details of threatened entities and conservation areas so that avoidance and mitigation measures could be incorporated into the amended project. Niche has received spatial information after consultation with the NSW Biodiversity Conservation Trust and NSW DCCEEW. Any additional feedback has been requested.
Species specific advice	NSW DCCEEW have provided advice regarding species exclusion (vagrancy), survey methodology and species polygon development for a number of species through email correspondence and online meetings with Accountable Officers.	Niche has incorporated NSW DCCEEW advice where practicable, for example: • survey methods for candidate frogs • species polygon refinements for candidate cockatoos • exclusions (as documented in candidate species Tables 7-1 and 7-4).

1.10.2 Consultation with Department of Primary Industries – Fisheries

A summary of the consultation undertaken to date with DPI Fisheries is provided in Table 1-7, which centres on feedback received (25 September 2023) on the version of the BDAR prepared for the EIS which was referred to DPI Fisheries for advice (DPI 2023b).

Table 1-7: DPI Fisheries consultation summary

Date	Summary of consultation
25/09/2023	DPI Fisheries response to request for advice: • Generally, DPI Fisheries concur with the conclusions of the aquatic ecology assessment. ▪ DPI Fisheries acknowledged that the construction process for the transmission line structures and associated transmission lines would largely avoid direct impacts to streams including the major waterways and the majority of streams included in KFH mapping within the amended project footprint. ▪ The construction of waterway crossings to support access for the amended project has been identified as the primary pathway of potential impact to aquatic habitats as this would result in the direct disturbance to aquatic ecosystems. ▪ Noted that Vegetated Riparian Zones (VRZs) based on stream order as stipulated by DPE Water have been applied in place of the riparian buffer zones outlined in the Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013). ▪ DPI Fisheries stated that as there is a Southern Pygmy Perch population in Oolong Creek the classification of CLASS 1 Major KFH would be appropriate. The proposed waterway crossings at Oolong Creek should consider this classification. • Watercourse crossings: ▪ The construction of all watercourse crossings or services through KFH should be in accordance with DPI document Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013). The proponent has indicated that they intend to follow these requirements.

Date	Summary of consultation
	▪ To reinstate fish passage, any temporary crossings should be fully removed upon completion of works. • Threatened species: ▪ Works within the Oolong Creek waterway should be avoided in September, October, November and December inclusive, the breeding season for Southern Pygmy Perch. ▪ Further consultation with DPI Fisheries is requested prior to the design and construction of the Oolong Creek waterway crossing. • Stockpiling of Felled Timber ▪ Consultation with DPI Fisheries should occur regarding stockpiling of felled trees from the footprint of the development for use as large woody debris to rehabilitate and improve the habitat quality of KFH.
07/12/2023	Niche response to feedback from DPI Fisheries: • Threatened species: ▪ The amended project would not require a waterway crossing of Oolong Creek. ▪ Niche have recommended requesting information on threatened species populations presence or records from NSW DPI Fisheries using the updated crossing alignment. ▪ The consideration of construction timing outside the species breeding season should be considered in the amended BDAR for waterways with known Southern Pygmy Perch populations (see recommendation for information request regarding presence of the species within the new alignment), or areas of indicative habitat mapping for the species where the species or supporting sensitive habitats are considered to have a moderate or higher likelihood of occurrence. This will also be considered in relation to the spawning season for the Flat-headed Galaxias and Murray Crayfish. o Additional mitigation measures (in-line with current approach) would be recommended for crossings in mapped indicative habitat for threatened species. This may include targeted survey, site inspection to guide micro-siting and management of potential impacts, recommendations as to crossing structure e.g. bridge vs culvert. o Targeted survey (in consultation with NSW DPI) may be recommended at crossings within the indicative distribution mapping of the species to resolve the presence or absence at that specific location, post-submission, as part of the suite of mitigation measures for waterway crossingwaterway crossings. If presence confirmed, this would trigger additional mitigation measures such as the avoidance of works within the breeding season and inform design considerations to further minimise potential impacts. If it is determined the species is unlikely to be present through targeted survey and habitat assessment – this should release the need for seasonal exclusions to construction, pending consultation with DPI Fisheries. • The opportunity to stockpile and supply felled trees for KFH rehabilitation or improvement work will be discussed with DPI Fisheries (refer to a new mitigation measure B19).
20/11/2023	Transgrid met with DPI Fisheries to discuss DPI Fisheries' submission on the EIS and updated plans for the Amendment Report. Following this meeting Transgrid provided shape files showing where the amended project footprint interacts with mapped KFH (01/02/2024). Transgrid requested any information on threatened habitat or species relevant to the amended project footprint, specifically information on known populations or records near the areas/waterways identified as potential crossing locations.
26/02/2024	DPI Fisheries responded to the information request and provision of amended project footprint shapefiles from Transgrid (01/02/2024). DPI Fisheries did not identify any specific assessment concerns (such as those identified previously at the Oolong Creek site) within the amended footprint, noting: • The construction of waterway crossings to support access for the amended project has been identified as the primary pathway of potential impact to aquatic habitats as this would result in

Date	Summary of consultation
	the direct disturbance to aquatic ecosystems. The construction of waterway crossings or services through Key Fish Habitat should be in accordance with DPI document Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013). • Key Fish Habitat and threatened fish species distributions based on indicative habitat can be found at the fisheries spatial data portal. This spatial data is appropriate for the HumeLink assessment, including the amended project footprint.
14/03/2024	DPI Fisheries provided Transgrid with further information to explore opportunities to incorporate a fish passage barrier in any waterway crossings of Oolong Creek to prevent the upstream incursion of Carp (*Cyprinus carpio*) and Redfin Perch (*Perca fluviatilis*) to protect any Southern Pygmy population. At this stage, it is anticipated that a waterway crossing of Oolong Creek would be required. If, however, following the completion of further detailed design, a waterway crossing of Oolong Creek is required, a fish passage barrier will be implemented to prevent the upstream incursion of Carp and Redfin Perch in Oolong Creek (refer to revised mitigation measure B34).

2 Project description

The project description in this chapter is based on a concept design and indicative construction methodology for the amended project. The design and construction methodology would continue to be refined and confirmed during further detailed design and construction planning by the construction contractors. Further details on the amended project are provided in Chapters 3 and Appendix A of the Amendment Report.

2.1 Summary of key components of the amended project

Key components of the amended project are summarised in Table 2-1.

Table 2-1: Summary of key components of the amended project

Component	Description
Transmission lines and supporting infrastructure	
Transmission lines and structures	The amended project includes the construction of new 500 kV transmission line sections between: • Wagga 330 kV substation and proposed Gugaa 500 kV substation (approximately 11 km) • Proposed Gugaa 500 kV substation and Wondalga (approximately 61 km) • Wondalga and future Maragle 500 kV substation (approximately 54 km) • Wondalga and Bannaby 500 kV substation (approximately 239 km). The transmission line section between the Wagga 330 kV substation and proposed Gugaa 500 kV substation would initially operate at 330 kV under HumeLink prior to the commissioning of VNI West. The amended project also includes the rebuild of approximately 2 km of Line 51 as a new 330 kV transmission line between the Wagga 330 kV substation and around Ivydale Road, Gregadoo. This would be adjacent to the new transmission line between the existing Wagga 330 kV and proposed Gugaa 500 kV substations. The 500 kV transmission lines would be supported on a series of free-standing steel lattice structures that would range between 50 m and 76 m with an average height of 60 m. In some locations, the height of the transmission line structures may increase above 76 m to minimise biodiversity, heritage or property impacts, or improve overall safety outcomes by providing the opportunity to increase the spanning distance between transmission line structures. These locations will be reviewed during further detailed design. The structures would generally be spaced between 300 to 600 m apart. Ongoing design development and changes to the transmission line corridor have refined transposition[1] locations, which may result in more transmission line structures in a location. Earth wire and communications cables would be co-located on the transmission line structures. The 330 kV structures for the rebuild of Line 51 would range between 24 m and 50 m in height and have a typical height of 40 m. Indicative configurations of transmission line structures that may be used as part of the amended project are shown in Figure 2-1. The type and arrangement of the structures would be refined during detailed design. The footings of each structure would require an area of approximately 300 m^2 to 450 m^2, depending on ground conditions and the proposed

[1] Transposition is the periodic swapping of positions of the conductors of a transmission line in order to improve transmission reliability.

Component	Description
	structure type. Additional disturbance at each structure site may be required to facilitate structure assembly and stringing.
Transmission line easements	The easements for the new 500 kV transmission lines would typically be 70 m wide. However, in a few locations (such as transposition locations) may require wider easements up to 110 metres wide and up to 130 metres wide where the new 500 kV transmission line would parallel the relocated section of Line 51. Transgrid is working with landowners to finalise the location of and acquire the new transmission line easement for the amended project. The easement provides a right of access to construct, maintain and operate the transmission line and other operational assets. The easement also generally identifies the zone of initial vegetation clearance and ongoing vegetation management to ensure safe electrical clearances during the operation of the lines. Vegetation management beyond the easement may also occur where nearby trees have the potential to fall and breach safety clearances.
Substation activities	
Construction of the proposed Gugaa 500 kV substation	A new 500/330 kV substation would be constructed at Gregadoo, about 11 km south-east of the Wagga 330 kV substation. The substation would include ten new 500/330 kV transformers and four 500 kV reactors. The proposed Gugaa 500 kV substation is expected to occupy an area of approximately 34 hectares.
Modification of the existing Bannaby 500 kV substation	The existing Bannaby 500 kV substation on Hanworth Road, Bannaby would be expanded to accommodate connections for new 500 kV transmission line circuits. The modification would include changes to the busbars, line bays, bench and associated earthworks, steelwork, drainage, external fence, internal/external substation roads, secondary containment dams, sediment containment dams, cabling, and secondary systems. All of the work would be restricted to the existing substation property.
Modification of the existing Wagga 330 kV substation	The existing Wagga 330 kV substation on Ashfords Road, Gregadoo would be reconfigured to accommodate new bays for two new 500 kV transmission line circuits within the existing substation property. This would include modifications to the busbars, line bays, existing line connections, bench and associated earthworks, relocation of existing high voltage equipment, drainage, external fence, internal substation roads, steelwork, cabling, and secondary systems.
Connection to the future Maragle 500 kV substation	The amended project would connect to the future Maragle 500 kV substation approved under the Snowy 2.0 Transmission Connection Project (SS1-9717). Construction of the Maragle substation is proposed to be undertaken between 2023 and 2026. Further detail on the Snowy 2.0 Transmission Connection project is available at the Department of Planning and Environment's Major Projects website: www.planningportal.nsw.gov.au/major-projects/project/10591.
Ancillary facilities	
Nomination of access tracks	New access tracks or upgrades to existing access tracks are proposed to connect construction areas and the transmission line easement to the existing road network. Existing unsealed local roads, forest roads, and tracks proposed for use as part of the access arrangements may also require minor improvement work, such as grading or resurfacing, or drainage work.
Construction compounds	Construction compounds, that would include demountable site offices and amenities, would be required during construction to support storage and equipment laydown, crushing and screening, concrete batching

Component	Description
	plants, sediment basins, helipad/helicopter facilities, temporary storage of materials, plant and equipment storage, generators and worker parking required to construct the various elements of the amended project. Eleven potential standalone construction compound locations have been identified. The proposed use of the construction compounds and their proposed boundaries/layout would be refined as the amended project design develops in consultation with relevant stakeholders and the construction contractors.
Worker accommodation facilities and compounds	The amended project includes the following new combined worker accommodation facilities and compounds: • Tarcutta accommodation facility and compound (AC03) – located about 1.5 km south-west of Tarcutta • Adjungbilly accommodation facility and compound (AC04) – located about 21.7 km east of Gundagai • Yass accommodation facility and compound (AC05) – located on the north-western outskirts of the Yass township • Crookwell accommodation facility and compound (AC06) – located off Graywood Siding Road, about 18.1 km north of Goulburn • Green Hills accommodation facility and compound (AC07) – located about 6.5 km west of Batlow.
Helipad/helicopter facilities	To facilitate construction of the amended project, helicopters may be used to deliver materials/equipment and transfer personnel to construction areas particularly within high alpine regions. To enable helicopters to operate safely and allow easy access to the site, a helicopter landing pad would be required. The helipad is expected to occupy an area of around 30 m by 30 m, and would be remediated after construction. These areas would typically be located on existing disturbed land not subject to inundation and a reasonable distance from waterways, sensitive receivers and drainage lines. Several construction compounds have been identified and assessed as helipad locations. The exact locations to be used would be confirmed as detailed design is finalised by the construction contractors. In addition to this, the existing facilities at the Wagga Wagga Airport and Tumut Airport may be used.
Utility connections, adjustments and protection	The amended project would require utility connections, adjustments and protection. Such work includes interfaces with other transmission lines and connections to existing services for temporary facilities. Potential impacts to existing services and utilities would be confirmed during detailed design and any proposed relocation and/or protection works would be determined in consultation with the relevant asset owners.

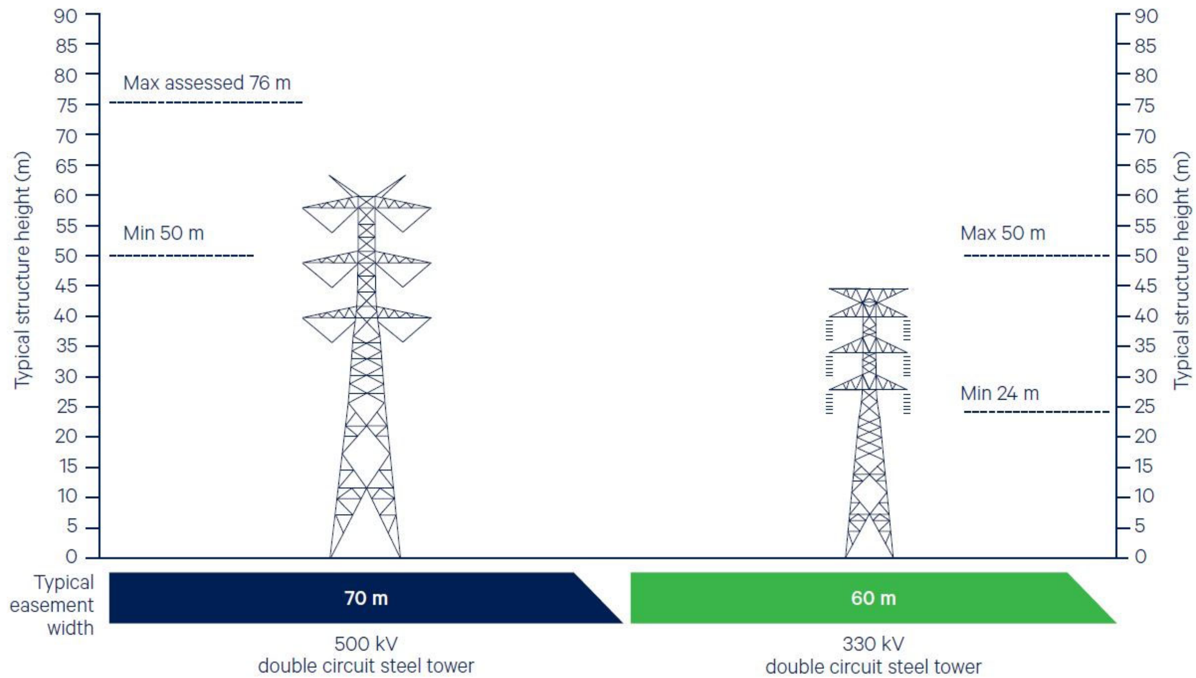


Figure not to scale.

Transmission line structures have been assessed to a height of 76 metres. Any structures that exceed 76 metres, would be managed in accordance with the change management process described in section 26.4 (Managing project changes) of the EIS, in consultation with affected landowners.

Figure 2-1: Indicative transmission line structures

2.2 Construction of the amended project

2.2.1 Construction activities

Key construction activities would generally include (but are not limited to):

- site establishment work, such as:
  - clearing of vegetation and topsoil
  - establishment of construction compounds, helipad/helicopter facilities and worker accommodation facilities
  - utility relocations and/or adjustments
  - construction of new access tracks and waterway crossings and/or upgrade of existing access tracks to transmission line structures
  - road improvement work where required
  - establishment of environmental management measures, traffic control measures and security fencing
  - construction of temporary worker accommodation facilities
  - establishing vehicle access and egress points including adjustment of roads to ensure safe vehicle movements as required
  - establishing hardstand areas for storage, laydown and car parking
  - carrying out geotechnical and contamination investigations
  - carrying out property adjustment and demolition work including adjustments to property fencing, barricades, gates and access, and demolition and relocation of existing dwellings and structures as required.
- construction of the transmission lines, including:
  - earthworks and establishment of construction benches and brake and winch sites as required for the stringing of the transmission line conductors
  - construction of footings and foundation work for the new transmission line structures including boring and/or excavation, steel fabrication works and concrete pours
  - erection of the new transmission line structures
  - stringing of conductors, overhead earth wires and OPGW
  - installation of earthing conductors
- relocation of a section of Line 51, including:
  - disconnection and removal of the existing section of Line 51
  - dismantling of transmission line structures and removal from site
  - construction of foundations and erection of new transmission line structures for the rebuild of Line 51 in a new location
  - stringing of conductors, overhead earth wires and OPGW
  - installation of associated transmission line structure fittings inclusive of all earthing below ground level
- construction of the proposed Gugaa 500 kV substation, including:
  - bulk earthworks to form the substation bench, access roads, drainage and oil containment structures

- excavation and installation of concrete foundations, bund walls, fire walls, noise walls and kerbs including excavation
  - installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
  - excavation and installation of electrical conduits, electrical trenches, site stormwater drainage, oil containment work and associated concrete pits, pipes and tanks including excavation
  - installation of new ancillary and equipment control buildings
  - erection of galvanised steel structures to support electrical equipment
  - installation of electrical equipment on foundations and/or steel support structures
  - installation of conductors, cabling, wiring, electrical panels and electrical equipment
  - erection of the substation site boundary security fencing, including site access gates
  - connection of the proposed transmission lines to the substation
- modification of the existing Wagga 330 kV substation to enable the proposed connection and operation of the new transmission lines, including:
  - demolition and removal of redundant electrical equipment, fencing and cabling
  - bulk earthworks to form the extended substation bench and modified drainage structures
  - installation of concrete foundations and kerbs including excavation
  - installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
  - erection of galvanised steel structures to support electrical equipment
  - installation of electrical equipment on foundations and/or steel support structures
  - installation of electrical conduits, electrical trenches, and modified site stormwater drainage including excavation
  - installation of conductors, cabling, wiring, electrical panels and electrical equipment
  - installation of fencing, lighting and other security features
  - connection of the proposed transmission lines to the substation
- modification of the existing Bannaby 500 kV substation to enable the proposed connection and operation of the new transmission lines, including:
  - bulk earthworks to form the extended substation bench, new access road, modified stormwater drainage, modified oil containment and modified sediment control structures
  - installation of concrete foundations, retaining walls, bund walls, fire walls and kerbs including excavation
  - installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
  - erection of galvanised steel structures to support electrical equipment
  - installation of electrical equipment on foundations and/or steel support structures
  - installation of electrical conduits, electrical trenches, site stormwater drainage, oil containment works and associated concrete pits, pipes and tanks including excavation
  - installation of conductors, cabling, wiring, electrical panels and electrical equipment
  - installation of fencing, lighting and other security features
  - demolish redundant fencing including footings and kerbs

    - connection of the proposed transmission lines to the substation
- connection of the proposed transmission lines to the future Maragle 500 kV substation, including:
    - stringing conductors between transmission line structures and the future Maragle 500 kV substation gantry (including overhead earth wire (OHEW) and OPGW)
    - installing droppers from the future substation gantry to the switchgear
- construction of the telecommunications connections, including:
    - excavation of trenches between around 0.8 and 3 metres in depth and up to 450 mm in width
    - installation of the fibre optic cables (either direct buried or in conduit) and installation of marker tape
    - backfilling of the trenches
    - installation of cable pits and marker posts at surface level in specific locations
    - installation of a layer of sand/ cement mix over fibre cable/ conduit for mechanical protection in some locations.
- testing and commissioning of new electrical infrastructure
- demobilisation and rehabilitation of areas disturbed by construction activities.

A number of activities are expected to commence in accordance with the amended project conditions of approval before the key construction activities outlined above. These activities are considered pre-construction minor work and would comprise low impact activities that would begin after planning approval but prior to approval of the Construction Environmental Management Plan by the Department of Planning, Housing and Infrastructure (DPHI) (formerly the Department of Planning and Environment (DPE)). Pre-construction work would be managed in accordance with an Enabling Works Management Plan or Environmental Work Method Statements or similar environmental management documents.

2.2.2 Construction program

Construction of the amended project is targeted to commence in 2024 and is estimated to take about 2.5 years to complete. The amended project is expected to be fully operational by the end of 2026 (refer to Figure 2-2).

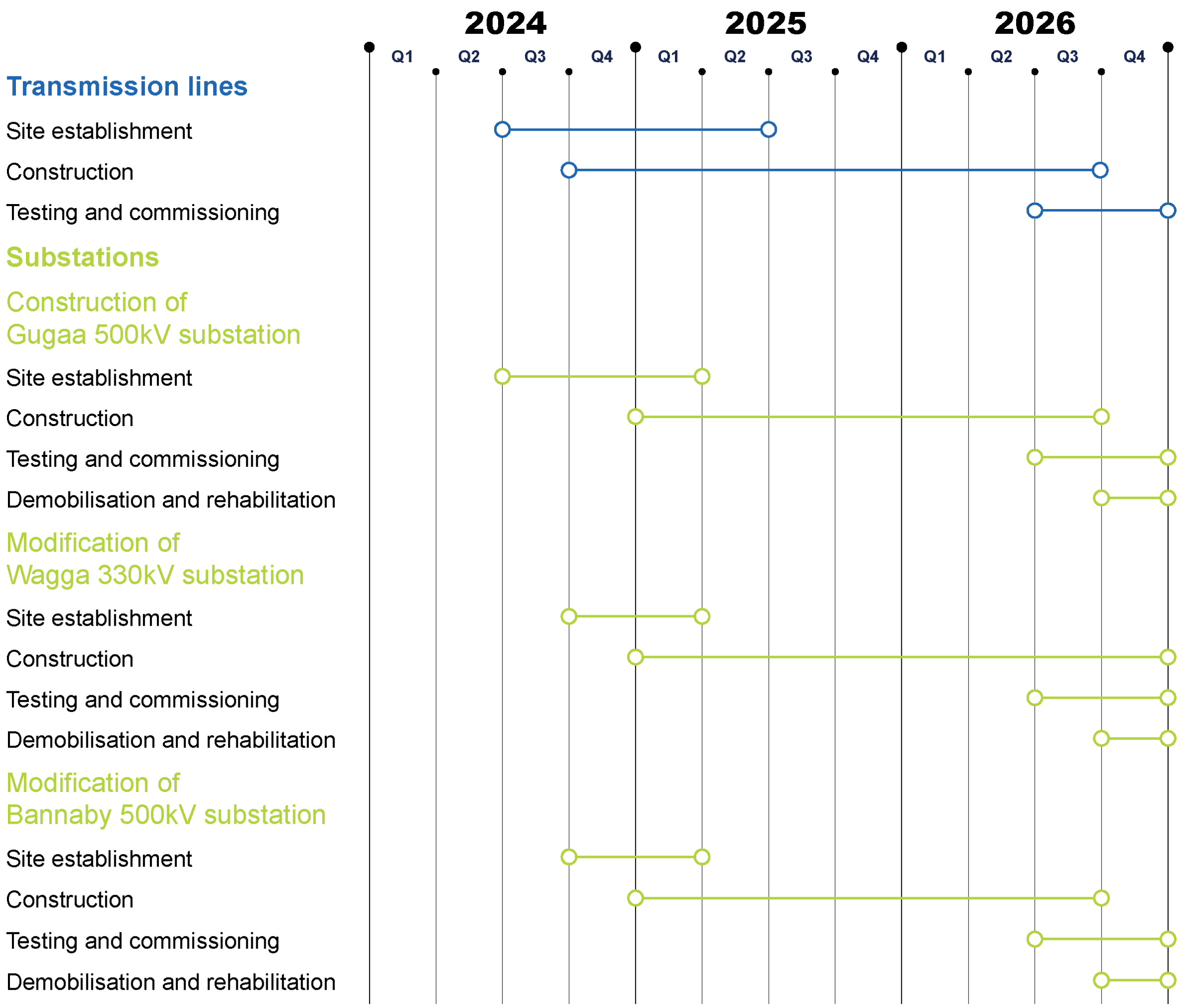


Figure 2-2 HumeLink indicative construction program

Indicative duration of construction activities

Construction at each transmission line structure would be transient and intermittent and construction activities would not occur at each structure location for the full duration for each phase of construction. However, following construction of the foundation, each transmission line structure would typically take one to three weeks to erect. The duration of any construction activity associated with an individual transmission line structure, and inactive/respite periods, may vary for a number of reasons including (but not limited to):

- multiple work fronts
- resource and engineering constraints
- environmental constraints
- work sequencing and location.

Figure 2-3 presents an indicative duration of construction activities associated with an individual transmission line structure.

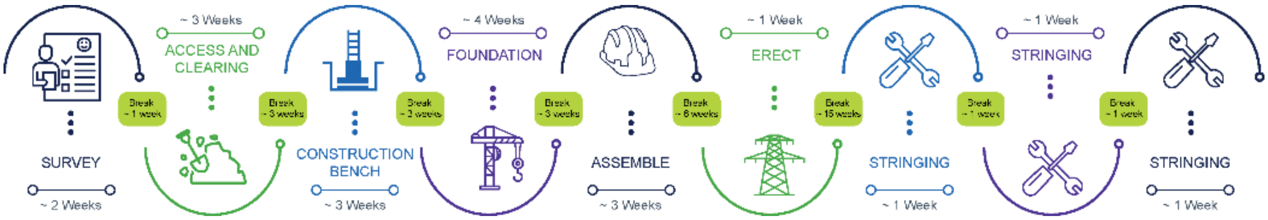


Figure 2-3 Indicative duration and sequence of construction activities for transmission line structures

Construction of the proposed Gugaa 500 kV substation could take up to 2.5 years.

2.2.3 Construction hours

It is expected that construction activities would largely be undertaken during standard construction hours. However, there would be times when working outside of standard construction hours would be required (as defined by the *Interim Construction Noise Guideline* (DECC, 2009)), subject to approval. As the details of construction methodology and amended project needs are developed, these hours will be refined for certain activities.

Where extended hours are proposed for activities in proximity to sensitive receivers, additional measures would be implemented and the work would be managed through an out-of-hours work protocol.

A series of work outside the standard construction hours is anticipated to include (but is not limited to) the following:

- transmission line construction at crossings of a main road or railway as these locations are expected to have restricted construction hours requiring some night work for activities such as conductor stringing over the crossing(s)
- work where a road occupancy licence (or similar) is required, depending on licence conditions
- transmission line cutover and commissioning
- the delivery of equipment or materials outside standard hours requested by police or other authorities for safety reasons (such as the delivery of transformer units)
- limited substation assembly work (eg oil filling of the transformers)
- connection of the new assets to existing assets under outage conditions (eg modification and/or connection work at Bannaby 500 kV substation, Wagga 330 kV substation and Maragle 500 kV substation), which is likely to require longer working hours
- operation of the temporary worker accommodation facilities
- emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm
- work timed to correlate with system planning outages
- situations where agreement is reached with affected sensitive receivers
- activities that do not generate noise in excess of the applicable noise management level at any sensitive receiver.

2.2.4 Construction plant and equipment

An indicative list of construction plant and equipment likely to be required during construction is provided below.

- air compressor
- backhoe
- bobcat
- bulldozers
- concrete agitator
- concrete pump
- cranes (various sizes up to 400 tonnes)
- crawler crane with grab attachments
- drill and blast units and associated support plant/equipment
- drones
- dumper trucks
- elevated working platforms
- excavators (various sizes)
- flatbed hiab trucks
- front end loader
- fuel trucks
- generators
- graders
- helicopters and associated support plant/equipment
- mobile cone/ jaw crusher
- mobile screener
- mulchers
- piling rig
- pneumatic jackhammers
- rigid tippers
- rollers (10 to 15 and 12-15 tonnes)
- semi-trailers
- tilt tray trucks
- trenchers
- transport trucks
- truck and dog
- watercarts
- winches.

2.2.5 Construction traffic

Construction vehicle movements would comprise vehicles transporting equipment, waste, materials and spoil, as well as workers' vehicles. A larger number of heavy vehicles would be required during the main construction work associated with the substations and transmission lines. Non-standard or oversized loads would also be required for the substation work (eg for transformer transport) and transportation of transmission line structure materials and conductors.

Hume Highway, Sturt Highway, Snowy Mountains Highway, Batlow Road, Barton Highway, Crookwell-Goulburn Road, Burley Griffin Way and Gocup Road are the main national and state roads proposed to provide access to the amended project footprint. These roads would be supported by regional and local roads throughout the LGAs of Wagga Wagga City, Snowy Valleys, Yass Valley, Cootamundra-Gundagai Regional, Goulburn Mulwaree and Upper Lachlan Shire that provide access routes to the amended project footprint.

2.2.6 Construction workers

The construction worker numbers would vary depending on the stage of construction and associated activities. During peak construction activities, the amended project could employ up to 1,600 full-time equivalent construction workers across multiple work fronts. It is expected that the maximum number of construction workers at any one location would not exceed 200.

2.2.7 Testing and commissioning

Prior to energisation of the infrastructure, a series of pre-commissioning activities would be conducted. This would include testing the new transmission lines and substation earthing, primary and secondary equipment.

2.2.8 Demobilisation and rehabilitation

Demobilisation and site restoration/ rehabilitation would be undertaken progressively throughout the amended project footprint during the construction program and would include the following typical activities:

- demobilisation of construction compounds and worker accommodation facilities
- removal of materials, waste and redundant structures not required during operation of the amended project
- removal of temporary fencing and environmental controls.

2.3 Operation and maintenance of the amended project

The design life of the amended project is 50 years, which can be extended to more than 70 years for some assets.

The substations and transmission lines 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). The amended project would require about five workers (in addition to Transgrid's existing maintenance workers) during operation for ongoing maintenance activities. Likely maintenance activities would include:

- regular inspection (ground and aerial) and maintenance of electrical equipment
- general building, asset protection zone and access road/track
- vegetation clearing/trimming within the easement
- fire detection system inspection and maintenance
- stormwater drainage systems maintenance.

It is expected that these activities would only require light vehicles and/or small to medium plant (depending on the work required).

3 Legislation and policy context

This chapter provides an outline of the key biodiversity legislative requirements and policy guidelines relating to the amended project.

3.1 Commonwealth government

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

An approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is required for the amended project due to identified impacts on listed MNES. A Referral was submitted to the Commonwealth DCCEEW in accordance with the requirements of Part 8 of the EPBC Act. The Commonwealth declared the EIS project a Controlled Action (EPBC 2021/9121) on 13 April 2022. Following the EIS public exhibition, a variation in accordance with the EPBC Act was identified to be required for the amended project as it was no longer considered consistent with the amended project that was originally referred in December 2021. This was primarily due to the proposed transmission line corridor changes (particularly the Green Hills corridor amendment) extending beyond the area assessed in the original referral. In accordance with Part 11, Division 1A of the EPBC Act and Division 5.4 of the Environment Protection and Biodiversity Conservation Regulations 2000, a proponent can request the Minister to accept a variation of the amended project from that described in the original referral (formally referred to as a request to vary the proposal to take an action). In accordance with this, a variation request was submitted to the Commonwealth DCCEEW on 17 May 2024. The Minister accepted the variation to the proposal on 5 June 2024..

This BDAR has addressed the Commonwealth assessment requirements for the amended project in relation to the following controlling provisions:

- listed terrestrial and aquatic threatened species and communities
- listed migratory species.

3.2 NSW State government

3.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) generally set the framework for planning and environmental assessment in NSW and work with the BC Act for the consideration of impacts to biodiversity including threatened biodiversity.

The amended project has been declared as Critical State Significant Infrastructure (CSSI) (SSI-36656827) under Section 5.13 of the EP&A Act and Schedule 5 of the State Environmental Planning Policy (SEPP) (Planning Systems) 2021. Approval for the amended project would be sought under Part 5, Division 5.2 of the EP&A Act, which requires proponents to use the BAM and the NSW Biodiversity Offset Scheme (BOS) to prepare a BDAR under the BC Act.

3.2.2 Biodiversity Conservation Act 2016

The BC Act, together with the BC Regulation, outlines the framework for assessment and approval of biodiversity impacts associated with developments that require consent under the EP&A Act. It includes a BOS, a framework to avoid, minimise and offset impacts on biodiversity from development and clearing.

The proponent for a development to which the BOS applies is required to prepare a BDAR in support of an application for approval to undertake that development. The BDAR uses the BAM to provide a methodology for determining the number and type of biodiversity credits required to offset unavoidable impacts to biodiversity.

3.2.3 Biosecurity Act 2015

The broad objectives for biosecurity in NSW under the *Biosecurity Act 2015* (Biosecurity Act) are to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants.

Under the Biosecurity Act, any person who deals with biosecurity matters (including landowners) and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

Declared pests and weeds are listed in Schedule 3 of the Biosecurity Regulation 2017. Declared weeds recorded within the amended project footprint are addressed in Section 6.4. Likely pest animals are addressed in Section 7.5.

3.2.4 Fisheries Management Act 1994

The FM Act aims to conserve, develop and share the fishery resources of the State for the benefit of present and future generations to:

- conserve fish stocks and KFH
- conserve threatened species, populations and ecological communities of fish and marine vegetation
- promote ecologically sustainable development, including the conservation of biological diversity.

Protection is provided by integrating the conservation of threatened species, endangered populations and Endangered Ecological Communities (EECs) /Critically Endangered Ecological Communities (CEECs) into development control processes under the EP&A Act.

As described in Section 5.23 of the EP&A Act, any requirements for a permit under Sections 201, 205 or 219 of the FM Act do not apply to the amended project as it is classified as CSSI under Section 5.13 of the EP&A Act.

This BDAR assesses the potential impact of the amended project on threatened species, populations and ecological communities listed under the FM Act, in response to the SEARs. An assessment of potential impacts to areas of KFH and Key Threatening Processes also forms part of this assessment.

3.2.5 Local Land Services Act 2013

The LLS Act was introduced to provide direction around programs and services associated with agricultural production, biosecurity, natural resource management and emergency management. It aims to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistent with the principles of ecologically sustainable development. One of the ways that it intends to achieve this is through the regulation of clearing of native vegetation.

Part 5A of the LLS Act sets out the ways in which the regulating of activities (in connection with land management) would occur and the areas of the State to which it would apply. Section 60A applies Part 5A to rural areas including lands associated with the amended project footprint.

Land categories are defined under the LLS Act and mapped on the Native Vegetation Regulatory Map (NVR map), which underpin the legislative framework for native vegetation clearing in rural areas. The NVR map is to be published by the Environment Agency Head. The current NVR Map is incomplete and transitional arrangements are in place, during which landowners are responsible for determining the categorisation of their land in accordance with section 60F of the LLS Act and the published NVR method statement called "Native vegetation regulatory map: method statement" (DPE, 2022a).

Category 1- exempt land is defined under the LLS Act (Part 5A Division 2 Section 60H) as land that meets the following criteria:

- 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 of 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.

Section 1.5 (1d) of the BAM (DPIE, 2020a) and Part 6, Division 2, Section 6.8(3) of the BC Act excludes any clearing of native vegetation and loss of habitat on Category 1- exempt land from requiring a biodiversity assessment, other than impacts prescribed by the regulations under Section 6.3 (prescribed impacts).

3.2.6 National Parks and Wildlife Act 1974

Applying the principles of ecologically sustainable development throughout the landscape and not just land reserved under the Act, the objects of the *National Parks and Wildlife Act 1974* (NPW Act) include:

- the conservation of nature including the conservation of:
  - habitat, ecosystems and ecosystem processes
  - biological diversity at the community, species and genetic levels
  - landforms of significance, including geological features and processes
  - landscapes and natural features of significance including wilderness and wild rivers
- the conservation of objects, places or features of cultural value (including biological diversity) within the landscape including:
  - places, objects and features of significance to Aboriginal people
  - places of social value to the people of New South Wales
  - places of historic, architectural or scientific significance
- provide for the management of land reserved under the NPW Act in accordance with the management principles applicable to each type of reservation (eg national parks and historic sites, state conservation areas, regional parks and nature reserves).

The amended project is situated near Tarlo River National Park, approximately 30 kilometres north-east of Goulburn. Tarlo River National Park was gazetted in 1982 with adjacent lands subsequently reserved bringing the total area to 8,074 hectares (NSW NPWS, 1998). The Park is known to support significant plant communities including *Allocasuarina nana* (Dwarf She-oak) heathland (NSW NPWS, 1998). Several threatened species including Powerful Owl (*Ninox strenua*), Squirrel Glider (*Petaurus norfolcensis*) and Koala (*Phascolarctos cinereus*) have also been historically recorded within the park (NSW NPWS, 1998).

The amended project footprint also abuts the eastern boundary of Minjary National Park, approximately 10 kilometres north-west of Tumut in the Inland Slopes Interim Biogeographic Regionalisation for Australia (IBRA) subregion. The Park was gazetted on 1 January 2001 given its significance in providing a vegetated link between larger tracts of forest to the south (in Kosciuszko National Park), the Tumut River Valley and nearby Ellerslie Nature Reserve and Tumblong Reserve to the north-west of Tumut (NSW NPWS, 2004).

The southern portion of the amended project footprint (near Maragle State Forest) is within two to eight kilometres and is well-connected with Kosciuszko National Park. Kosciuszko National Park is known to support several endemic flora and fauna species, including but not limited to: Southern Corroboree Frog (*Pseudophryne corroboree*), Mountain Pygmy-possum (*Burramys parvus*), and Broad-toothed Rat (*Mastacomys fuscus)*.

This BDAR addresses direct, indirect and prescribed impacts to biodiversity associated with these national parks including any likely adverse interactions with prescribed management outcomes as outlined within NPWS management plans.

3.2.7 Forestry Act 2012

Forestry is regulated by several different laws in NSW, however, forestry operations on Crown land are predominately regulated under the *Forestry Act 2012* (Forestry Act) and associated Forestry Regulation 2012. The Forestry Act provides for the dedication, management and use of State forests and other Crown-timber land for forestry and other purposes. It also outlines the objectives and functions of the Forestry Corporation of New South Wales (FCNSW).

State mapping of Forestry Management Zones (FMZs) supports the facilitation of the Forestry Act and identifies the accepted use and management intent for forestry lands within NSW.

State forests are primarily reserved for timber production. However, forestry lands may also be managed for biodiversity conservation such as through the dedication of flora reserves or the declaration of special management zones where forestry operations such as general-purpose logging are prohibited.

The amended project footprint intersects with the following State forests occurring within the amended project footprint:

- Green Hills State Forest, approximately 16 kilometres south-west of Tumut
- Bago State Forest, approximately 20 kilometres south of Tumut
- Red Hill State Forest, approximately 18 kilometres north-east of Tumut.

Forestry Management Zones (FMZs) that would be impacted within these forests include:

- Zone 1 Special Protection Zone

- Zone 2 Special Management Zone
- Zone 3A Harvesting Exclusions Zone
- Zone 3B Special Prescription Zone
- Zone 4 General Management Zone
- Zone 6 Softwood Plantations Zone
- Zone 7 Non-Forestry Use Zone.

Direct and indirect impacts to native vegetation and threatened species associated with State forests are documented within this BDAR (refer to Section 12.3 and 12.4). Prescribed impacts, including non-native vegetation providing habitat for threatened species, are also addressed (refer to Section 12.5).

3.2.8 State Environmental Planning Policy (Koala Habitat Protection) 2020 and State Environmental Planning Policy (Koala Habitat Protection) 2021

SEPP (Koala Habitat Protection) 2021 (Koala SEPP 2021) commenced in March 2021. It applies across all zones in metropolitan Sydney LGAs and the Central Coast LGA and to zones other than RU1 Primary Production, RU2 Rural Landscape and RU3 Forestry for the remaining 74 LGAs, including the LGAs encompassed by this amended project (Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire, Goulburn Mulwaree and Yass Valley). As with Koala SEPP 2020, Koala SEPP 2021 applies to projects that require development consent under Part 4 of the EP&A Act on land with an area of more than one hectare or adjoining land in the same ownership of more than one hectare.

Additionally, both Koala SEPP 2020 and Koala SEPP 2021 provide for the preparation of Koala Plans of Management (KPoM) for the part of or a whole LGA and for individual development sites. There are currently nine approved KPoMs across NSW, however, none apply to the LGAs encompassed by this amended project.

Approval for the amended project would be sought under Part 5, Division 5.2 of the EP&A Act. It is noted that both Koala SEPP 2020 and Koala SEPP 2021 apply to activities under Part 4 of the EP&A Act that require Development Consent. Consequently, the provisions of Koala SEPP 2020 and Koala SEPP 2021 do not apply to the amended project as it is CSSI under Section 5.13 of the EP&A Act.

3.2.9 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 and State Environmental Planning Policy (Vegetation in Non-Rural Areas) Further Amendment 2021

SEPP (Vegetation in Non-rural Areas) 2017 (Vegetation SEPP 2017) and SEPP (Vegetation in Non-rural Areas) Further Amendment 2021 (Vegetation SEPP 2021) set the rules for clearing of native vegetation on land zoned for urban and environmental purposes that is not associated with a development application.

Approval for the amended project would be sought under Part 5, Division 5.2 of the EP&A Act which requires proponents to use the BAM and the NSW BOS to prepare a BDAR under the BC Act. It is noted that both Vegetation SEPP 2017 and Vegetation SEPP 2021 apply to activities under Part 4 of the EP&A Act that do not require development consent. Consequently, the provisions of Vegetation SEPP 2017 and Vegetation SEPP 2021 do not apply to the amended project.

3.2.10 Water Management Act 2000

The object of the Water Management Act 2000 (WM Act) is the sustainable and integrated management of the state's water for the benefit of both present and future generations.

Under the WM Act, an approval is required to undertake controlled activities on waterfront land, unless that activity is otherwise exempt. Applicants that are not exempt must obtain a controlled activity approval from DPE Water before commencing the controlled activity.

Waterfront land is the bed of any river, lake or estuary and any land within 40 metres of the highest bank of the river, the lake shore or the mean high-water mark of the estuary. Under the WM Act, controlled activities include:

- erecting a building
- carrying out work
- removing material from waterfront land, such as plants or rocks
- depositing material on waterfront land, such as gravel or fill
- any activity which affects the quantity or flow of water in a water source.

According to the WM Act, the carrying out of controlled activities must avoid or minimise land degradation, including soil erosion, compaction, decline of native vegetation and where possible land must be rehabilitated.

As the amended project has been determined as having CSSI status, the activities are exempt from requiring a controlled activity approval, under Chapter 5.23(1) of the EP&A Act. While exempt from controlled activity approvals, according to the SEARs, where the amended project involves work within waterfront land the assessment is required to identify the likely impacts to the waterfront land and describe how the activities are to be designed and implemented in accordance with the *Guidelines for riparian corridors on waterfront land* (DPE Water, 2022a).

The WM Act is supported by a series of guidelines, including the *Guidelines for riparian corridors on waterfront land* (DPE Water, 2022a). This guideline defines the widths of VRZs, based upon stream order according to the Strahler System of ordering watercourses, measured from the top of the highest bank on both sides of the watercourse. The guideline also includes design principles and overarching management measures for work on waterfront land. Other supporting guidelines considered in the development of this assessment include:

- *Guidelines for instream works on waterfront land* (DPE Water, 2022b)
- *Guidelines for watercourse crossings on waterfront land* (DPE Water, 2022c).

4 Assessment methods

This chapter details the methodology implemented to assess biodiversity values within the amended project footprint and surrounding locality. The assessment was undertaken in accordance with BAM (DPIE, 2020a) and associated methodologies as detailed in Section 4.1. Key methodologies used for the assessment are detailed in the following sections and included:

- a desktop review of available data and existing reports relevant to existing vegetation (Section 4.4.1), threatened flora (Section 4.5.1) and threatened fauna (Section 4.6.1) within the locality (ie the amended project footprint and surrounds)
- field surveys carried out within accessible lands to:
  - verify vegetation communities present and develop a map of vegetation zones as detailed in Section 4.4.2
  - assess habitat suitability for threatened fauna including the presence/ absence of known habitat constraints (Section 4.6.2)
  - carry out BAM plots within vegetation zones to calculate vegetation integrity (Section 4.4.3 and 4.4.4)
  - assess and survey bushfire affected lands (Section 4.3)
  - undertake targeted surveys for candidate threatened flora (Section 4.5)
  - undertake targeted surveys for candidate threatened fauna (Section 4.6)
  - assess aquatic habitat condition and suitability for threatened fish (Section 4.8)
- supplementary assessments undertaken to address information and data gaps (required primarily due to land access constraints) (Section 4.10).

Figure 4-1 and Figure 4-2 (Attachment 5) show the extent of field surveys relative to the amended project footprint and associated IBRA subregions for flora and fauna respectively. Field survey dates and observed weather conditions are documented in Section 4.7. Section 4.9 outlines important field survey limitations which are addressed in detail in Section 4.10.

4.1 Site context methods

Methods adopted as a part of this assessment to establish the site context are detailed further below. This includes the approach to estimating native vegetation cover and assigning patch size classes to vegetation zones. In accordance with the BAM, site context for a linear project is generally assessed within a 500 metre buffer to the project centreline.

Scattered trees were addressed in the same manner as other native woody PCTs. The extent of scattered tree canopies were mapped using aerial photo interpolation and NSW Woody Vegetation Extent Mapping (NSW DCCEEW, 2019a). Where these were within 100 metres of other native woody vegetation they were assigned to the same patch. These were also considered native woody vegetation for the purpose of native vegetation cover and contributed to overall native cover scores reported for the landscape buffer. The above approach was applied as an alternative to applying the scattered tree assessment module of the BAM, which was deemed inappropriate to apply to a project of this scale.

4.1.1 Native vegetation cover

Under the BAM (DPIE, 2020a), native vegetation cover estimates are based on the cover of native woody and non-woody vegetation (including regrowth, derived native grasslands and plantations) that are comprised of plants native to NSW. Native vegetation cover is estimated for all lands within 1,500 metres of a non-linear project and applied as a filter within the BAM-C for informing habitat suitability for candidate fauna species (Section 5.2.1(2)(d)).

Although not generally applied to linear projects, it is reasoned that so long as native vegetation cover can be accurately estimated then it can be applied to assess habitat suitability for candidate fauna species under the BAM. This is based on the understanding that a species would inhabit vegetation patches based on the intactness of the landscape, independent of the type of project proposed (ie linear versus non-linear).

As native vegetation cover cannot be applied as a filter for linear projects within the BAM-C, it was instead incorporated into the ESRI ArcGIS habitat mapping process[2] that was adopted to delineate suitable habitats for candidate threatened flora and fauna species, as detailed in Section 7.1 and Attachment 1. Consultation with the NSW DCCEEW regarding the proposed approach was undertaken and is documented in Section 1.8 and Attachment 7.

A number of different methods were trialled to find the best approach to mapping native vegetation cover across the amended project footprint so as to ensure:

- sufficient sensitivity to capture localised changes in vegetation cover likely to influence habitat suitability
- sufficient accuracy through correlation with aerial imagery and field-based data.

This included a review of different publicly available spatial datasets to assess their accuracy and suitability in informing the location of woody and non-woody vegetation beyond the amended project footprint. It also involved a comparison of native vegetation cover estimates obtained for a 1,500 metre buffer area as opposed to the standard 500 metre buffer typically applied to linear projects.

An ultimate approach was adopted in ESRI ArcGIS using the following data inputs:

- Niche Vegetation zone mapping, developed through field and desktop vegetation assessments
- NSW Native Vegetation Extent 5 metre Raster v1.2 (New South Wales Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), 2017).

Native vegetation cover estimates were limited to woody vegetation only, given the limited availability of reliable data to inform native non-woody vegetation extent beyond the amended project footprint and a general lack of grassland/ grassy woodland candidate species with higher vegetation cover thresholds.

The process for estimating native vegetation cover was as follows:

[2] Vegetation polygons that did not meet the vegetation cover threshold for a species were considered degraded (in accordance with Section 5.2.3 Step 3 of the BAM and Section 4.4.3 of the BAM 2020 Ops Manual) and were removed from the species polygons.

1. extract Woody vegetation from "NSW_Native_Vegetation_Extent_v1p2_5m_2017.tif" where type is Tree Cover (pixel value is 1) within the amended project footprint
2. convert raster to simplified polygons
3. extract woody vegetation from Niche vegetation zone map and clip to the amended project footprint
4. clip simplified polygon from Step 1 to a 1,500 metre buffer around the amended project footprint
5. delete polygons where they are situated within the amended project footprint and merge remaining data with the Niche woody veg extract from Step 3
6. dissolve and explode into separate contiguous polygons
7. buffer each of the polygons by 1,500 metres (this is assuming that each vegetation polygon is a stand-alone impact area, that is treated like a BAM 2020 non-linear impact). This creates many overlapping buffers, since some of the Tree Cover polygons are small
8. calculate buffer size
9. calculate native vegetation within each buffer:
   - intersect the initial native vegetation layer (step 5) with the 1,500 metre buffers
   - dissolve by buffer ID and retain buffer size (first)
   - calculate native vegetation areas within each buffer
   - join native vegetation layer (step 5) back to buffer to populate native veg size and buffer size
   - calculate per cent Native Vegetation using formula: *(native vegetation (ha) / Buffer area (ha)) *100*
10. create new field and allocate native vegetation cover categories:
    - 0–10 per cent, relictual (with 10 per cent or less habitat retained)
    - >10–30 per cent, fragmented (between 11 and 30 per cent habitat retained)
    - >30–70 per cent, variegated (between 31 and 70 per cent habitat retained)
    - >70 per cent, intact (> 70 per cent natural habitat retained)
11. separate polygon layers are then generated for native woody vegetation cover as follows for use in the ESRI ArcGIS habitat mapping process:
    - all >70 per cent cover
    - all >30 per cent cover
    - all >10 per cent cover
    - all Tree Cover.

Native woody vegetation cover estimates and assigned cover classes are summarised in Table 5-8 for each IBRA subregion.

4.1.2 Patch size

Under the BAM (DPIE, 2020a), a patch is an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100 metres from the next area of native vegetation (or less than 30 metres for non-woody vegetation). A patch may extend onto adjoining land.

Patch size was assessed for each vegetation zone, which may be assigned to one or more patch size classes as follows: <5 hectares; 5 to <25 hectares; 25 to <100 hectares; >100 hectares. The patch size analysis was limited to the consideration of woody vegetation only given the limited availability of reliable data to inform native non-woody vegetation extent beyond the amended project footprint and a general lack of grassland/ grassy woodland candidate fauna species with higher patch size thresholds. As such, a patch size of >100 hectares was conservatively prescribed as for all non-woody PCTs within the BAM-C.

Patch size was calculated for woody PCTs within the amended project footprint by means of the following steps:

- Extract Woody vegetation from "NSW_Native_Vegetation_Extent_v1p2_5m_2017.tif" where type is Tree Cover (pixel value is 1) and convert to simplified polygon.
- Clip to an arbitrary 10 kilometres radius of the amended project footprint to reduce the number of polygons.
- Replace woody polygons within the amended project footprint with the Niche woody vegetation polygons.
- Buffer the polygons by 50 metres (ie 100 metres from patch to patch).
- Dissolve and explode the buffers into contiguous polygons.
- Calculate patch size and allocate to one of the following categories:
  - <5 hectares
  - 5 – <25 hectares
  - 25 – <100 hectares
  - ≥100 hectares.

When undertaking the patch size analysis, it was noted that some riparian vegetation extended a significant distance from the amended project footprint before reaching the greater than 100 hectare category. To ensure the patch size assigned to this vegetation was correct, a visual check of each patch was undertaken to identify any potential for the patch to extend beyond the arbitrary 10 kilometre radius forming the limit of the analysis.

4.2 Determination of Category 1 – exempt land

4.2.1 Method for determining Category 1 – exempt land (overview)

The process for establishing Category 1 – exempt land for the amended project footprint followed section 60F of the LLS Act and the published NVR method statement called *Native vegetation regulatory map: method statement* (DPE, 2022a). This approach was recommended by the BCD with final mapping products provided to NSW DCCEEW for review and feedback on 30 March 2022.

The following mapping layers and datasets were utilised to support the spatial mapping process:

- *NSW Land use Mapping* (NSW DCCEEW, 2019b)
- *NSW Woody Vegetation Extent Mapping* (NSW DCCEEW, 2019a)
- *NSW Historical Imagery* (Spatial Services –- Department of Customer Service NSW (DCS), 2023)
- *NSW Native Vegetation Regulations Map: Transitional – Excluded, and Sensitive Regulated Land; Transitional – Excluded Land* (NSW DCCEEW, 2021a).

The Category 1 lands process described below considers all land within the amended project footprint and excludes lands from Category 1 classification (therefore retaining all other land for full consideration within the BDAR for the purposes of ecosystem and species credit offset obligations) based on a two-step process described in Sections 4.2.2 and 4.2.3 respectively.

4.2.2 Step 1 of Category 1 – exempt land method: GIS process to follow the NVR method statement

Based on a review of the aforementioned datasets, the following areas were excluded from consideration as Category 1- exempt land (ie deemed not meet the Category 1- exempt land definition):

- vegetation mapped as Excluded Land, ie where pixel value is 1 in the NVR map "naluma_nsw_2017_abel0".
- vegetation mapped as Category 2 vulnerable and/or sensitive land, ie where pixel value is 3, 4 or 6 in the NVR map "naluma_nsw_2017_abkl0".
- Woody vegetation, ie where pixel value is 1 in the "NSW_Native_Vegetation_Extent_v1p2_5m_2017.tif"
- land use polygons where the secondary ALUM class is one of the following (as per Figure 7 of the NVR method statement [DPE, 2022a]):
  - 1.1 Nature conservation (Excluded)
  - 1.2 Managed resource protection (Category 2 regulated)
  - 1.3 Other minimal use (Category 2 regulated)
  - 2.1 Grazing native vegetation (Category 2 regulated)
  - 2.2 Production forestry (Excluded)
  - 5.7 Transport and Communication (Category 2 regulated).
- land use polygons where the tertiary ALUM class is one of the following (as per Figure 7 of the NVR method statement [DPE, 2022a]):
  - 5.4.3 Rural residential without agriculture (Category 2 regulated)
  - 6.1.1 Lake – conservation (Category 2 regulated)
  - 6.1.4 Lake – saline (Category 2 regulated)
  - 6.3.1 River – conservation (Category 2 regulated)
  - 6.5.1 Marsh/wetland – conservation (Category 2 regulated)
  - 6.5.4 Marsh/wetland – saline (Category 2 regulated)
  - 6.6.1 Estuary/coastal waters – conservation (Category 2 regulated).

4.2.3 Step 2 of Category 1 – exempt land method: manual correction and filtering of remaining lands

Following implementation of Step 1, some manual correction and filtering of remaining lands was then undertaken where necessary to exclude any additional areas that might not meet Category 1 -exempt land definitions; the following process was undertaken:

- review of the draft NVR Category 1 – exempt lands mapping (NSW DCCEEW, 2021a), released under a provisional data licence to support the HumeLink EIS and Amendment Report. The dataset was compared with the results of the Niche process identified above to ensure general consistency. Where any inconsistencies were found, a precautionary approach was adopted whereby lands were excluded from Category 1 – exempt land classification.
- ensure consistency with the Niche vegetation zone boundaries and to exclude any of the following where identified:

- native woody vegetation, including scattered paddock trees (scattered paddock trees have been assessed and offset using the standard BAM approach and assignment of these features to an appropriate vegetation zone)
- derived grasslands that are critically endangered ecological communities.

An overview of Category 1 – exempt land mapping as determined for the amended project footprint is presented in Figure 4-3 (Attachment 5). Attachment 8 details the vegetation zones mapped within Category 1 – exempt land and their associated vegetation condition. The proportion of area mapped as Category 1 – exempt land within the amended project footprint.

4.3 Bushfire impacts and identification of severely burnt vegetation

The NSW government developed the 'Guideline for applying the Biodiversity Assessment Method at severely burnt sites' (DPIE, 2020c) following the 2019-2020 bushfires. The aim of the guideline is to provide assessors with a reasonable, evidence-based and transparent process for identifying severely burnt native vegetation. The guideline provides a range of approaches for applying the BAM where severe or catastrophic bushfire (ie bushfire of high to extreme severity) has resulted in significant modification of vegetation structure and composition such that the original vegetation type and condition is no longer identifiable.

This section outlines the methodology applied to assess bushfire severity, map vegetation zones, and assess vegetation integrity within the amended project footprint in accordance with the DPIE (2020e) guideline.

Fire Extent Severity Mapping (FESM) developed by the NSW DCCEEW (2020) was used to inform the extent of bushfire affected lands within the amended project footprint and to make decisions about whether the standard BAM (DPIE, 2020a) could be applied for vegetation assessment. Consultation with FCNSW was also undertaken to obtain any additional on-ground knowledge where relevant to the evaluation of severely burnt lands. Feedback received from the FCNSW indicated that the FESM mapping was fairly consistent with conditions observed on the ground (refer to Chapter 9 for detailed consideration of bushfire impacts and assessment considerations).

To assess bushfire severity across the extent of burnt lands, 39 sites were surveyed by ELA between October 2020 and February 2021 (approximately one-year post-fire). Another 77 sites were subsequently surveyed by Niche from March 2022 to November 2023 (i.e. 2-4 years post-fire). A summary of the Niche burnt area assessments is provided in Attachment 9. The location of these assessments is shown in Figure 9-1 (Attachment 5).

Native vegetation was evaluated at each site to confirm if it was severely burnt in accordance with the criteria outlined in Table 1 of the DPIE (2020e) guideline (refer to Table 4-1). According to the DPIE (2020e) guideline, the assessor must 'use their judgement to determine if the combination of the features described constitutes severely burnt'. The vegetation formation, condition and land use prior to the bushfire were considered as a part of the assessment and informed where relevant by observed conditions in adjacent unburnt areas of vegetation zones.

Chapter 9 addresses severely burnt lands within the amended project footprint and important considerations for the assessment. Data supporting the identification and mapping of severely burnt lands is provided in Attachment 9.

Table 4-1: Decision support criteria to assess if native vegetation is severely burnt (DPIE, 2020c)

Feature	Descriptive characteristics for severely burnt vegetation
Species richness	The range of species present before the fire are burnt and / or cannot be identified. Dominant species cannot be easily identified until regeneration occurs.
Growth form: trees	Canopy trees are killed and/or canopy is consumed or largely consumed with most leaf material charred/ scorched. Epicormic growth, if present, is not well developed (<1 m long).
Growth form: shrubs, forbs, ferns and other	All understorey plants are consumed or largely consumed (some charred). Regrowth, if present, is immature (very few species have attained full height).
Growth form, grasses and grass-like	Ground cover is consumed, or largely consumed. Evidence of ground scorch is present. Regrowth, if present, consists predominantly of new resprouting growth (native vegetation).
Logs	Logs (if expected to have been previously on site) are absent or largely consumed.
Litter cover	Pre-fire surface litter (if expected) is consumed. Soil organic layer is consumed or largely consumed. New leaf may be occurring where the canopy was burnt but not scorched.
Ash	White ash deposition and charred organic matter is present to several cm depth.

4.4 Native vegetation mapping and classification

4.4.1 Review of existing information

A number of existing spatial datasets were used to inform the initial extent and classification of vegetation communities within the amended project footprint (refer to Table 4-2). The coverage and reliability of these datasets varied across the extent of the amended project footprint with western and southern parts of the amended project footprint more extensively mapped using the NSW Plant Community Type classification method. Coverage of the eastern portions of the amended project footprint was generally poor with existing datasets limited to the South-east Local Land Services Biometric Vegetation Map (NSW DCCEEW, 2015a) VISID4211.

A number of existing spatial datasets were also referenced to support the delineation and field validation of threatened ecological communities (TECs) within the amended project footprint, as detailed in Table 42. The layers mentioned below were intersected with the working Niche vegetation mapping layer to assist in addressing the criteria outlined in the Final Determination (BC Act) and the Species Profile and Threats Database (SPRAT) (Commonwealth DCCEEW, 2022a) (EPBC Act) for each TEC.

Table 4-2: Information sources used to inform the delineation of vegetation and threatened ecological communities

Information source
• BioNet Vegetation Classification Database (NSW DCCEEW, 2024b) • Preliminary vegetation mapping (Eco Logical Australia dataset provided to Niche in 2021) • Riverina Bioregion Extant Vegetation Map (NSW DCCEEW, 2019c) VISID 4175 • South-East Local Land Services Biometric Vegetation Map (NSW DCCEEW, 2015a) VISID4211 • Peat-forming bogs and fens of the Snowy Mountains (NSW DCCEEW, 2021b) • Grasslands, Pre-Settlement, South-eastern Highlands (NSW DCCEEW, 2015b) VISID 4099 • Mitchell Landscapes (DECC, 2002) • Rainfall (BoM, 2024) • NSW Elevation and Depth Theme (DCS, 2021a) • NSW Seamless Geology dataset (DRNSW, 2022) • NSW Hydrography (DCS, 2021b) • Aerial imagery (Esri, 2022).

4.4.2 Native vegetation verification and stratification

The verification and stratification of vegetation communities across the amended project footprint incorporated the following key tasks:

- preparation of a preliminary vegetation map using existing regional vegetation mapping
- field validation of vegetation
- data review and analysis and post-field refinement of vegetation mapping to align to best fit PCTs and condition states.

The preliminary vegetation map was provided to the field teams in a spatially georeferenced format in Enterprise Field Maps. A list of PCTs mapped for the region along with their associated descriptions was compiled and provided to the field teams for reference.

Field validation of vegetation was carried out by Eco Logical Australia and Niche for all accessible lands within the amended project footprint and to assign vegetation condition within the amended project footprint in accordance with the criteria outlined in Table 4-3.

Table 4-3: Vegetation zone condition class criteria

Condition class	Description
Very Low	Cleared paddocks with sparse or complete lack of canopy or mid layer vegetation. Ground cover generally <30% native. Includes cropping and highly improved pasture or weed infested areas likely to be considered Category 1 – exempt land and/or below the threshold required for offsetting (VI score 15 or below).
Low	Cleared paddocks with limited canopy or mid layers (ie thinned or under scrubbed). Ground cover generally 30-50% native. Includes grazing land that has long history of heavy grazing and some pasture improvement.
	Regenerating bushland with some structural elements present. Recently or repeatedly cleared and/or with ongoing disturbance or other soil profile damage preventing good recovery.
Moderate	Paddocks with canopy and midstorey layers present either as remnant or advanced regeneration. Generally thinned but with some older habitat attributes present and ground cover generally 30-50% native. Can include areas with limited canopy or mid layers and where groundcover is >50% native.
	Regenerating bushland with most structural elements present. Disturbance is typically recurrent which has impacted diversity of species/ structure and habitat availability.
High	Paddocks with canopy and midstorey layers either well developed or remnant. Moderately treed with some older habitat features. Ground cover generally >50% native. Includes grazing land with limited pasture improvement and moderate clearing/grazing history.
	Regenerating bushland with most structural elements present and limited disturbance. Limited development of habitat elements and old growth characteristics. Disturbance history is typically once off or limited in severity which has not limited diversity of species/ structure.
Very High	Paddocks with canopy and midstorey layers remnant. Moderate to well treed with older habitat attributes present including fallen logs. Good native diversity and native cover >50%. Includes land subject to low levels of historic clearing/ grazing.
	Remnant bushland with all structural elements present and generally good habitat availability with limited disturbance history. Good native diversity and cover with old growth characteristics present.

4.4.3 Vegetation integrity plot survey methods

The BAM (DPIE, 2020a) prescribes a standardised approach for assessing the vegetation integrity of vegetation zones within subject lands. The BAM (DPIE, 2020a) specifies the data collection and effort requirements using standardised plots and transects. Data relating to three key attributes (composition, structure and function of native vegetation) is collected within a 20 by 50 metre plot, a 20 by 20 metre nested quadrat and five one by one metre sub-plots arranged along the 50 metre plot centreline (Table 4-4).

A summary of the vegetation integrity plot survey effort achieved for the amended project is documented in Section 4.4.4.

Table 4-4: Attributes recorded in the BAM plot and transect

Plot/ transect	Data collected
20 by 20 m quadrat	Flora species common and scientific name, stratum, growth form, cover, abundance and native/exotic/high threat weed status
20 by 50 m plot	The number of large trees, tree stem size class, tree regeneration, total length of fallen logs and number of trees with hollows
1 by 1 m plot	Per cent litter cover

4.4.4 Vegetation integrity plot survey effort

A total of 703 vegetation integrity plots were sampled in accordance with the BAM (DPIE, 2020a) methodology as described in Section 4.4.3 (Attachment 10). The minimum number of vegetation integrity plots required per vegetation zone for each IBRA subregion intersecting the amended project footprint is presented in Table 4-5 to Table 4-10. Floristic structure and habitat function data for each plot are provided within Attachments 5 and 6.

Plot surveys were undertaken throughout the concept design phase and formed a key data input for amended project footprint and updated indicative disturbance area refinement, and the development of design avoidance measures. While this has ultimately facilitated a reduced amended project impact scenario, design changes to avoid high condition vegetation has, in some instances, led to BAM plots being situated outside of the updated indicative disturbance area or amended project footprint. BAM plot data gathered within the amended project footprint and adjacent landscape buffer (ie within 500 metres) where available, was used to inform the vegetation integrity score of vegetation zones within each IBRA subregion. Where this was not possible, and where a plot shortfall remained for vegetation zones, the following hierarchical process was applied to obtain the requisite plot data:

1. Surrogate plot data gathered from the same vegetation zone but situated within an adjacent IBRA subregion (where present within the same IBRA region). Accordingly, a single asterisk “*” in the tables below indicates where these plots have been used.
2. Surrogate plot data gathered from the same PCT and IBRA subregion but within a higher condition state. This was therefore a conservative measure of the vegetation integrity score. A double asterisk “**” in the tables below indicates where these plots have been used.
3. Surrogate plot data gathered from the same vegetation zone but situated within a different IBRA subregion and IBRA region. Surrogate plots were located often within close proximity to the impacted vegetation zone, as detailed in Attachment 12. A triple asterisk “***” in the tables below indicates where these plots have been used.
4. Where no plot data was available from the above process benchmark data was used (i.e. best possible condition). Plots using benchmark data are underlined in the relevant tables below.

Where multiple duplicate or surrogate plots were available from one vegetation zone, all were used to enable calculation of 'best estimate' vegetation integrity for the given zone. Vegetation zones for which the above steps were applied are indicated in **bold** in Table 4-5 below using the symbology as indicated. Attachment 12 provides a detailed overview of BAM plot data used to assess plot shortfall and justifications for using surrogate plots, including distance of surrogate plots to the subregion and vegetation zone they are used. Distance from vegetation zone has only been entered for surrogate plots which were taken from different subregions, if a surrogate plot is within the same subregion but just considered a surrogate because it is within a higher condition class, distance has not been included.

Table 4-5: Vegetation integrity plot requirements for the Bungonia IBRA subregion

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
283	Low	>100	TCZ – 0.16	1	0	**511MP005S***
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.13	1	2	BY001BD2 BY001F8E
			ECZ – 0.06	1		
			HTZ – nil	N/A		
870	Very high	>100	TCZ – 1.1	1	3	BY008-F BY008-G BY008-H
			ECZ – 0.76	1		
			HTZ – nil	N/A		
1093	Low	>100	TCZ – 1.28	1	2	BY-014K BY-014I
			ECZ – 0.04	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.05	1	3	BY-014B BY-014C BY018406
			ECZ – 0.17	1		
			HTZ – 0.01	1		
	High	>100	TCZ – 1.38	1	2	BY014B34 BY0186D0
			ECZ – 0.36	1		
			HTZ – nil	N/A		
	Very High	>100	TCZ – 1.91	1	5	BY-014J BY-014H BY-014F BY-014D BY018AFC BY-020C BY020DBC
			ECZ – 1.4	1		
			HTZ – 0.03	1		
1097	Very low	>100	TCZ – 0.28	1	2	
			ECZ – 0.02	1		
			HTZ – 0.01	1		
	Low	<5	TCZ – nil	N/A	1	BY-020B
			ECZ – 0.02	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			HTZ – nil	N/A		
		>100	TCZ – 0.01	1		
			ECZ – 0.01	1		
			HTZ – nil	N/A		
1107	High	>100	TCZ – nil	N/A	2	BY010012FA BY0109B6
			ECZ – 0.03	1		
			HTZ – nil	N/A		
1150	Very Low	>100	TCZ – 0.38	1	2	BY0089C4 BY008824
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.26	1	1	BY008-E
			ECZ – 0.13	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.49	1	1	BY008-C
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	High	>100	TCZ – 7.23	3	4	BY010F5E BY008F42 BY010ED2 BY019E9C
			ECZ – 7.07	3		
			HTZ – 0.38	1		
1330	Very Low	>100	TCZ – 16.53	3	5	BY001CE9 BY00101F13 BY006-D BY005-A BY001D81
			ECZ – 0.24	1		
			HTZ – nil	N/A		
	Low	<5	TCZ – 0.07	1	6	BY001CF1 BY008-D BY008-A BY006-B BY006-A BY008-01-A
			ECZ – 0.05	1		
			HTZ – nil	N/A		
		>100	TCZ – 3.99	2		
			ECZ – 1.06	1		
			HTZ – 0.06	1		
	Moderate	>100	TCZ – 0.11	1	1	BY-014G
			ECZ – nil	N/A		
			HTZ – nil	N/A		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
	High	>100	TCZ – 0.67	1	5	BY016CE4 BY01640F BY-016A BY008-B BY006-C
			ECZ – 0.95	1		
			HTZ – nil	N/A		
	Very high	>100	TCZ – 0.22	1	1	BY-014E
			ECZ – 0.01	1		
			HTZ – nil	N/A		

Table 4-6: Vegetation integrity plot requirements for the Crookwell IBRA subregion

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
277	Low	>100	TCZ – 0.18	1	1	AUBY049
			ECZ – nil	N/A		
			HTZ – nil	N/A		
280	Very low	>100	TCZ – nil	N/A	1	BY044933
			ECZ – 0.02	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.69	1	2	BY044D31 BY0447A5
			ECZ – 0.94	1		
			HTZ – 0.01	1		
283	Very low	>100	TCZ – 2.78	2	2	BY06701BB5 BY068529
			ECZ – 0.13	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.24	1	1	511MP005
			ECZ – 0.05	1		
			HTZ – 0.01	1		
	Moderate	>100	TCZ – 0.18	1	2	146MP006 BY06701A72
			ECZ – 0.1	1		
			HTZ – nil	N/A		
	High	>100	TCZ – 0.6	1	2	146MP008 146MP007
			ECZ – 0.46	1		
			HTZ – nil	N/A		
335	Very high	>100	TCZ – 0.36	1	2	BY03412A

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			ECZ – 0.01	1		BY03426A
			HTZ – nil	N/A		
679	Low	>100	TCZ – 0.36	1	**0**	**BY044B95S****
			ECZ – 0.02	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.42	1	1	BY044B95
			ECZ – 0.08	1		
			HTZ – nil	N/A		
	High	>100	TCZ – 0.07	1	4	BY-049D BY044EBA BY096B08 BY049EDB
			ECZ – 0.15	1		
			HTZ – nil	N/A		
727	Very Low	>100	TCZ – 0.64	1	3	BY045261 BY045BFA BY045473
			ECZ – 0.04	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.36	1	1	AUBY049-2
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 1.11	1	3	BY-049B BY0455B5 BY04996D
			ECZ – 0.07	1		
			HTZ – nil	N/A		
	Very High	>100	TCZ – 1.33	1	3	BY-049C BY-049A BY-048A
			ECZ – 0.33	1		
			HTZ – 0.01	1		
731	Low	>100	TCZ – 3.4	2	7	BY0348E7 BY-032C BY03130D BY034A6C BY034745 BY0349F2 BY034E63
			ECZ – 0.18	1		
			HTZ – nil	N/A		
	High	>100	TCZ – 0.36	1	3	BY-032B BY0340E3 BY03470F
			ECZ – 0.81	1		
			HTZ – 0.01	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
	Very high	>100	TCZ – 1.01	1	2	BY035E53 BY-032A
			ECZ – 1.4	1		
			HTZ – 0.07	1		
952	Very Low	>100	TCZ – 3.65	2	4	BY-026A BY02867D BY028EAB AUBY028
			ECZ – 0.4	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.72	1	3	BY-029C BY027DFA BY027HJJ
			ECZ – 0.27	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.52	1	5	BY-029D BY-032D BY-029B BY-029A BY-026B
			ECZ – 0.39	1		
			HTZ – nil	N/A		
1093	Very Low	>100	TCZ – 4.01	2	3	BY076B8A BY0763CA BY-057A
			ECZ – 0.29	1		
			HTZ – 0.02	1		
	Low	>100	TCZ – 3.10	2	3	BY0529A5 BY0382AE BY038CA3
			ECZ – 0.27	1		
			HTZ – nil	N/A		
		<5	TCZ – nil	N/A		
			ECZ – 0.01	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.67	1	3	BY076ED0 BY0573C9 BY052BA4
			ECZ – 0.49	1		
			HTZ – 0.01	1		
		<5	TCZ -0.09	1		
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	High	>100	TCZ – 4.34	2	6	BY083EC7 BY052FAF BY052F82 BY052A65 BY05274F BY0448CD

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			ECZ – 3.15	2		
			HTZ – 0.04	1		
1151	Low	>100	TCZ – 1.73	1	3	BY-054C BY-037B BY-054D
			ECZ – 0.12	1		
			HTZ – 0.19	1		
	High	>100	TCZ – 2.36	2	6	BY056C93 BY-054B BY-054A BY0362A1 BY036053 BY0369DB
			ECZ – 3.26	2		
			HTZ – 0.06	1		
	Very High	>100	TCZ – 0.83	1	4	BY-037A BY035D53 BY03714E BY037F1D
			ECZ – 3.07	2		
			HTZ – 0.13	1		
1191	Very low	>100	TCZ – 0.69	1	2	BY06701F54 BY066AC48
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.13	1	1	146MP009
			ECZ – nil	N/A		
			HTZ – nil	N/A		
1256	Low	>100	TCZ – 0.29	1	1	BY-057C
			ECZ – 0.02	1		
			HTZ – nil	N/A		
1330	Very low	>100	TCZ – 42.52	4	4	BY066A52 BY0651CB BY065325 BY0962C8
			ECZ – 0.57	1		
			HTZ – 0.01	1		
		25 – 100	TCZ – 1.71	1		
			ECZ – 0.11	1		
			HTZ – nil	N/A		
		<5	TCZ – nil	N/A		
			ECZ – 0.01	1		
			HTZ – nil	N/A		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
	Low	>100	TCZ – 7.32	3	7	BY1004EA BY-057B BY-048B BY0573C2 BY100142 BY047F67 511MP002
			ECZ – 2.85	2		
			HTZ – 0.03	1		
		25 – 100	TCZ – nil	N/A		
			ECZ – 0.14	1		
			HTZ – 0.02	1		
		<5	TCZ - nil	N/A		
			ECZ – 0.05	1		
			HTZ - nil	N/A		
	Moderate	>100	TCZ – nil	N/A	1	BY-049E
			ECZ – 0.06	1		
			HTZ – nil	N/A		
	High	>100	TCZ – 0.64	1	7	BY103-A 511MP003 511MP001 511MP004 BY06703F9B BY06703F_a BY05708A
			ECZ – 1.88	1		
			HTZ – 0.05	1		
		<5	TCZ – nil	N/A		
			ECZ – 0.18	1		
			HTZ – 0.01	1		
	Very high	>100	TCZ – 0.65	1	5	BY098822 BY099CD1 BY0996BD BY098179 BY0991C2
			ECZ – 2.09	2		
			HTZ – 0.16	1		

Table 4-7: Vegetation integrity plot requirements for the Murrumbateman IBRA subregion

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
266	Very low	>100	TCZ – 1.91	1	3	YG0288A1 YG02859F YG028306
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Low	<5	TCZ – 0.11	1	0	**YG037-1S***** **YG03577BS***** **YG035CD2S*****
			ECZ – 0.02	1		
			HTZ – nil	N/A		
		>100	TCZ – 0.1	1		
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Moderate	>100	TCZ - 0.29	1	1	YG007FE8
			ECZ - 0.02	1		
277	Low	>100	TCZ – 0.18	1	0	**WM046550S***** **YG0056F6S***** **YG-042BS***** **WM037-01S***** **WM05392CS***** **WM029882S***** **YG0075A7S*****
			ECZ – nil	N/A		
			HTZ – nil	N/A		
280	Very Low	>100	TCZ – 8.61	3	4	YG026A72 BY1200488D BY115C0D 6699ABB4
			ECZ – 0.06	1		
			HTZ – nil	N/A		
	Low	<5	TCZ – 0.11	1	2	YG02401 YG024F50
			ECZ – nil	N/A		
			HTZ – nil	N/A		
		5-25	TCZ – 0.01	1		
			ECZ – 0.01	1		
			HTZ – nil	N/A		
		>100	TCZ – 3.33	2		
			ECZ – 0.01	1		
			HTZ – nil	N/A		
	Moderate	<5	TCZ – 0.03	1	2	YG02634E BY12003FEA
			ECZ – nil	N/A		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			HTZ – nil	N/A		
		5-25	TCZ – 0.2	1		
			ECZ – 0.02	1		
			HTZ – nil	N/A		
		>100	TCZ – 0.41	1		
			ECZ – 0.26	1		
			HTZ – nil	N/A		
	High	>100	TCZ – 1.46	1	5	YG020D4B YG020259 YG02001 BY1155B8 BY115ABC
			ECZ – 0.9	1		
			HTZ – 0.01	1		
283	High	>100	TCZ – 0.06	1	2	BY111AB5 BY103E46
			ECZ – 0.37	1		
			HTZ – nil	N/A		
	Very High	>100	TCZ – 0.18	1	4	BY111E49 BY10369E BY10345E BY111463
			ECZ – 0.18	1		
			HTZ – nil	N/A		
287	Very Low	>100	TCZ – 0.12	1	4	YG013C29 YG01368F YG013BA5 YG0138B4
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.01	1	2	YG0130F0 BY1060BE
			ECZ – 0.21	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.78	1	3	YG013560 YG01331A YG013C20
			ECZ – 0.11	1		
			HTZ – nil	N/A		
322	Low	>100	TCZ – 0.55	1	1	BY14305C
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	High	>100	TCZ – 0.23	1	1	BY1430A1
			ECZ – 0.1	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			HTZ – nil	N/A		
349	Very low	>100	TCZ – 1.26	1	4	BY13019F8D BY13019DA7 BY1301901C BY1301923A
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.7	1	2	BY1301709A BY13017C4F
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.8	1	5	BY1301916A BY1301948C BY13018553 BY13017BFB BY13017B1B
			ECZ – 0.58	1		
			HTZ – 0.01	1		
	Very high	>100	TCZ – 0.25	1	3	BY1301723F BY13018AB5 BY13017EE2
			ECZ – 0.39	1		
			HTZ – nil	N/A		
351	Very Low	>100	TCZ – 1.15	1	8	YG018179 YG01809F YG018D51 YG0193DC YG017816 YG019179 YG019D51 YG01909F
			ECZ – 0.02	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 1.05	1	2	YG019620 YG0172F3
			ECZ – 0.04	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.97	1	2	YG01933B YG01601
			ECZ – 1.12	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			HTZ – 0.05	1		
	High	>100	TCZ – 1.88	1	2	BY130160BC BY1301600E
			ECZ – nil	N/A		
			HTZ – nil	N/A		
352	Very Low	>100	TCZ – 3.28	2	2	YG01407E YG013024
			ECZ – 0.02	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 2.15	2	2	YG014754 BY11301ADB
			ECZ – 0.23	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 1.13	1	2	YG014FF0 YG013197
			ECZ – 0.42	1		
			HTZ – nil	N/A		
731	High	>100	TCZ – 0.05	1	2	BY13011EC5 BY13010FC9
			ECZ – 0.53	1		
			HTZ – 0.02	1		
1093	Very Low	>100	TCZ – 0.57	1	4	BY1301695A BY13010D40 BY13010602 BY1305FF
			ECZ – 0.01	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 1.09	1	1	BY13012678
			ECZ – 0.08	1		
			HTZ – 0.04	1		
	Moderate	>100	TCZ – 1.92	1	4	BY1301202 BY1301503 BY13001795 BY130029A6
			ECZ – 1.65	1		
			HTZ – 0.02	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
	Very High	>100	TCZ – 5.98	3	12	BY13012ACE BY130126C4 BY1300903B BY13009E6B BY1110C5 BY111515 6699ABB2 BY1301201 BY1301501 BY1301502 BY130163BC BY130164B3
			ECZ – 7.34	3		
			HTZ – 0.19	1		
1256	Very low	>100	TCZ – 0.01	1	0	**BY-057CS*** **
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.02	1	2	YG027B8E YG0275EA
			ECZ – nil	N/A		
			HTZ – nil	N/A		
1330	Very low	<5	TCZ – nil	N/A	15	YG0068A8 YG00769F BY130146D8 BY1301437A BY13012976 13002214 13002B22 B12851A BY12502584 BY122021B6 BY12201A52 BY122EC8 BY117039A3 BY115016 BY11301346
			ECZ – 0.01	1		
			HTZ – nil	N/A		
		>100	TCZ – 41.22	4		
			ECZ – 1.03	1		
			HTZ – 0.04	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
	Low	<5	TCZ – 0.08	1	4	BY13019B24 BY103FFB BY1037A5 YG027B04
			ECZ – nil	N/A		
			HTZ – nil	N/A		
		>100	TCZ – 13.83	3		
			ECZ – 3.43	2		
			HTZ – 0.05	1		
	Moderate	<5	TCZ – 0.2	1	4	BY13019757 BY130193A7 6699ABB3 BY13001091
			ECZ – 0.15	1		
			HTZ – 0.03	1		
		>100	TCZ – 2.52	2		
			ECZ – 1.87	1		
			HTZ – 0.02	1		
	High	>100	TCZ – 1.27	1	7	BY143551 BY13011940 BY128F52 BY113010D9 BY113010D2 BY1117D0 BY11136B
			ECZ – 4.05	2		
			HTZ – 0.16	1		
	Very high	>100	TCZ – 0.5	1	2	6699ABB1 BY11154F
			ECZ – 0.52	1		
			HTZ – nil	N/A		

Table 4-8: Vegetation integrity plot requirements for the Inland Slopes IBRA subregion

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
5	Low	>100	TCZ – 0.04	1	1	YG035B13
			ECZ – 0.05	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.48	1	3	WM0248F6 WM02478C WM024949
			ECZ – 1.5	1		
			HTZ – 0.22	1		
266	Very low	<5	TCZ – nil	N/A	3	MA089714 YG037B35 21
			ECZ – 0.02	1		
			HTZ – nil	N/A		
		>100	TCZ – 8.7	3		
			ECZ – 0.01	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 23.66	4	6	MA-089A YG037-1 WM006289 MA0926A9 YG03577B YG035CD2
			ECZ – 1.5	1		
			HTZ – 0.14	1		
	Moderate	>100	TCZ – 4.28	2	3	YG007C9C WM0083F2 20
			ECZ – 1.03	1		
			HTZ – 0.08	1		
	High	>100	TCZ – 8.6	3	9	MA2067A MA2-067A MA2-067B 6699ABB5 YG040-1 YG040-4 YG040-3 YG040-2 MA2067B
			ECZ – 1.9	1		
			HTZ – 0.22	1		
268	Very low	>100	TCZ – 0.4	1	2	5 19
			ECZ – nil	N/A		
			HTZ – nil	N/A		

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
	Low	>100	TCZ – 15.35	3	8	WM053A1A WM05303E WM055735 WM0557B3 13 15 16 17
			ECZ – 0.15	1		
			HTZ – nil	N/A		
		<5	TCZ -nil	N/A		
			ECZ – 0.09	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.64	1	4	14 1 34 31
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	High	>100	TCZ – 0.25	1	7	WM051799 MA092758 MA092425 3 2 30 25
			ECZ – 0.33	1		
			HTZ – nil	N/A		
	Very high	>100	TCZ – 7.42	3	13	WM053FFF WM04792A WM047180 WM047D5B WM05731A WM053CE7 WM0571B0 WM0552AC WM055ADB WM0572CF WM057A2F WM057074 WM055733
			ECZ – 1.3	1		
			HTZ – 0.05	1		
277	Very Low	>100	TCZ – 102.79	6	18	WM0465B2 YG030A3A YG0308A7 YG030D7D YG030230 YG030ED6 YG030881 YG030B22 YG005A75 YG002F69 YG001AA0 YG001693 BY143C11 BY145882 YG-042E YG-042D YG-042F MA096050
			ECZ – 1.8	1		
			HTZ – 0.22	1		
		5 – 25	TCZ – 0.14	1		
			ECZ – nil	N/A		
			HTZ – nil	N/A		
		<5	TCZ – 0.04	1		
			ECZ – 0.15	1		
			HTZ – 0.01	1		
	Low	>100	TCZ – 6.85	3	7	WM046550 YG0056F6 YG-042B
			ECZ – 2.48	2		

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
			HTZ – 0.28	1		WM037-01 WM05392C WM029882 YG0075A7
		<5	TCZ – 0.81	1		
			ECZ – 0.42	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 2.4	2	4	BY145C9B YG-042G MA09282A WM0320E5
			ECZ – 1.2	1		
			HTZ – 0.13	1		
	High	>100	TCZ – 0.75	1	8	WM045F7E WM045964 YG030560 YG030MP2 WM032F4C WM0328F6 WM0422CA WM0427BE
			ECZ – 3.2	2		
			HTZ – 0.17	1		
278	Very Low	>100	TCZ – 5.2	3	5	YG0011A7 YG001B70 YG001E6E YG001D0C YG001DF2
			ECZ – 0.06	1		
			HTZ – 0.01	1		
	Low	>100	TCZ – 0.76	1	3	BY14520E YG-042C WM032BE8
			ECZ – 1.7	1		
			HTZ – 0.1	1		
		<5	TCZ – 0.06	1		
			ECZ -nil	N/A		
			HTZ -nil	N/A		
	High	>100	TCZ – 0.23	1	2	BY14562F BY1459EC
			ECZ – 0.83	1		
			HTZ – 0.1	1		
280	Very Low	>100	TCZ – 29.03	4	6	MA05903-01 MA059039C8 MA079354 MA079C4E MA079EA6 MA05912DC0
			ECZ – 0.59	1		
			HTZ – 0.02	1		

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
		25 – 100	TCZ – 0.04	1		
			ECZ – nil	N/A		
			HTZ – nil	N/A		
		<5	TCZ – 0.03	1		
			ECZ – 0.12	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 1.2	1	1	WM060777
			ECZ – 0.11	1		
			HTZ -nil	N/A		
	Moderate	25 – 100	TCZ – 1	1	5	MA098668 MA079A30 MA079E17 YG029641 WM046356
			ECZ – 0.27	1		
			HTZ -nil	N/A		
		>100	TCZ – 7.8	3		
			ECZ – 2.1	2		
			HTZ – 0.21	1		
	High	25 – 100	TCZ – 0.82	1	7	MA-086A MA-087A MA05905-01 MA05903241 MA05903706 WM046FC8 WM0469C6
			ECZ – 0.2	1		
			HTZ – nil	N/A		
		>100	TCZ – 5.4	3		
			ECZ – 2.4	2		
			HTZ – 0.11	1		
287	Very Low	>100	TCZ – 1.3	1	0	**WM058E47S****
			ECZ – 0.03	1		
			HTZ -nil	N/A		
	Low	>100	TCZ – 0.1	1	1	WM058E47
			ECZ -nil	N/A		
			HTZ -nil	N/A		
	Moderate	>100	TCZ – 0.76	1	2	BY15469A WM060069
			ECZ – 0.26	1		
			HTZ -nil	N/A		
	High	>100	TCZ – 0.07	1	1	YG030D4A
			ECZ – nil	N/A		
			HTZ -nil	N/A		
	Very high	>100	TCZ – 0.63	1	0	**IN287BENCH**

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
			ECZ – 2.2	2		
			HTZ – 0.09	1		
290	Very Low	>100	TCZ – 4.4	2	6	WM0598AD WM058DCC WM0580FD WM05876E WM060ED7 WM060FE9
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 1.2	1	2	YG035805 WM059CE5
			ECZ – 0.05	1		
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 0.47	1	2	WM05927D WM057IS1
			ECZ – 0.17	1		
			HTZ -nil	N/A		
	High	>100	TCZ – 3.2	2	3	WM057IS2 WM057742 WM061487
			ECZ – 1.2	1		
			HTZ – 0.03	1		
294	Low	>100	TCZ – 0.12	1	2	28 36
			ECZ -nil	N/A		
			HTZ -nil	N/A		
	Moderate	>100	TCZ -0.02	1	3	4 29 11
			ECZ -nil	N/A		
			HTZ -nil	N/A		
295	Moderate	>100	TCZ – 0.57	1	1	MA0926CA
			ECZ – 0.22	1		
			HTZ -nil	N/A		
297	Very Low	>100	TCZ – 0.54	1	5	WM058F1D WM058EAA WM05968C WM0584DB WM0587EC
			ECZ – 0.06	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.03	1	2	WM0581E8 WM058C4E
			ECZ – 0.02	1		
			HTZ -nil	N/A		
	Moderate	>100	TCZ – 0.87	1	6	WM05881E WM05852D WM058C61 WM058BE9 WM058F00
			ECZ – 0.49	1		

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
			HTZ -nil	N/A		WM058D03
299	Very Low	>100	TCZ – 0.13	1	1	WM06217010
			ECZ – 0.98	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 0.05	1	0	**WM0621710S*** WM06217E6S*****
			ECZ – 0.08	1		
			HTZ -nil	N/A		
	Moderate	>100	TCZ – 0.04	1	0	**WM0621710S*** WM06217E6S*****
			ECZ – nil	N/A		
			HTZ -nil	N/A		
301	Very low	>100	TCZ – 0.29	1	1	MA092960
			ECZ -nil	N/A		
			HTZ -nil	N/A		
	Low	>100	TCZ – 1.8	1	2	MA089096 MA-089C
			ECZ -nil	N/A		
			HTZ -nil	N/A		
	Moderate	>100	TCZ – 0.72	1	1	MA09247B
			ECZ -nil	N/A		
			HTZ -nil	N/A		
	High	>100	TCZ – 0.6 ECZ -nil	1 N/A	4	MA-089B MA089A15 MA-014A5 MA0929CA
			HTZ -nil	N/A		
306	Very Low	>100	TCZ – 2.4	2	2	AUMA038-2 AUMA038-3
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 1.2	1	1	AUMA038-1
			ECZ – 0.13	1		
			HTZ – 0.03	1		
314	Very Low	>100	TCZ – 2.5	2	2	MA0592BA7 MA05902638
			ECZ – 0.04	1		
			HTZ – 0.01	1		
	Low	>100	TCZ – 0.28	1	2	MA059023 MA059025C9
			ECZ – 0.12	1		

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
			HTZ – nil	N/A		
	Moderate	>100	TCZ – 2.6	2	3	MA059030D1 MA059032E2 MA05902317
			ECZ – 0.61	1		
			HTZ – 0.04	1		
	Very high	>100	TCZ – 1.2	1	0	**IN314BENCH**
			ECZ – 0.15	1		
			HTZ – 0.01	1		
316	Very low	>100	TCZ – 0.11	1	1	MA0518FD
			ECZ – 0.03	1		
			HTZ – nil	N/A		
	Low	>100	TCZ – 5.46	3	3	MA05134E MA0515FE MA0513EB
			ECZ – 0.09	1		
			HTZ – nil	N/A		
	Very high	>100	TCZ – 2.95	2	4	MA051576 MA0518AA MA0510DF MA051544
			ECZ – 7.97	3		
			HTZ – 0.54	1		
319	Low	>100	TCZ – 0.86	1	6	WM016B40 WM013E61 WM0138DE WM01690B WM01613A WM013D3B
			ECZ – 0.01	1		
			HTZ -nil	N/A		
	Moderate	>100	TCZ – 0.53	1	2	WM0139C1 WM013669
			ECZ – 0.07	1		
			HTZ -nil	N/A		
343	Very Low	>100	TCZ – 3.1	2	7	WM04487C WM044A25 WM04353B WM043E66 WM034766 WM04414B WM034767
			ECZ – 0.12	1		
			HTZ -nil	N/A		
	Low	>100	TCZ – 0.89	1	2	WM0334B9 WM044D65
			ECZ – 0.08	1		
			HTZ -nil	N/A		

PCT ID	Condition	Patch size (ha)	Estimated clearing extent*(ha)	Minimum plots required	Plots completed	Plots codes
	Moderate	>100	TCZ – 0.9	1	8	WMO45E81 WM018002 WM018003 WM0187E3 WM033A29 WM033AC8 WM035A55 WM044C69
			ECZ – 0.75	1		
			HTZ – 0.04	1		
352	Very Low	>100	TCZ – 6.3	3	2	AUMA038-5 AUMA038-4
			ECZ – 0.03	1		
			HTZ -nil	N/A		
	Low	>100	TCZ – 1.39	1	0	YG014754S*** BY11301ADS***
			ECZ – nil	N/A		
			HTZ -nil	N/A		
731	Very Low	>100	TCZ – 0.7	1	0	BY0348E7S*** BY-032CS*** BY03130DS*** BY034A6CS*** BY034745S*** BY0349F2S*** BY034E63S***
			ECZ – 0.07	1		
			HTZ -0.03	1		
	Low	>100	TCZ – 0.38	1	0	BY0348E7S*** BY-032CS*** BY03130DS*** BY034A6CS*** BY034745S*** BY0349F2S*** BY034E63S***
			ECZ – 0.07	1		
			HTZ – 0.03	1		
1191	Very low	>100	TCZ – 0.16	1	1	MA096678
			ECZ -0.17	1		
			HTZ -nil	N/A		

Table 4-9: Vegetation integrity plot requirements for the Bondo IBRA subregion

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
285	Low	>100	TCZ – 1.06	1	3	WM06217856 WM06217A0F WM0621707C
			ECZ – 3.06	2		
	High		TCZ – 1.08	1	0	**WM062175DS**** **WM062172CS**** **WM062176CS**** **WM06217A4S**** **WM062170DS**** **WM062170AS**** **WM062170ES**** **WM062170BS****
			ECZ – 3.73	2		
			HTZ – 0.2	1		
	Very High		TCZ – 0.1	1	8	WM062175D5 WM062172CC WM062176CD WM06217A47 WM0621707D WM0621707A WM0621707E WM0621707B
			ECZ – 0.38	1		
			HTZ – 0.01	1		
290	Low	>100	TCZ – 0.18	1	0	**YG035805S***** **WM059CE5S*****
295	Moderate	>100	TCZ – 1.07	1	5	MA-014A2 MA-092C MA09208C MA09249A MA092B25
			ECZ – 2.12	2		
299	Very low	>100	TCZ – 0.49	1	2	MA-092A MA-092B
			ECZ – 1.17	1		
	Moderate		TCZ – 3.96	2	6	WM0948A5 MA09278F MA092743 MA092318 WM0621710B WM06217E63
			ECZ – 11.28	3		
			HTZ – 0.22	1		
300	Low	>100	TCZ – 0.14	1	0	**WM0944C5S***** **WM0905DDS***** **WM0621501S*****
	Moderate		TCZ – 0.35	1	3	WM0944C5 WM0905DD WM0621501A
			ECZ – 1.06	1		
352	Low	>100	TCZ – 0.07	1	0	**YG014754S***** **BY11301ADS*****

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
638	Very low	>100	TCZ – 0.06	1	1	MA011069
			ECZ – 0.14	1		
			HTZ – 0.02	1		
	Low		TCZ – 0.1	1	0	**MA0117F6S***** **MA011FD6S*****
			ECZ – 0.05	1		
	High		TCZ – 1.52	1	3	MA011493 MA011BEE MA011781
			ECZ – 4.12	2		
			HTZ – 1.11	1		
953	Very low	>100	TCZ – 0.03	N/A	0	**MA094OUT3S*****
	Moderate		TCZ – 0.06	1	0	**MA0041AAS***** **WM0942C1S*****
			ECZ – 0.53	1		

Table 4-10: Vegetation integrity plot requirements for the Snowy Mountains IBRA subregion

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
285	Low	>100	TCZ- 0.41	1	1	MA0114DD
			ECZ- 1.02	1		
			HTZ- 0.09	1		
300	Low	>100	TCZ – 0.49	1	1	MA094OUT2
			ECZ – 0.12	1		
			HTZ – 0.13	1		
	Moderate	>100	TCZ – 0.07	1	1	WM094E1
			ECZ – 0.2	1		
			HTZ – 0.01	1		
	Very High	>100	TCZ- 4.85	2	4	WM094A1B WM0941A7 WM094765 WM094607
			ECZ- 9.02	3		
			HTZ- 3.24	2		
637	High	>100	TCZ- 0.02	1	1	MA0027A2
			ECZ- nil	N/A		
			HTZ- nil	N/A		
638	Low	>100	TCZ – 0.64	1	2	MA0117F6 MA011FD6
			ECZ – 0.82	1		

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
679			HTZ – 0.07	1		
	Moderate	>100	TCZ – 4.93	2	3	WM094C38 MA011680 MA01117E
			ECZ – 7.62	3		
			HTZ – 3.23	2		
	High	>100	TCZ – 13.15	3	15	WM0944D7 WM09498C WM094A73 WM094F0B WM094580 WM094613 WM094037 MA011F2F MA01121A MA01101C MA011756 MA0117D7 MA011440 MA0112ED MA011020
			ECZ – 21.94	4		
			HTZ – 7.63	3		
	Low	>100	TCZ – 0.27	1	1	MA002091
			ECZ – nil	N/A		
			HTZ – nil	N/A		
	High	>100	TCZ – 1.55	1	1	MA002A7B
			ECZ – 1.73	1		
			HTZ – 0.17	1		
939	Very High	>100	TCZ – 0.07	1	1	WM094BOG2
			ECZ – 0.45	1		
			HTZ – 0.03	1		
953	Low	>100	TCZ – 5.62	3	5	MA094OUT5 MA094OUT1 MA094OUT4 MA094E3 WM094898
			ECZ – 2.04	1		
			HTZ – 0.4	1		
	Moderate	>100	TCZ – 3.21	2	2	MA0041AA WM0942C1
			ECZ – 5.04	3		
			HTZ – 0.61	1		
	High	>100	TCZ – 15.14	3	12	WM117798 WM094E0E WM094953 WM117287 WM114574

PCT ID	Condition	Patch size (ha)	Clearing zones (ha)	Minimum plots required	Plots completed	Plots codes
			ECZ – 17.54	3		WM1147C9 WM1140A2 WM094203 WM114C79 WM11484B WM117873 MA011LC1
			HTZ – 3.5	2		
	Very High	>100	TCZ – 12.43	3	6	WM094971 WM094284 MA-009A WM0945E2 WM114F2B MA0110C9
			ECZ – 19.7	3		
			HTZ – 4.4	2		
1196	Low	>100	TCZ – 0.93	1	2	MA0023AE WM0944CF
			ECZ – 0.55	1		
			HTZ – 0.11	1		
	High	>100	TCZ – 6.16	3	4	MA002A30 MA0077B6 MA002083 MA002430
			ECZ – 19.10	3		
			HTZ – 2.09	2		
1224	High	>100	TCZ – 0.02	1	2	MA0019FF MA001C58
			ECZ – nil	N/A		
			HTZ – nil	N/A		

4.5 Threatened flora survey methods

4.5.1 Review of existing information

A review of relevant public databases, existing reports and literature was undertaken for a 20-kilometre radius of the amended project footprint (the locality) to identify potentially occurring threatened flora species listed under both NSW and Commonwealth legislation (refer to Table 4-11).

Table 4-11: Information sources used to inform potentially occurring threatened flora species

Information source
NSW BioNet Atlas Database (NSW DCCEEW, 2024a) accessed 2022-2024 for: • spatial records of threatened flora listed under the BC Act within the locality • threatened biodiversity database collection (TBDC) information.
DPIE (not dated) BAM – Important Areas viewer. https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas
EPBC Act Protected Matters Search Tool (PMST) (Commonwealth DCCEEW, 2024a) accessed 2022-2024 for threatened flora species identified as MNES known from or with potential habitat within the locality.
BAM-C (Department of Primary Industries (DPI) 2021/22/23/24) (using benchmark condition for previously mapped PCTs) to identify candidate flora species credit species known or predicted to occur within the IBRA subregions intersecting the amended project footprint as follows: Bungonia, Crookwell, Murrumbateman, Inland Slopes, Bondo, Snowy Mountains.
The following documentation as relevant for candidate threatened flora species: • conservation advice • Species Profile and Threats Database (SPRAT) • final determinations • recovery plans.
Landscape information: • Niche vegetation mapping • Mitchell Landscapes (DECC, 2002) used to inform the soil and geology of potential habitat • NSW Hydrography (DCS, 2021b) • NSW Seamless Geology dataset (DRNSW, 2022).
Other existing records for threatened flora: • Forestry Corporation of NSW – Ecological information and spatial data provided by Dr Rohan Bilney of the NSW Forestry Corporation on 14 July 2022, relating to threatened flora within State forests • Canberra Orchid Society – spatial records of threatened orchids in the vicinity of the amended project footprint, provided by Derek Corrigan of Canberra Orchid Society on 5 January 2024 • NSW DCCEEW records of threatened orchids in the McPhersons Plain area from surveys in December 2023-February 2024 (provided by Angela Jenkins).

4.5.2 Habitat constraints assessment

Suitable habitat for potentially occurring candidate threatened flora species was delineated and mapped for the amended project footprint using a combination of:

- landscape information (refer to Chapter 5)
- known PCT associations (as identified within the BioNet Atlas Database (NSW DCCEEW, 2024a))
- vegetation mapping and BAM plot surveys
- available desktop data including soil and surface geology mapping (Section 4.5.1)
- supplementary approaches documented in Section 4.10.

Section 7.1 summarises the adopted approach to mapping habitat for candidate threatened species and the associated justification under the BAM (DPIE, 2020a). Attachment 1 documents the approach in more detail. Suitable habitat identified within the amended project footprint was subject to targeted survey in accordance with the methods detailed in Section 4.5.3. Where lands could not be accessed for field surveys, the candidate species were assumed to be present.

4.5.3 Targeted threatened flora surveys

Field surveys for threatened flora were carried out using a combination of parallel field traverses and a two-phase grid-based systematic survey approach as set out in the DPIE (2020c) Guideline for Surveying threatened plants and their habitats. In addition to systematic surveys, field teams were also opportunistically searching and recording any threatened flora species when traversing between sites.

Parallel field traverses involved searching along a grid of parallel transects at a set distance apart according to the lifeform and density of habitat for target candidate flora species. Each traverse was surveyed at walking pace by one ecologist (ELA, 2021).

Two-phase systematic surveys involved a grid spaced at 100-square-metres nested within a one-square-kilometre grid from a topographic map image and then overlayed onto the amended project footprint using a geographic information system (GIS). Surveys were undertaken where the 100-square-metre gridlines intersected with suitable habitat for a target species. At each grid-based flora survey location (grid intersect), a 40-metre diameter area (i.e., 1,256 square-metres) was systematically surveyed for the target species by at least two ecologists.

Where two-phase systematic surveys were mapped on land with no consent to enter, surveys were not conducted. If possible, a visual assessment was done over the fence to identify any conspicuous threatened flora species and/or suitability of habitat. The habitat mapping as described in Section 7.1 was used to determine where species presence has been assumed in inaccessible lands.

Survey for multiple target species occurred concurrently where species had similar habitat preferences, the same life form/habit, and the same optimal survey time, as specified by the Threatened Biodiversity Data Collection (TBDC). When a target species was located, finer-scale grid surveys were undertaken to locate the population extent, which helped define the species polygon extent. This subsequent phase ensured a greater intensity of survey effort in locations where the target species occurs (McGarvey et al., 2016).

Where threatened species were in high density (i.e., greater than 50 stems), the mean density was extrapolated by sampling over the observed area of occupancy. To adequately sample a dense population, two 30 metre transect lines were established one metre apart, and a stem count was then conducted within the area (30 square metres). The count recorded within the 30 square metre area was then extrapolated across the larger area. For larger areas of occupancy (i.e., more than 400 square metres) this count method was used multiple times to produce a more reliable estimate. This methodology was applied in accordance with the Guideline for Surveying threatened plants and their habitats (DPIE, 2020d).

Reference population checks were undertaken for candidate orchid species prior to targeted surveys (as detailed in Attachment 1, Section 2.6.1, Table A1-13. Where this was not possible, advice on likely flowering time and survey suitability was sought from NSW DCCEEW and species experts.

Opportunistic survey effort included consideration of vegetation cover and target species height; broadly:

- within 40 m of traverses in open vegetation and 20 m in closed vegetation for tree growth forms
- within 20 m of traverses in open vegetation and 10 m in closed vegetation for shrub growth forms

- within 10 m of traverses in open vegetation and 5 m in closed vegetation for grass, forb and orchid growth forms.

A summary of total threatened flora survey effort (excluding orchids) is shown in Table 4-12 in relation to IBRA subregions and timing of survey complete. Table 4-13 details effort specific to candidate orchid species. Survey effort associated with threatened flora parallel transects is summarised in Table 4-14. Attachment 1 provides detail regarding the threatened flora survey effort for each species and where this has resulted in a species polygon reduction. Figure 4-1 (Attachment 5) shows the location of targeted threatened flora surveys within the amended project footprint. Targeted surveys were conducted for all candidate flora species. Specific dates of survey and associated weather conditions are provided in Attachment 13 and summarised below. Relevant survey limitations are documented in Section 4.9.

Table 4-12: Count of grid-intersect flora surveys undertaken within potential threatened flora habitat (excluding orchid species).

IBRA subregion	Target species	Month surveyed	2021 (count)	2022 (count)	2023 (count)	Grand Total (count)
Bondo	All candidate species (except orchids) where survey timing corresponds with the BAM prescribed window	September	-	-	3	3
		October	-	-	3	3
Bungonia		January	-	37	-	37
		February	-	134	-	134
		September	130	-	-	130
		October	14	-	183	197
		December	-	-	234	234
Crookwell		January	-	26	-	26
		February	-	139	-	139
		March	-	9	-	9
		May	-	5	-	5
		September	104	-	-	104
		October	43	-	8	51
		December	-	-	36	36
Inland Slopes		January	-	6	-	6
		February	-	3	-	3
		March	-	139	-	139
		May	-	10	-	10
		September	171	-	292	463
		October	401	-	509	910
		November	156	-	-	156
		December	-	-	283	283
Murrumbateman		February	-	85	-	85
		March	-	3	-	3
		May	-	15	-	15
		September	476	-	1277	1753
		October	193	-	135	328

IBRA subregion	Target species	Month surveyed	2021 (count)	2022 (count)	2023 (count)	Grand Total (count)
		November	206	-	166	372
		December	135	-	82	217
Snowy Mountains		January	-	8	-	8
		March	-	8	10	18
		September	-	-	2	2
		October	-	-	74	74
		November	66	-	379	445
		December	-	-	407	407
Grand Total			**2095**	**627**	**4083**	**6805**

Table 4-13: Count of grid-intersect flora surveys carried out in potential threatened orchid habitat

IBRA subregion	Target species	Month surveyed	2021 (count)	2022 (count)	2023 (count)	Grand Total (count)
Bondo	*Caladenia montana*	October	-	-	3	3
Bungonia	*Genoplesium superbum*	February	-	23	-	23
	Diuris aequalis	October	-	-	13	13
Crookwell	*Diuris aequalis*	October	24	-	2	26
Inland Slopes	*Caladenia concolor* and *Prasophyllum petilum*	September	33	-	100	133
	Prasophyllum petilum	October	6	-	9	15
	Prasophyllum petilum	November	10	-	-	10
Murrumbateman	*Caladenia concolor* and *Prasophyllum petilum*	September	62	-	199	261
	Prasophyllum petilum	October	22	-	17	39
	Prasophyllum petilum	November	19	-	-	19
	Prasophyllum petilum	December	12	-	16	28
Snowy Mountains	*Caladenia montana* and *Pterostylis foliata*	October	-	-	35	35
	Caladenia montana, Pterostylis alpina, Pterostylis foliata and *Thelymitra alpicola*	November	72	-	377	449
	Prasophyllum bagoense, Prasophyllum keltonii, Pterostylis	December	-	-	207	207

IBRA subregion	Target species	Month surveyed	2021 (count)	2022 (count)	2023 (count)	Grand Total (count)
	oreophila and *Thelymitra alpicola*					
Grand Total			**260**	**23**	**997**	**1,280**

Table 4-14: Summary parallel transects effort (survey track length)

IBRA subregion	Target species	Month	Year	Transect length (m)
Bondo	*Pomaderris cotoneaster*	November	2020	7,543.82
Bungonia	*Genoplesium superbum*	February	2024	13,866.35
Crookwell	*Acacia bynoeana, Calotis glandulosa, Eucalyptus aggregata, Eucalyptus macarthurii, Grevillea iaspicula, Leucochrysum albicans subsp. tricolor, Persoonia mollis* subsp *revoluta, Pomaderris pallida* and *Solanum armourense*	March	2021	359,972.18
Inland Slopes	*Caladenia concolor, Grevillea wilkinsonii, Swainsona recta* and *Swainsona sericea*	October	2020	27,693.03
	Ammobium craspedioides	November	2020	97,680.48
	Leucochrysum albicans subsp. tricolor	March	2021	16,144.80
	Grevillea iaspicula, Leucochrysum albicans subsp. tricolor and *Senecio garlandii*	April	2021	19,286.44
	Grevillea iaspicula and *Senecio garlandii*	May	2021	30,906.65
Snowy Mountains	*Diuris ochroma*	January	2024	22,236.02
	Euphrasia_scabra	March	2024	16,304.89
	Diuris aequalis and *Swainsona sericea*	October	2020	22,213.17
	Pomaderris cotoneaster and *Pterostylis foliata*	November	2020	157,644.08
	Calotis glandulosa, Eucalyptus aggregata, Leucochrysum albicans subsp. tricolor, Thesium australe and *Xerochrysum palustre*	February	2021	227,474.14
	Calotis glandulosa, Eucalyptus aggregata, Leucochrysum albicans subsp. tricolor and *Xerochrysum palustre*	March	2021	112,227.76
	Leucochrysum albicans subsp. tricolor	April	2021	110,520.22
	Leucochrysum albicans subsp. tricolor	May	2021	55,935.44
Grand Total				**1,297,649.47**

4.6 Threatened fauna survey methods

4.6.1 Review of existing information

A review of relevant public databases, existing reports and literature was undertaken for a 20-kilometre radius of the amended project footprint (the locality) to identify potentially occurring threatened fauna species listed under both NSW and Commonwealth legislation (refer to Table 4-15).

Table 4-15: Information sources used to inform potentially occurring threatened fauna species

Information source
NSW BioNet Atlas Database (NSW DCCEEW, 2024a) for: • Spatial records of threatened fauna listed under the BC Act within a 20 km radius of the amended project footprint • Threatened Biodiversity Database Collection (TBDC) information.
DPIE (not dated (N.D.)) BAM – Important Areas viewer. https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas
Ecological information and spatial data provided by Dr Rohan Bilney FCNSW on 14 July 2022, relating to threatened fauna within State forests.
EPBC Act PMST (Commonwealth DCCEEW, 2024a) for threatened fauna species and migratory species identified as MNES known from or with potential habitat within the locality.
BAM-C (OEH, 2023) (using benchmark condition for PCTs mapped by previous vegetation community mapping projects) to identify candidate species credit species and predicted ecosystem credit species known or predicted to occur within the IBRA subregions intersecting the amended project footprint: Bungonia, Crookwell, Murrumbateman, Inland Slopes, Bondo, Snowy Mountains.
The following documentation as relevant for candidate threatened fauna species: • conservation advice • SPRAT profiles • final determinations • recovery plans.
NSW Hydrography – Strahler Stream Order (DPI, 2024)
Booroolong Frog Habitat Mapping provided by DPE (2023), relating to known Booroolong Frog habitat

4.6.2 Habitat constraints assessment

Fauna habitat assessments were undertaken for all accessible lands within the amended project footprint to assess habitat suitability for threatened fauna species (those species known or predicted to occur within the locality from previous data collection, literature, and database review). Fauna habitat characteristics assessed included, but were not limited to:

- the structure and floristics of the canopy, understorey, and groundcover vegetation, including the presence of flowering and fruiting trees providing potential foraging resources for a range of species
- physical aspects such as geology, soils, slope, elevation, drainage, and aspect
- identification and mapping of reptile habitat such as outcropping rock with exfoliations, rocky hillslopes (potential habitat for Pink-tailed Legless Lizard *(Aprasia parapulchella)* and Striped Legless Lizard *(Delma impar)*), crevice habitat or termite mounds (ie habitat for Broad-headed Snake [*Hoplocephalus bungaroides*] and Rosenberg's Goanna [*Varanus rosenbergi*])
- identification and mapping of large canopy stick nests, ground refugia, feed trees and hollow-bearing trees of different size classes that could potentially support threatened microbats, gliders, owls, cockatoos, or raptors
- presence and abundance of groundcover vegetation, leaf litter, fallen timber and man-made structures as potential to provide shelter for invertebrates, ground-dwelling mammals, reptiles, and amphibians

- presence and profiling of waterways (ephemeral or permanent) and water bodies.

Opportunistic sightings of animals were recorded. Indirect evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc was also noted.

Other considerations included:

- landscape information (refer to Chapter 5)
- known PCT associations (as identified within the BioNet Atlas Database (NSW DCCEEW, 2024a)
- vegetation mapping and BAM plot surveys
- available desktop data including soil and surface geology mapping (Section 4.5.1)
- supplementary approaches documented in Section 4.10.

Section 7.1 details the adopted approach to mapping habitat for candidate threatened fauna species and the associated justification under the BAM (DPIE, 2020a). Suitable habitat identified within the amended project footprint was subject to targeted survey in accordance with the methods detailed in Section 4.6.3. Where habitats could not be accessed for field survey, the candidate species were assumed present.

4.6.3 Targeted threatened fauna surveys

Survey methods were selected to detect target candidate threatened fauna species, as well as to employ a broad range of survey techniques that allowed for detection of the variety of fauna species groups. Relevant threatened species guidelines and the TBDC (NSW DCCEEW, 2024b) were consulted to assist in determining appropriate survey methods, effort, and timing (refer to Table 4-15). Survey methods utilised are outlined in Table 4-16. Targeted fauna survey effort is summarised in Table 4-17 and shown in Figure 4-2[3] (Attachment 5). Attachment 1 provides a detailed overview of the survey effort review and final species polygon development process undertaken to support these outcomes.

Table 4-16: Fauna survey methods implemented for the assessment

Survey method	Description
Diurnal bird surveys	Formal 20-minute diurnal bird searches were completed typically by two ecologists. 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. Bird surveys were completed during different times of the day, but generally occurred during early morning hours or approaching evening. Birds were also recorded opportunistically during all other surveys. The candidate bird species (where relevant to the IBRA-subregions) targeted during diurnal bird surveys included: • Superb Parrot (*Polytelis swainsonii*) • Pink Robin (*Petroica rodinogaster)* • Glossy Black-Cockatoo (*Calyptorhynchus lathami*) • Gang-gang Cockatoo (*Callocephalon fimbriatum*) • White-bellied Sea-eagle (*Haliaeetus leucogaster*)

[3] Note: Figure 4-2 Legend states 'location of fauna survey points adjusted for clarity' - Given many of the records directly overlap in a specific location, each points location has been randomly shifted so that more than one point can be visualised at the map scale. At the map scale used for the figures this is approximately up to 20 metres. The source data location is maintained while the visual representation on the figures is slightly altered.

Survey method	Description
	• Square-tailed Kite (*Lophoictinia isura*) • Little Eagle (*Haliaeetus morphnoides*). Targeted survey effort conducted for the above list of candidate species is outlined in Table 4-17. Survey guidelines implemented: • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004) • *Survey guidelines for Australia's threatened birds* (DEWHA 2010a).
Acoustic microbat surveys	Passive ultrasonic bat detectors (Anabat Swift/ Anabat Express – Titley Scientific, Brendal QLD; or SM4Bat – Wildlife Acoustics, Inc., Maynard, MA USA) were used to record and identify the echolocation calls of microchiropteran bats foraging at each survey site. Passive monitoring of survey sites was achieved by setting bat detectors to record throughout the night. Calls were analysed by Greg Ford, and Kayla McGregor using AnalookW (Version 4.7) software with reference to 'Bat Calls of NSW: Region Based Guide to the Echolocation Calls of Microchirpoteran Bats' (Pennay *et al*., 2004). Targeted survey effort for threatened microbat species is outlined in Table 4-17. Survey guidelines implemented: • *'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method* (DPIE 2021a).
Microbat harp trapping	Although many microchirpoteran bat species are detectable through call detection methodologies, the vocal differences between species such as *Nyctophilus sp*. are sometimes too subtle to reliably differentiate between the various species occurring in each locality. In addition, harp trapping can provide additional information on sex, age, reproductive status, and other characteristics that can be assessed. Such information is required for surveys targeting breeding habitat for dual credit species. Site selection for the setting of harp traps included several considerations including suitable flyways and target species roosting and foraging habitat requirements. Harp traps were set at each location over a two-night period between spring and summer months (surveys best conducted between October and April for most species). Captured bats were identified to species level, sexed, measured, and weighed. Bats were released immediately after processing during dark conditions. Targeted survey effort for harp trapping is outlined in Table 4-17. Species targeted included: Southern Myotis (*Myotis Macropus*), Large-eared Pied Bat (*Chalinolobus dwyeri*), and Large Bent-winged Bat (*Miniopterus orianae oceanensis*). Survey guidelines implemented: • *'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method* (DPIE 2021a).
Stagwatching	Stagwatching is primarily used to detect hollow-dependant arboreal mammals, owls, cockatoos and microchirpoteran bat species emerging or returning to tree hollows. Observations were usually conducted just before dusk (30 minutes before) and for a short time afterwards (30 to 60 minutes after) and involved stationing observers near dead or living hollow-bearing trees so that they could identify and count the nocturnal species that emerged. Targeted survey effort for stagwatching is outlined in Table 4-17. Survey guidelines implemented: • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004) • *Survey guidelines for Australia's threatened mammals* (DESWPC 2011a).
Nocturnal call playback	Call playback surveys (broadcasting) were conducted in conjunction with stagwatching and spotlight surveys. The broadcasting of pre-recorded calls of target species (Owls, Koala and Gliders) was undertaken intermittently for five minutes, followed by a listening period for 10 minutes. Following on from the listening period, observers inspected the immediate vicinity with a spotlight to see if non-vocalising fauna were attracted to the calls (for a minimum of 10 minutes). Targeted survey effort for Nocturnal call playback is outlined in Table 4-17. Survey guidelines implemented:

Survey method	Description
	• *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004) • *Survey guidelines for Australia's threatened birds* (DEWHA 2010a). Additional guidance: • Survey comments for candidate owls identified in the TBDC
Spotlighting	Spotlighting surveys were completed on foot by pairs of ecologists, targeting arboreal, flying, and large ground-dwelling mammals, as well as nocturnal birds, reptiles, and amphibians. At least one person hour of survey effort was completed per site. Spotlighting survey effort is outlined in Table 4-17. Survey guidelines implemented: • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004) • *Survey guidelines for Australia's threatened mammals* (DSEWPC 2011a) • *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DPE 2022b).
Remote cameras	Remote cameras were deployed within the amended project footprint, targeted within areas of good quality habitat. Cameras were baited with peanut butter, honey, and oats. Camera traps were deployed between early spring and summer months. Terrestrial and arboreal baited remote camera trapping was used to target Eastern Pygmy-possum, Smoky Mouse, Greater Glider, Squirrel Glider, Koala and Brush-tailed Phascogale. Remote camera trap survey effort is outlined in the summary survey effort table below (Table 4-17). Survey guidelines implemented: • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004) • *Survey guidelines for Australia's threatened mammals* (DSEWPC 2011a). Additional guidance: • Recommended methodology for Smoky Mouse surveys (Linda Broome via email, dated 15 November 2023).
Koala Spot Assessment Technique (SAT)	Koala SAT (Phillips & Callaghan, 2011) survey was undertaken in areas with listed Koala feed trees (DPE, 2022b). SAT surveys involved survey of thirty trees with a Diameter at Breast Height (DBH) of 20 cm or more from a central tree. In accordance with Phillips & Callaghan (2011), the central tree may be a recorded use tree (observed or pellets) but may also be a tree species of known food value to Koala. The assessment was undertaken by two observers at a time, and the duration of the assessment was a minimum of 30 minutes (average of two minutes per tree). Recording of secondary signs of presence (specifically pock marks and scratches on tree trunks) were also undertaken. Koala SAT survey effort is outlined in Table 4-17. Survey guidelines implemented: • *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DPE 2022b).
Golden Sun Moth habitat transects	A total of 147 100 m step-point transects were undertaken throughout areas of potential Golden Sun Moth habitat. Microhabitats and habitat suitability were characterised at each 1 m interval of the transect, based on the presence of following: • Bare earth/soils • Cryptogams • Litter/dead vegetation • Perennial native grass – Other • Perennial native grass – *Austrostipa* spp. • Perennial native grass – *Rytidosperma* spp. • Other native grass (non-Golden Sun Moth food) • Exotic Golden Sun Moth food plants – Other • Exotic Golden Sun Moth food plants – Chilean Needle Grass

Survey method	Description
	• Exotic Golden Sun Moth food plants – Serrated Tussock • Perennial exotic grass (non-Golden Sun Moth food) • Annual exotic grass • Exotic forbs. The overall suitability of a patch for Golden Sun Moth was determined by surveyor(s) upon completion of the 100 m transect based on general availability and connectivity of suitable microhabitats. Golden Sun Moth habitat was mapped within the amended project footprint based on the field survey results and supplementary information provided within an expert report (Section 7.3.4). The final habitat calculation represents the synthesis of the field survey data (incorporating the results of expert review and validation), vegetation plot data and habitat parameters considered to reliably indicate potential habitat. Golden Sun Moth habitat transect effort is outlined in Table 4-17. Additional survey effort completed as a part of the expert report is documented in Attachment 14. Survey guidelines implemented: • *Background Paper to EPBC Act Policy Statement 3.12 – Nationally Threatened Species and Ecological Communities Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana)* (DEWHA 2009). Additional guidance: • Species expert report (Section 7.3.4).
Reptile searches	Areas within the amended project footprint that contained shallow embedded surface rocks and native grassy ground-layer, were subject to active searches (rock rolling) for species such as Pink--tailed Legless Lizard and Striped Legless Lizard. In the specified habitat most rocks that could be up-turned were checked (150–200 rocks need to be turned to be reasonably confident of determining the species' presence) (DSEWPC, 2011c). Searches were conducted between spring and early summer on warm days (DSEWPC, 2011c). Surveyors ensured rocks, logs and other refugia were placed back in the same position to minimise disturbance. Reptile searches and habitat mapping were then used to refine and map habitat for these candidate reptile species within the amended project footprint. Reptile search survey effort is outlined in Table 4-17. Survey guidelines implemented: • *Threatened reptiles Biodiversity Assessment Method survey guide* (DPE 2022e). • Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DSEWPC 2011b).
Elliot trapping	Elliot traps were deployed within Bago State Forest in April 2021 targeting Broad-toothed Rat (*Mastacomys fuscus*) and Smoky Mouse (*Pseudomys fumeus*). The traps were placed on the ground and baited with peanut butter, honey, and oats. Additional Elliot trapping surveys were conducted in November 2023, targeting Smoky Mouse in associated PCTs 638, 639, 953 and 1196. Survey guidelines implemented: • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004) • *Survey guidelines for Australia's threatened mammals* (DSEWPC 2011a).

Survey method	Description
Active frog searches	Aural-visual surveys were conducted constituting a combination of listening for the calls of frogs and searching for individuals along a transect. Visual searches included searches along a 500 m transect in breeding habitat along, around or through a suitable waterbody. Where there was insufficient habitat to accommodate a 500 m transect a pro-rata effort was applied to all available habitats being searched. Aural-visual surveys commenced with the surveyors listening for calls (in silence and darkness) for a minimum of five minutes at the start of the survey, per feature surveyed or 500 m length of stream. The visual survey aimed to detect frogs via 'eyeshine'. Suitable habitat was scanned along the transect, around and between aural survey points. Aural-visual frog survey effort is outlined in Table 4-17. Survey guidelines implemented: • *NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020).
Call playback (frogs)	Call-playback was undertaken using a loudspeaker to broadcast the advertisement calls of target threatened frogs to elicit either an advertisement or territorial response call. Call playbacks were completed during active frog searches, immediately after the five-minute listening period and at the same location. A call was broadcast continuously for a period of no less than two minutes (responses are typically heard within the first minute). The playback period was followed by a two-minute listening period to detect any late responses or responses masked by the sound of the broadcast call. Not all species are known to be responsive to call playback (e.g. Giant Burrowing Frog; excluded based on vagrancy) and some species may respond to calls of other species (e.g. Stuttering Frog). Frog survey effort is outlined in Table 4-17. Survey guidelines implemented: • *NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020).
Acoustic recording (frogs)	Passive acoustic recorders (Songmeter Mini acoustic recorders – Wildlife Acoustics, Inc., Maynard, MA USA) were deployed in suitable aquatic habitats targeting Stuttering Frog and Yellow-spotted Tree Frog, between December 2023 and early January 2024. The recorders were used to record and identify the audible calls of frog species at 30-minute recording intervals, between dusk and dawn, at each survey site. Acoustic recorders were deployed at suitable aquatic habitats for a minimum of 14 nights (154 trap nights, per 500 m length of stream). Calls were analysed by Niche ecologists using Kaleidoscope Pro software (Version 5.4.8, 2021, Wildlife Acoustics, Inc). Targeted survey effort for threatened frogs is outlined in Table 4-17. Survey guidelines implemented: • *NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020).
Hair tubes	Baited terrestrial and arboreal hair tubes arrays were deployed by ELA (2021) in suitable habitats for the following candidate small mammal species: • Eastern Pygmy-possum (All IBRA subregions) • Broad-toothed Rat (Bondo and Snowy Mountains IBRA subregion) • Smoky Mouse (Bondo, Bungonia and Snowy Mountains IBRA subregions) • Squirrel Glider (All IBRA subregions) • Greater Glider (All IBRA subregions). Double-sided tape was attached to the inside of the tube near the bait (universal bait of oats, peanut butter, and honey), to collect hair samples on entry and departure of the tube. Hair tubes were placed in appropriate habitats. The tubes were checked regularly and not removed for at least four days and nights. The hair samples were then subsequently analysed via microscope, and specimens were identified to species level. Hair tube survey effort is outlined in Table 4-17. Survey guidelines implemented: • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004* (DEC 2004)

Survey method	Description
	• *Survey guidelines for Australia's threatened mammals* (Cth DCCEEW 2011).

Table 4-17: Threatened fauna survey effort

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
Diurnal bird surveys						
Bungonia	A total of 14, 2-ha bird surveys	15.67 person hours (940 minutes)	All candidate bird species	All accessible habitats	April – May 2021; July 2021; September 2021; January – March 2022; October 2023	All year
Crookwell	A total of 37, 2-ha bird surveys	19.57 person hours (1,174 minutes)	All candidate bird species	All accessible habitats	April 2021; January – March 2022; May 2022	All year
Murrumbateman	A total of 88, 2-ha bird surveys	68.72 person hours (4,123 minutes)	All candidate bird species	All accessible habitats	March – April 2021; July -August 2021; October – December 2021; February – March 2022; September – October 2023	All year
Inland Slopes	A total of 116, 2-ha bird surveys	76.03 person hours (4,562 minutes)	All candidate bird species	All accessible habitats	October – December 2021; January – March 2022; May 2022; September – October 2023	All year
Snowy Mountains	A total of 74, 2-ha bird surveys	61.20 person hours (3,672 minutes)	All candidate bird species	All accessible habitats	February –April 2021; August 2021; December 2021; March 2022; October 2023	All year
Bondo	A total of 30, 2-ha bird surveys	23.88 person hours (1,433 minutes)	All candidate bird species	All accessible habitats	March 2021; January 2022; March 2022; October 2023; December 2023	All year
Acoustic microbat surveys						
Bungonia	16 anabat ultrasonic devices	140 trap nights	Candidate Microchiropteran bats	Cliff line habitat, gullies, on the edge of vegetated corridors (potential flyways) and riparian habitat	October 2021; January – February 2022; October – December 2023	October to March
Crookwell	One anabat ultrasonic devices	13 trap nights	Candidate Microchiropteran bats	Cliff line habitat, gullies, on the edge of vegetated corridors (potential flyways) and riparian habitat	January – February 2022	October to March
Murrumbateman	12 anabat ultrasonic devices	54 trap nights	Candidate Microchiropteran bats	Cliff line habitat, gullies, on the edge of vegetated corridors (potential flyways) and riparian habitat	November 2021; February 2022	October to March

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
Inland Slopes	Seven anabat ultrasonic devices	37 trap nights	Candidate Microchiropteran bats	Cliff line habitat, gullies, on the edge of vegetated corridors (potential flyways) and riparian habitat	October – December 2021; – January 2022; March 2022; April 2022, and October 2023.	October to March
Snowy Mountains	28 anabat ultrasonic devices	109 trap nights	Candidate Microchiropteran bats	Cliff line habitat, gullies, on the edge of vegetated corridors (potential flyways) and riparian habitat	March 2021; January 2022	October to March
Bondo	Four anabat ultrasonic devices	16 trap nights	Candidate Microchiropteran bats	Cliff line habitat, gullies, on the edge of vegetated corridors (potential flyways) and riparian habitat	March 2021; February – March 2022	October to March
Microbat harp trapping						
Bungonia	Nine harp trapping surveys	17 trap nights	Candidate Microchiropteran bats	Trapping targeted to flyways within vegetated areas, riparian areas, or cliff lines within the amended project footprint.	January 2022; December 2023	October to March
Crookwell	N/A	N/A	N/A	N/A	N/A	N/A
Murrumbateman	Four harp trapping surveys	2 four trap nights	Candidate Microchiropteran bats	Trapping targeted to flyways within vegetated areas, riparian areas, or cliff lines within the amended project footprint.	November – December 2021	October to March
Inland Slopes	Eight harp trapping surveys	Eight trap nights	Candidate Microchiropteran bats	Trapping targeted to flyways within vegetated areas, riparian areas, or cliff lines within the amended project footprint.	October – December 2021	October to March
Snowy Mountains	N/A	N/A	N/A	N/A	N/A	N/A
Bondo	N/A	N/A	N/A	N/A	N/A	N/A
Stagwatching						
Bungonia	Five stagwatching surveys	7.5 person hours	Candidate Cockatoos, Owls, Squirrel Glider, and Greater Glider	Hollow-bearing trees with hollows over 20 cm	October 2021; February 2022	**Glossy Black-Cockatoo:** January to September (breeding) **Gang-gang Cockatoo:** October to January (breeding) **Owls:** May to August (breeding),

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
						Squirrel Glider and Greater Glider: All year
Crookwell	Five stagwatching surveys	7.97 person hours	Candidate Cockatoos, Owls, Squirrel Glider, and Greater Glider	Hollow-bearing trees with hollows over 20 cm	February – March 2022	**Glossy Black-Cockatoo:** January to September (breeding) **Gang-gang Cockatoo:** October to January (breeding) **Owls:** May to August (breeding) **Squirrel Glider and Greater Glider:** All year
Murrumbateman	Eight stagwatching surveys	10.20 person hours	Candidate Cockatoos, Owls, Squirrel Glider, and Greater Glider	Hollow-bearing trees with hollows over 20 cm	October – November December 2021	**Glossy Black-Cockatoo:** January to September (breeding) , **Gang-gang Cockatoo:** October to January (breeding), **Owls:** May to August (breeding) , **Squirrel Glider and Greater Glider:** All year.
Inland Slopes	Three stagwatching surveys	3.18 person hours	Candidate Cockatoos, Owls, Squirrel Glider, and Greater Glider	Hollow-bearing trees with hollows over 20 cm	October – November 2021	**Glossy Black-Cockatoo:** January to September (breeding) **Gang-gang Cockatoo:** October to January (breeding), **Owls:** May to August (breeding), **Squirrel Glider and Greater Glider:** All year
Snowy Mountains	Six stagwatching surveys	7.15 person hours	Candidate Cockatoos, Owls, Squirrel Glider, and Greater Glider	Hollow-bearing trees with hollows over 20 cm	January 2022; March 2022	**Glossy Black-Cockatoo:** January to September (breeding) **Gang-gang Cockatoo:** October to January (breeding), **Owls:** May to August (breeding), **Squirrel Glider and Greater Glider**: All year
Bondo	N/A	N/A	N/A	N/A	N/A	N/A
Nocturnal call playback						
Bungonia	Three nocturnal call playback surveys	1.5 person hours	Barking Owl, Masked Owl, and Powerful Owl	Suitable habitat for candidate owls	January – February 2022, May 2023	Outside breeding period for Owls (winter) **Powerful Owl:** May to August (breeding) **Masked Owl:** May to August (breeding) **Barking Owl:** May to December (breeding)
Crookwell	26 nocturnal call playback surveys	13 person hours	Barking Owl, Masked Owl, and Powerful Owl	Suitable habitat for candidate owls	February- March 2022, April – May 2021 and July 2021	Outside breeding period for Owls (winter) **Powerful Owl:** May to August (breeding) **Masked Owl:** May to August (breeding) **Barking Owl:** May to December (breeding)

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
	10 nocturnal call playback surveys	3.33 person hours	Bush Stone-Curlew	Suitable habitat for Bush Stone-Curlew	May 2021	All year
	22 nocturnal call playback surveys	7.33 person hours	Squirrel Glider and Yellow-bellied Glider	Suitable habitat for candidate gliders	April – May 2021	All year
Murrumbateman	36 nocturnal call playback surveys	18.50 person hours	Barking Owl, Masked Owl, and Powerful Owl	Suitable habitat for candidate owls	November – December 2021; February 2022, Late April 2021; September 2023	**Powerful Owl:** May to August (breeding) Outside breeding period for Owls (winter) **Masked Owl:** May to August (breeding) **Barking Owl**: May to December (breeding)
	12 nocturnal call playback surveys	4 person hours	Bush Stone-Curlew	Suitable habitat for Bush Stone-Curlew	April 2021	All year
	24 nocturnal call playback surveys	8 person hours	Squirrel Glider and Yellow-bellied Glider	Suitable habitat for candidate gliders	April 2021	All year
Inland Slopes	70 nocturnal call playback surveys	35 person hours	Barking Owl, Masked Owl, Powerful Owl, and Sooty Owl	Suitable habitat for candidate owls	Late March – April 2021 (partially outside of recommended survey period); July 2021 October – November 2021; January 2022; September – October 2023	Outside breeding period for Owls (winter) **Powerful Owl:** May to August (breeding) **Masked Owl:** May to August (breeding) **Barking Owl:** May to December (breeding) **Sooty Owl:** April to August (breeding)
	10 nocturnal call playback surveys	3.33 person hours	Bush Stone-Curlew	Suitable habitat for Bush Stone-Curlew	March – April 2021; October 2023	All year
	11 nocturnal call playback surveys	3.67 person hours	Squirrel Glider and Yellow-bellied Glider	Suitable habitat for candidate gliders	March – April 2021; July 2021	All year
	Eight nocturnal call playback surveys	2.67 person hours	Koala	Suitable habitat for Koala	March – April 2021; July 2021	All year
Snowy Mountains	59 nocturnal call playback surveys	29.50 person hours	Barking Owl, Masked Owl, Powerful Owl, and Sooty Owl	Suitable habitat for candidate owls	February – April 2021 (partially outside of recommended survey period); January 2022; March 2022; August 2021; September 2023	**Powerful Owl:** May to August (breeding) **Masked Owl:** May to August (breeding) **Barking Owl:** May to December (breeding) **Sooty Owl:** April to August (breeding)
	8 nocturnal call playback surveys	2.67 person hours	Bush Stone-Curlew	Suitable habitat for Bush Stone-Curlew	February – March 2021	All year
	19 nocturnal call playback surveys	6.33 person hours	Yellow-bellied Glider and Greater Glider	Suitable habitat for candidate gliders	March 2021; August 2021; September 2023	All year

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
	Eight nocturnal call playback surveys	2.67 person hours	Koala	Suitable habitat for Koalas	February – April 2021	All year
Bondo	5 nocturnal call playback surveys	2.50 person hours	Barking Owl, Masked Owl, and Powerful Owl	Suitable habitat for candidate owls	March 2021 (outside of recommended survey period); October 2023	**Powerful Owl:** May to August (breeding) **Masked Owl:** May to August (breeding) **Barking Owl:** May to December (breeding) N/A
	Two nocturnal call playback surveys	0.67 person hours	Bush Stone-Curlew	Suitable habitat for Bush Stone-Curlew	March 2021	All year
	Two nocturnal call playback surveys	0.67 person hours	Yellow-bellied Glider	Suitable habitat for Yellow-bellied Gliders	March 2021	All year
	Two nocturnal call playback surveys	0.67 person hours	Koala	Suitable habitat for Koalas	March 2021	All year
Spotlighting						
Bungonia	10 spotlighting surveys	30.53 person hours	All relevant candidate species and other candidate nocturnal fauna	All accessible habitats	May 2021; October 2021; January - February 2022; December 2023	All year
Crookwell	43 spotlighting surveys	65.53 person hours	All relevant candidate species and other candidate nocturnal fauna	All accessible habitats	February April – May 2021; July 2021; October 2021; January; February - March 2022	All year
Murrumbateman	36 spotlighting surveys	59.32 person hours	All relevant candidate species and other candidate nocturnal fauna	All accessible habitats	April 2021; October – December 2021; February 2022; September 2023	All year
Inland Slopes	47 spotlighting surveys	65.33 person hours	All relevant candidate species and other candidate nocturnal fauna	All accessible habitats	March – April 2021; July -August 2021; October – November 2021; January 2022; March 2022; September – October 2023	All year

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range		Optimal survey period
Snowy Mountains	36 spotlighting surveys	54.93 person hours	All relevant candidate species and other candidate nocturnal fauna	All accessible habitats	February – April 2021; August 2021; January 2022; March 2022; September 2023		All year N/A
Bondo	Nine spotlighting surveys	9.57 person hours	All relevant candidate species and other candidate nocturnal fauna	All accessible habitats	March 2021; October 2023		All year
Remote cameras							
Bungonia	34 baited remote cameras (arboreal and terrestrial)	451 trap nights	Eastern Pygmy-possum, Greater Glider, Squirrel Glider, Koala, and other candidate terrestrial fauna	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	One terrestrially deployed (13 trap nights) 12 arboreal deployed (92 trap nights)	May 2021	All year
					14 arboreal deployed (217 trap nights) Seven terrestrially deployed (65 129 trap nights)	September – October 2021, January – February 2022; December 2023 – January 2024	
Crookwell	79 baited cameras (arboreal and terrestrial)	745 trap nights	Eastern Pygmy-possum, Greater Glider, Squirrel Glider, Koala, and other candidate terrestrial fauna	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	46 terrestrially deployed (358 trap nights) 14 arboreal deployed (86 trap nights)	February 2021; April – May 2021; July – August 2021	All year
					17 arboreal deployed (269 trap nights) Two terrestrially deployed (32 trap nights)	October 2021	
Murrumbateman	91 baited remote cameras (arboreal and terrestrial)	3,142 trap nights	Eastern Pygmy-possum, Greater Glider, Squirrel Glider, Koala, and other candidate terrestrial fauna	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	11 terrestrially deployed (202 trap nights) 13 arboreal deployed (206 209 trap nights)	April – May 2021	All year

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range		Optimal survey period
					17 terrestrially deployed (765 trap nights) 50 arboreal deployed (1,966 trap nights)	October – November 2021; January – February 2022 September – November 2021 – May 2022; September – October 2023	
Inland Slopes	112 baited remote cameras (arboreal and terrestrial)	2,542 trap nights	Eastern Pygmy-possum, Greater Glider, Squirrel Glider, Koala, and other candidate terrestrial fauna	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	40 terrestrially deployed (646 trap nights) 30 arboreal deployed (490 trap nights)	March – May 2021 March – May 2021; August 2021	All year
					Six terrestrially deployed (207 trap nights) 36 arboreal deployed (1,199 trap nights)	October 2021 – January 2022; March 2022- April 2022; September – October 2023	
Snowy Mountains	98 baited remote cameras (arboreal and terrestrial)	1,502 trap nights	Eastern Pygmy-possum, Greater Glider, Squirrel Glider, Koala, and other candidate terrestrial fauna	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	21 arboreal deployed (103 142 trap nights) 26 terrestrially deployed (272 299 trap nights)	February – March 2021	All year
					21 arboreal deployed (297 623 trap nights) 30 terrestrially deployed (438 trap nights)	November – December 2021; January 2022; November - December 2021; January 2022; September –	

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range		Optimal survey period
						December 2023	
Bondo	14 baited remote cameras (arboreal and terrestrial)	244 trap nights	Eastern Pygmy-possum, Greater Glider, Squirrel Glider, Koala, and other candidate terrestrial fauna	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	Six arboreal deployed (78 trap nights) Five terrestrially deployed (65 trap nights)	March 2021	All year
					Three arboreal deployed (101 trap nights)	January 2022; September – December 2023	
Koala Spot Assessment Technique (SAT) survey							
Bungonia	19 SAT surveys	19 SAT surveys, 19 person hours (1,140 minutes)	Koala	Suitable Koala habitat	September – October 2021; January – February 2022		All year
Crookwell	25 SAT surveys	25 SAT surveys, 25 person hours (1,500 minutes)	Koala	Suitable Koala habitat	February – March 2022; October 2023		All year
Murrumbateman	54 SAT surveys	54 SAT surveys, 54 person hours (3,240 minutes)	Koala	Suitable Koala habitat	September 2021; September – October 2023		All year
Inland Slopes	23 SAT surveys	23 SAT surveys, 23 person hours (1,380 minutes)	Koala	Suitable Koala habitat	December 2021; October 2023		All year
Snowy Mountains	13 SAT surveys	13 SAT surveys, 13 person hours (780 minutes)	Koala	Suitable Koala habitat	December 2021; September – October 2023		All year
Bondo	N/A	N/A	N/A	N/A	N/A		N/A
Golden Sun Moth habitat transects							
Bungonia	N/A	N/A	N/A	N/A	N/A		N/A
Crookwell	N/A	N/A	N/A	N/A	May 2022		All year
Murrumbateman	89 Golden Sun Moth habitat	89 transects (approx.. 89 person hours)	Golden Sun Moth	Potential Golden Sun Moth grassland habitat	November – December 2021; February – December 2022; November 2023		All year

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
	assessment transects					
Inland Slopes	58 Golden Sun Moth habitat assessment transects	58 transects (approx. 58 person hours).	Golden Sun Moth	Potential Golden Sun Moth grassland habitat	November 2021; January – December 2022; November – December 2023	All year
Snowy Mountains	N/A	N/A	N/A	N/A	N/A	N/A
Bondo	N/A	N/A	N/A	N/A	N/A	N/A
Reptile searches						
Bungonia	Six reptile searches	7.4 person hours	Pink-tailed Legless Lizard, and Striped Legless Lizard	Suitable rocky habitat for legless lizard	September 2021; January – February 2022 (5.8 hours outside of recommended legless lizard survey period)	September to December
Crookwell	21 reptile searches	13.78 person hours	Pink-tailed Legless Lizard, and Striped Legless Lizard	Suitable rocky habitat for legless lizard	February – March 20221 (11.78 hours outside of recommended legless lizard survey period); November 2023	September to December
Murrumbateman	82 reptile searches	71.6 person hours	Pink-tailed Legless Lizard, and Striped Legless Lizard	Suitable rocky habitat for legless lizard	September 2021; November – December 2021; February – March 2022 (18 hours outside of recommended legless lizard survey period); September 2023; November 2023.	September to December
Inland Slopes	55 reptile searches	37.98 person hours	Pink-tailed Legless Lizard, and Striped Legless Lizard.	Suitable rocky habitat for legless lizard	March 2021; November; October – December 2021; February – March 2022; September – October 2023; December 2023 (10.83 hours outside of recommended legless lizard survey period)	September to December
Snowy Mountains	33 reptile searches	34.08 person hours	Threatened reptiles (Alpine She-oak Skink)	Suitable Alpine She-oak Skink habitat.	February 2021 (outside of recommended survey period); December 2021; January 2022; March 2022 (all outside of recommended survey period)	October to April

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range	Optimal survey period
Bondo	Two reptile searches	0.5 person hours	Pink-tailed Legless Lizard, and Striped Legless Lizard.	Suitable rocky habitat for legless lizard	March 2022 (outside of recommended legless lizard survey period); September 2023	September to December
Frog census						
Bungonia	Seven frog census surveys	23.07 person hours	Booroolong Frog, Yellow-spotted Tree Frog, Stuttering Frog	Aquatic habitats and streams with potential to support breeding activity	January 2022; December 2023	**Booroolong Frog:** October to December **Yellow-spotted Tree Frog:** November to December **Stuttering Frog:** September to March
Crookwell	18 frog census surveys	20.27 person hours	Booroolong Frog, and Yellow-spotted Tree Frog	Aquatic habitats and streams with potential to support breeding activity	January – February 2022; May 2022	**Booroolong Frog:** October to December **Yellow-spotted Tree Frog:** November to December
Murrumbateman	33 frog census surveys	72.2 person hours.	Booroolong Frog, and Yellow-spotted Tree Frog.	Aquatic habitats and streams with potential to support breeding activity	February 2021; October – December 2021; February 2022; January 2023; September 2023	**Booroolong Frog:** October to December **Yellow-spotted Tree Frog:** November to December
Inland Slopes	34 frog census surveys	38.12 person hours	Booroolong Frog, and Sloane's Froglet	Aquatic habitats and streams with potential to support breeding activity	July 2021; November – December 2021; September 2023	**Booroolong Frog:** October to December **Sloane's Froglet:** July to August
Snowy Mountains	38 frog census surveys	78.43 person hours	Yellow-spotted Tree Frog and Southern Corroboree Frog	Aquatic habitats and streams with potential to support breeding activity	December 2021; January 2022; October 2023, January 2024	**Yellow-spotted Tree Frog:** November to December **Southern Corroboree Frog:** January
Bondo	Four frog census surveys	Three person hours	N/A	Aquatic habitats and streams with potential to support breeding activity	January 2022; September 2023	N/A
Frog acoustic survey						
Bungonia	Two frog acoustic surveys	81 trap nights	Stuttering Frog	Aquatic habitats and streams with potential to support breeding activity	December 2023 – January 2024	**Stuttering Frog:** September to March
Crookwell	Six frog acoustic surveys	240 trap nights	Primarily Yellow-spotted Tree Frog	Aquatic habitats and streams with potential to support breeding activity	December 2023 – January 2024 (partially outside of recommended survey period)	**Yellow-spotted Tree Frog:** November to December

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range		Optimal survey period
Murrumbateman	Two frog acoustic surveys	80 trap nights	Primarily Booroolong Frog, and Yellow-spotted Tree Frog	Aquatic habitats and streams with potential to support breeding activity	December 2023 – January 2024 (partially outside of recommended survey period)		**Booroolong Frog:** October to December **Yellow-spotted Tree Frog:** November to December
Inland Slopes	N/A	N/A	N/A	N/A	N/A		N/A
Snowy Mountains	N/A	N/A	N/A	N/A	N/A		N/A
Bondo	N/A	N/A	N/A	N/A	N/A		N/A
Hair tubes							
Bungonia	12 baited hair tubes (arboreal and terrestrial)	90 trap nights.	Eastern Pygmy-possum, Greater Glider, and Squirrel Glider.	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species.	10 Arboreal hair tubes (70 trap nights) Two terrestrial hair tubes (20 trap nights)	May 2021	All year
Crookwell	61 baited hair tubes (arboreal and terrestrial)	454 trap nights	Eastern Pygmy-possum, Greater Glider, and Squirrel Glider.	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species.	45 Arboreal hair tubes (357 trap nights) 16 Terrestrial hair tubes (97 trap nights)	February 2021; April – May 2021; July – August 2021	All year
Murrumbateman	24 baited hair tubes (arboreal and terrestrial)	396 trap nights	Eastern Pygmy-possum, Greater Glider, and Squirrel Glider.	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species.	12 Arboreal hair tubes (198 trap nights) 12 Terrestrial hair tubes (174 198 trap nights)	April – May 2021	All year
Inland Slopes	72 baited hair tubes (arboreal and terrestrial)	1,166 trap nights	Eastern Pygmy-possum, Greater Glider, and Squirrel Glider.	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species.	31 Arboreal hair tubes (503 trap nights) 41 Terrestrial hair tubes (663 trap nights)	March – May 2021	All year
Snowy Mountains	49 baited hair tubes (arboreal and terrestrial)	337 trap nights	Eastern Pygmy-possum, Smoky Mouse, Greater	Good quality habitat, with suitable ground refugia or with Banksias	18 Arboreal hair tubes (101 trap nights)	February – March 2021	All year

IBRA subregion	Summary	Total survey effort	Target species	Habitat surveyed and other survey details	Survey date range		Optimal survey period
			Glider, and Squirrel Glider.	and other proteaceous subcanopy species.	31 Terrestrial hair tubes (206 236 trap nights)		
Bondo	12 baited hair tubes (arboreal and terrestrial)	120 trap nights	Eastern Pygmy-possum, Greater Glider, and Squirrel Glider	Good quality habitat, with suitable ground refugia or with Banksias and other proteaceous subcanopy species	Seven arboreal hair tubes (70 70 trap nights) Five terrestrial hair tubes (50 trap nights)	February – March 2021	All year
Elliot trapping							
Snowy Mountains	237 baited Elliot traps deployed on the ground	1,111 trap nights	Smoky Mouse and Broad-toothed Rat	Suitable habitat for Smoky Mouse within PCTs 639, 1196 and 953.		April 2021; November 2023	**Broad-toothed Rat:** October to May **Smoky Mouse:** September to April

4.7 Survey dates and conditions

Field surveys were undertaken over several separate campaigns from December 2018 to March 2024 as summarised in Table 4-18. Attachment 13 details weather observations (BOM, 2024) for the dates of field surveys. This data is intended to provide a general overview of weather conditions at the time of field survey. Given the broad geographic extent of the amended project, localised survey conditions may vary slightly from those documented.

Section 4.9 highlights important survey limitations due to observed weather conditions, and other factors potentially influencing the outcome of the surveys.

Table 4-18: Field survey dates

Field survey activities	Date														
	Summer 2018 (Dec)	Summer 2019 (Dec)	Summer 2020 (Jan/Feb)	Spring 2020 (16 Oct-27 Nov)	Summer 2021 (22-26 Feb)	Autumn 2021 (1 Mar-28 May)	Winter 2021 (21 Jul – 12 Aug)	Spring 2021 (13 Sept – 30 Nov)	Summer 2021 (1 Dec-28 Feb)	Autumn 2022 (1 Mar – 31 May)	Spring 2022 (1 Sep – 30 Nov)	Summer 2022 (1-2 Dec)	Spring 2023 (Sep-Nov)	Summer 2023-24 (Dec-Feb)	Autumn 2024 (Mar)
Acoustic survey														Niche	
Active frog search						ELA	ELA	Niche	Niche	Niche					
Anabat deployment					ELA	ELA	ELA	Niche	Niche	Niche			Niche	Niche	
BAM Plots				ELA	ELA		ELA	Niche	Niche		Niche		Niche	Niche, Aurecon	Aurecon
Burn area assessments				ELA	ELA					Niche	Niche		Niche		
Call playback								Niche	Niche	Niche			Niche		
Diurnal bird surveys				ELA	ELA	ELA	ELA	Niche	Niche	Niche			Niche	Niche	
Elliot traps						ELA							Niche		
Frog census										Niche			Niche	Niche	
Golden Sun Moth habitat assessment								Niche		Niche	Species expert		Species expert	Species expert	
Hair tube sampling					ELA	ELA	ELA								
Harp trap								Niche	Niche	Niche				Niche	Niche
Koala SAT surveys								Niche	Niche	Niche			Niche		
Microbat survey			ELA												
Remote camera traps					ELA	ELA	ELA	Niche	Niche	Niche			Niche		
Rock rolling for threatened reptiles				ELA	ELA	ELA		Niche	Niche	Niche			Niche	Niche	
Spotlighting					ELA	ELA	ELA	Niche	Niche	Niche			Niche	Niche	
Stag watch								Niche	Niche	Niche					
Stick nest survey				ELA											
Targeted surveys for candidate threatened flora				ELA	ELA	ELA	ELA	Niche	Niche	Niche			Niche	Niche	
Targeted threatened orchid surveys	ELA	ELA						Niche					Niche	Niche	
Vegetation validation				ELA	ELA	ELA	ELA	Niche	Niche		Niche				
Visual stream inspections targeting potential microbat habitat				ELA											

4.8 Aquatic habitat assessment methods

Aquatic habitats have been assessed primarily through a detailed desktop assessment of high-resolution aerial imagery and other data sources, augmented by opportunistic field assessment of aquatic habitats within accessible lands. The habitat-based assessment includes identification and mapping of any sensitive fluvial geomorphological features or significant aquatic ecological habitats in perennial or ephemeral streams within the amended project footprint.

The assessment of aquatic habitats has been designed to address the SEARs as well assessing biodiversity impacts of the amended project in relation to the two relevant aims of the FM Act, namely the conservation of threatened species, populations or ecological communities, as well the conservation of KFH.

The desktop assessment initially identified all waterways that intersected with the updated indicative disturbance area. A desktop inspection of these waterways coupled with field observations was completed to achieve a general understanding of aquatic habitat conditions and potential existing catchment-wide impacts within the updated indicative disturbance area. Building on this preliminary overview, a specific assessment of potential impacts to streams within areas of potential threatened aquatic species distribution and within areas mapped as being KFH (DPI, 2023a).

The construction of waterway crossings associated with access tracks has been identified as the primary pathway of potential impact to aquatic habitats (further detail is provided in Section 4.8.2).

4.8.1 Field aquatic habitat recording

Field teams collected relevant data on stream condition at streams with well-defined channels (generally a Strahler stream order of two or above) on an opportunistic basis, where access was available to Niche field teams. A total of 278 visual assessments of aquatic habitats were made during field surveys by Niche. Field observations included the completion of a proforma visual aquatic assessment form. Data collection involved the assessment of aquatic habitat features and landscape factors, including:

- topography
- water quality
- water level
- shade level
- fish habitat types
- aquatic habitat types
- disturbance
- stream width
- bank condition
- moss and algae cover
- land use
- riparian and aquatic vegetation
- stream substrates.

4.8.2 Desktop assessment of threatened aquatic species habitats and mapped Key Fish Habitats (KFH)

The proposed access tracks would predominantly cross small streams (82% of crossings would be across stream orders of two or lower) within the updated indicative disturbance area. This assessment has focussed on assessing potential impacts to KFH and habitats that have the potential to support threatened aquatic species.

Indicative distribution mapping of threatened aquatic species and mapped KFH (DPI, 2023a) was reviewed to identify areas intersecting waterways in the indicative access track disturbance area. The indicative distribution mapping provided in the Fisheries spatial data portal (DPI, 2023a) is considered conservative. It is important to note that the indicative distribution mapping should not be considered to represent the known range or extent of occurrence of the species. These distributions are modelled and while they may include stream segments where the species has been recorded, individual records and associated information such as date and survey type are not made available. The indicative distribution modelling also includes stream segments where environmental conditions are the same as a stream segment where the species is known to occur (predicted occurrence based upon MaxEnt analysis, modelling that predicts species occurrences by identifying the greatest spread of distribution using limits of the environmental variables of locations where the species has been recorded), as well as expert opinion (DPI, N.Da.; DPI, 2016a).

The desktop assessment has utilised the most up to date indicative access track mapping provided by Transgrid. The exact locations of the waterway crossings within the updated indicative disturbance area may be subject to change (following detailed design). The point-based assessment provides a basis for the assessment of the waterways to be crossed as the most likely location of crossings, however conditions within the amended project footprint surrounding these points are also considered, in addition to observational and desktop data sources from the broader landscape. The findings should therefore not be considered as limited to the point of assessment, rather as representative of the same stream section within the amended project footprint.

The list of all waterways that are intersected by the updated indicative disturbance area was filtered to identify those that have also been mapped as KFH or indicative distribution mapping for threatened aquatic species by DPI (2023a). At each of these sites a specific desktop assessment was completed to identify whether any of these locations would be considered sensitive aquatic habitats or habitats suitable to support threatened aquatic species to guide additional avoidance or mitigation measures. It should be noted that first and second order streams on gaining stream networks, as well as farm dams on first and second order streams or unmapped gullies are not considered KFH unless identified as habitat of a threatened aquatic species (Fairfull, 2013).

The aquatic desktop assessment points (Section 10.2) are considered to represent potential habitats for threatened aquatic species and/or represent potentially sensitive aquatic habitats present with the updated indicative disturbance area, which are potentially subject to direct impacts. At each of these locations a specific desktop assessment was completed to describe habitat conditions and environmental stressors present. This desktop assessment included an assessment of:

- high resolution aerial imagery
- stream order mapping

- indicative threatened species distribution mapping (DPI, 2023a). Where relevant, the location and age of threatened aquatic species records as published in Lintermans (2007) were also considered.
- fish community status mapping (DPI, 2023a), ranging between “Very Poor” and “Good”
- KFH mapping (DPI, 2023a)
- assessment of channel form and flow status eg ephemeral, intermittent or perennial
- identification of obvious habitat features eg aquatic macrophytes, riparian vegetation, coarse woody debris
- identification of condition factors or stressors eg landscape modification, dams, grazing, riparian clearing
- Identification of any existing waterway crossings ranging from bridges on formed roads to informal 4WD tracks
- outcomes of available field assessments and geotagged photos.

Additionally, an assessment against the KFH CLASS classification as detailed in Fairfull (2013) was conducted (Table 4-19). This was completed to assign each site a classification of waterways for fish passage (CLASS) rating. This additional assessment assists in evaluating the importance and functionality of habitats and fish passage with regards to waterway crossings in accordance with relevant guidelines.

Table 4-19: DPI CLASS classification and recommended crossing type (adapted from Fairfull, 2013)

CLASS	Description of Key Fish Habitat (KFH)	Minimum recommended crossing type	Additional design information
CLASS 1	Major Key Fish Habitat - Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (eg river or major creek), habitat of a threatened or protected fish species or ‘critical habitat’.	Bridge, arch structure or tunnel.	Bridges are preferred to arch structures.
CLASS 2	Moderate Key Fish Habitat - Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present.	Bridge, arch structure, culvert or ford.	Bridges are preferred to arch structures, box culverts and fords (in that order).
CLASS 3	Minimal Key Fish Habitat - Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (eg fish, yabbies). Semi- permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other.	Culvert or ford.	Box culverts are preferred to fords and pipe culverts (in that order).
CLASS 4	Unlikely Key Fish Habitat - Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free standing water or pools post rain events (eg dry gullies or shallow floodplain depressions with no aquatic flora present).	Culvert, causeway or ford.	Culverts and fords are preferred to causeways (in that order).

These habitat descriptions were then assessed against the available information on the known range of relevant threatened aquatic species and habitat requirements as published in available profiles, conservation documents and publications to assess the likelihood of species occurring and being impacted.

EPBC Act listed threatened aquatic species that are not included in the indicative DPI Fisheries habitat distribution mapping (DPI, 2023a) were identified as having the potential to occur within the amended project footprint These species include Murray Cod (*Maccullochella peelii*), Riek's Crayfish (*Euastacus rieki*) and Bald Carp Gudgeon (*Hypseleotris gymnocephala*). In this case, distribution information available through the PMST and relevant species descriptions, Conservation Advice or species Recovery Plans were used to guide the assessment.

The aquatic assessment of the indicative access track disturbance area has considered 251 aquatic desktop assessment points. Of these, 56 represent an intersect with KFH buffers, but are not actually proposed crossings over a stream mapped as KFH or indicative threatened aquatic species habitat (e.g. access track runs adjacent to waterway). Further to this, the assessment has considered 58 additional aquatic desktop assessment points, associated with previous access track updated indicative disturbance areas across the study area (Table 10-1. To support the desktop assessment, 278 field based aquatic habitat inspections have been collected.

The desktop assessment was used to identify whether any of these aquatic desktop assessment points would be considered sensitive receivers or significant aquatic habitats that may support threatened species that would require additional avoidance or mitigation measures.

The assessment of impacts associated with proposed access tracks considered the access track descriptions and indicative scope of works summarised in Table 4-20.

Table 4-20: Access track descriptions

Access track	Description
Existing tracks/roads	Existing access tracks include well-established unsealed local roads, forest roads, and tracks maintained by FCNSW or unsealed property access tracks, generally suitable for heavy vehicles. Some existing access tracks/roads may be subject to maintenance activities or minor upgrades along the formation, such as resurfacing or grading, or drainage work. Minor vegetation pruning/trimming may be required in some locations where vegetation may be considered a roadside hazard. Where pruning/trimming is required, it would be undertaken to avoid impacts on the long-term viability of the vegetation.
Upgraded tracks	Upgraded access tracks typically consist of unsealed property access tracks of varying conditions, from well-established sections to rarely used, barely visible sections (ie requiring substantial upgrade). The existing gradient of upgraded access tracks varies and may only be suitable for light vehicles without these upgrades. Upgraded access tracks are expected to require more substantial work to allow their use during construction compared with existing tracks/ roads. Work may include earthworks to improve gradients, grading or resurfacing, formation widening to 8 m or realignment, drainage work or upgrades to waterway crossings. Vegetation clearing or pruning/trimming may be required for widening/formation work or where vegetation may be considered a roadside hazard. The total clearing width would generally be up to 10 m, with some areas (eg steep terrain) requiring a clearing width of up to 20 m for batters.
New tracks	The locations of new access tracks have generally been selected in consultation with affected landowners to minimise property impacts, including running the track along fence lines, using movement paths preferred by landowners, and going through existing property gates. Establishing the new tracks would typically include earthworks, grading, drainage work and construction of waterway crossings. Fill material may be imported to provide a suitable capping material. To establish the new tracks, vegetation clearing or pruning/trimming may be required. The total clearing width would generally be up to 10 m, with some limited areas (eg steep terrain) requiring a clearing width of up to 20 m.

4.8.3 Riparian corridors

Hydro line spatial data (DPIE Water, 2018) was used to map waterways within the amended project footprint. On-line dams (dams that are part of existing stream networks or linked by channels) were included this waterway mapping, with off-line dams (isolated dams) excluded. The Hydro line spatial data layer was used as the basis of the waterfront land and VRZ mapping completed for the assessment.

Adopted riparian corridor VRZ widths adopted for this assessment are those detailed in the *Guidelines for riparian corridors on waterfront land* (DPE Water, 2022a), as these are required to be addressed by the SEARs. The VRZs specified in DPE Water (2022a) are essentially equivalent to those outlined in Attachment E of the BAM (DPIE, 2020a) (Table 4-21) that also must be considered as part of the assessment.

The VRZ widths defined in the *Policy and Guidelines for Fish Habitat Conservation and Management* (Fairfull, 2013) have not been utilised in this assessment. This is because these widths are not consistent with those defined by DPE Water (2022a) and the BAM (DPIE, 2020a). These widths would also in many places across the amended project footprint (in particular land subject to agricultural uses) exceed the current level of vegetated riparian vegetation present.

To further assess impacts to riparian corridors, native riparian PCTs were identified from a review of PCTs mapped within the amended project footprint, selecting those identified as being primarily formed by riparian vegetation. Total areas of native vegetation within the VRZs (all PCTs, excluding 0 - Not Native, 9996 - Not Native (Road), 9997 - Not Native (Waterbody), 9998 - Planted Vegetation) have also been considered. Details of the assessment are presented in Section 14.7.4.

Table 4-21: Riparian corridor widths (VRZs)

Stream order	Riparian corridor width in metres (each side of waterway)	
	BAM (DPIE, 2020a)*	DPE Water (2022a)**
Unmapped and 1st order streams	10	10
2nd order stream	20	20
3rd order stream	30	30
4th and 5th order streams and above	40	40
6th order stream and above	50	-
Wetland	20	40
Important wetland	50	40
Estuarine area	50	40

* If the top of the bank is defined, riparian buffer distances are measured on both sides of the stream. Otherwise, buffer distances are measured from the edge of the stream; they are only measured from the centre of the stream if the edge is not defined. If a stream has more than one bank on either side, the bank closest to the main channel is used.

** Waterfront land and VRZs include the channel zone and are measured from the highest bank of the river, lake or estuary.

4.9 Limitations

4.9.1 Land access

Private land access posed a considerable constraint to the assessment by restricting the location, number and timing of field surveys undertaken in many parts of the updated indicative disturbance area. Eco Logical Australia (ELA) and Niche-led ecologists have conducted field survey along the length of the alignment within accessible lands since December 2018. Access has generally increased (although some access has been revoked) as Transgrid have worked through the option selection process, which has involved consideration of constraints (including ecological constraints) and consultation with landowners. For each IBRA subregion intersecting the amended project footprint, the proportion of land access that could be facilitated for the purpose of field survey is summarised in Table 4-22 and shown in Figure 4-4 (Attachment 5).

Table 4-22: Field survey extent according to IBRA subregion

IBRA region	IBRA subregion	Amended project footprint (ha)	Survey extent (ha)	% amended project footprint surveyed in IBRA subregion
South-Eastern Highlands	Bondo	1,082.20	888.54	82%
	Bungonia	438.01	399.87	91%
	Crookwell	1,289.17	974.70	76%
	Murrumbateman	1,478.42	1,271.52	86%
NSW South-Western Slopes	Inland Slopes	3,873.59	2,810.35	73%
Australian Alps	Snowy Mountains	673.31	668.45	99%
	Total	**8,834.70**	**7,013.42**	**79%**

There was generally a scattering of properties throughout all IBRA subregions that could not be accessed for field survey. These lands were generally surrounded by good levels of survey access (including adjoining accessible properties, road reserves, travelling stock routes, Crown land) allowing for the extrapolation of existing field data to inform the assessment and mapping of biodiversity values. The largest section of inaccessible land was situated within the Inland Slopes IBRA subregion where approximately 11 kilometres of the alignment could not be accessed.

Whilst the level of field survey is considered adequate for the purpose of informing amended project impacts, Section 4.10 outlines supplementary approaches to address information and data gaps within inaccessible landholdings or other lands where survey effort was considered insufficient to meet guideline requirements.

4.9.2 Weather and season

Numerous plant and animal species are cryptic or difficult to detect. Some cryptic plant species are more easily detected at certain times of the year, such as during flowering events. Some fauna species can only be detected during certain seasons (e.g. migration patterns or intra-torpor periods). As such, for the species that could not be surveyed, potential presence was determined based on the suitability of validated or modelled habitat (based on PCT associations and other attributes) in the amended project footprint.

For some of the fauna survey methods detailed in Section 4.6, anomalous climatic conditions, such as higher than average rainfall totals throughout the summer survey season of 2021 may have influenced detectability. Field survey teams undertaking targeted surveys for nocturnal fauna, including harp trapping, spotlighting, call playback, frequently reported no or very little fauna activity due to sub-optimal weather conditions. Additionally, field teams had to abort their campaigns on more than one occasion due to worsening weather conditions which reduced overall survey effort. These limitations have been taken into account when making decisions around species credit species presence and absence.

The Golden Sun Moth flying season was significantly impacted by prolonged spring and summer rainfall across consecutive flying seasons. Across its entire range, very few moths were recorded flying with very limited survey days supporting suitable weather conditions for species activity. An expert report has been prepared to inform the assessment in lieu of targeted survey effort.

Efforts were made to check reference populations for confirmation of flowering prior to orchid surveys being undertaken, where possible. Attachment 1 (Section 2.6.1) details advice provided by NSW DCCEEW and other orchid specialists, confirmed flowering periods and confirmation of where survey effort was deemed suitable to count towards each species polygon reductions.

4.9.3 Project size and timeline

Due to the scale of the amended project, access, and timing constraints, repetition of some survey methods within each patch of suitable habitat was not possible. For instance, some survey methods that require multiple months between set-up and survey commencement (such as installation of artificial shelter sites for Striped Legless Lizard) were not considered possible for an amended project of this scale.

Comprehensive targeted surveys for identifying breeding owl and cockatoo habitat were not feasible due to amended project timeframes, limited land access and the substantial survey effort required for identifying breeding habitat within an amended project footprint of this scale.

Across accessible areas of the amended project footprint, 5,528 hollow-bearing trees have been mapped. Of these mapped hollow-bearing trees, 701 trees support suitable hollow size-classes for breeding owls, 525 trees support suitable hollow size-classes for breeding Gang-gang cockatoos, and 344 trees support suitable hollow size-classes for breeding Glossy Black-Cockatoo.

To adequately target all potential owl breeding trees via stag-watching methods, the minimum survey effort would equate to a minimum of 1,052 person hours between May and August. A minimum estimate of 1,376 person hours would be required to target all potential breeding habitat for Glossy Black-Cockatoo (between April and August). A minimum estimate of 2,100 person hours would be required to target all potential Gang-gang Cockatoo breeding habitat (between October and January).

In lieu of being able to achieve the above, alternative survey methodologies were conducted (per the appropriate survey guidelines) (refer to Table 4-16), and in place of adequate assessment as determined by relative guidelines, a conservative approach was adopted, such as assuming species presence, consultation with NSW DCCEEW (see Attachment 7 for details) or engaging a species expert.

4.9.4 Bushfire impacts

The Dunn's Road bushfire occurred within the amended project footprint and surrounds during the 2019/2020 summer bushfire season. Areas of the amended project footprint that intersect the Snowy Mountains, Bondo and Inland Slopes IBRA subregions, were moderately to severely burnt according to field observations and FESM Mapping (NSW DCCEEW, 2020). The severity of the fire would have significantly influenced the ability of these areas to support threatened flora and fauna habitat within the survey period.

These limitations were addressed by applying specific guidelines for severely burnt areas (DPIE, 2020c) and conducting surveys over a range of seasonal and climatic conditions to maximise seasonal coverage of survey effort and species detectability. This was also coupled with thorough analysis of candidate species' specific habitat requirements and employing a range of trapping and survey techniques. Refer to Chapter 9 for bushfire impacts and assessment considerations.

4.9.5 LiDAR

Light detection and ranging (LiDAR) or point clouds can be used to get detailed three-dimensional imagery of ground elevation (digital elevation models or DEMs) or surface layers (digital surface models or DSMs). It can be very useful to calculate and visualise vegetation height and vegetation profiles, which allows habitat assessment across the amended project footprint.

Transgrid provided Niche with 2,480 LAZ files (LASzip file format, a compressed version of the LAS (LIDAR Aerial Survey)) dated May 2022. The Green Hills corridor amendment was not covered by the LiDAR tiles. Therefore, LiDAR data that covered the Green Hills corridor amendment was downloaded from the NSW Elevation Information System (ELVIS), dated 2017/2018 (Source: https://elevation.fsdf.org.au/).

Some small areas within the amended project footprint are missing LiDAR coverage all together (Plate 1). These areas largely comprise existing cleared lands and are not considered to present a significant data gap.

Similarly, the Green Hills corridor amendment area addressed using the ELVIS dataset comprises mostly forestry parcels. Between 2017/18 and May 2022 a significant amount of this vegetation was cleared. As a result, the 2017/18 LiDAR data is now inconsistent with on-ground conditions for these cleared areas with vegetation heights significantly overestimated. The implications of this data inconsistency were considered minor, given affected areas comprise exotic vegetation and vegetation heights have been overestimated instead of the alternative.

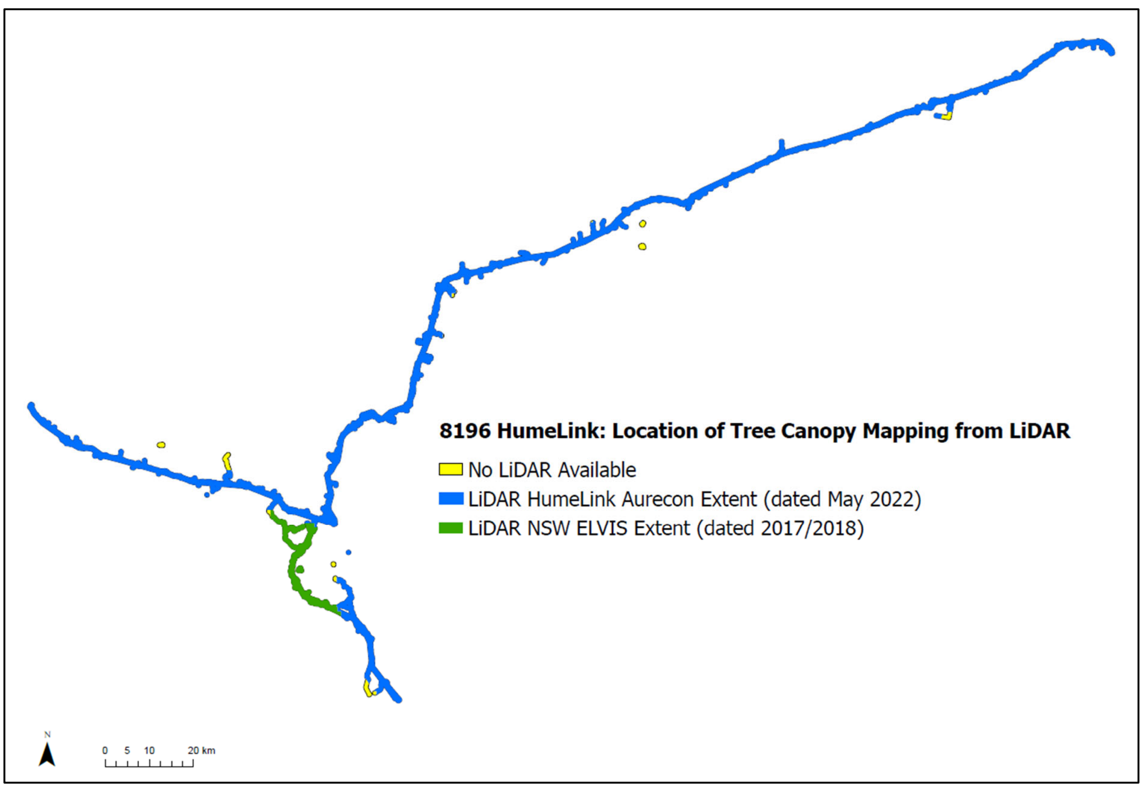


Plate 1: LiDAR datasets and remaining gaps in relation to the amended project footprint

The difference in quality between the LAS files depending on their source is illustrated in the Table 4-23 below. The main differences that impact this amended project are date and point density.

Table 4-23: Comparison of LiDAR dataset attributes

Data attributes	LiDAR data from Transgrid	LiDAR data from NSW ELVIS
Area covered	HumeLink	Green Hills corridor amendment
Date	May 2022	2017-2018
Point density	11.9 – 21.1 points/sqm	0.4 – 0.7 points/sqm
Point spacing	0.21 - 0.29 m	1.2 – 1.5 m
Classification	8 classification codes	6 classification codes
Tiles size	1 km x 1 km	2 km x 2 km
Number of tiles	2,478 #	58
Number of points	38,478,023,612	128,276,707
Average points/sqm	15.5	0.55

4.10 BDAR supplementary assessment methods

Desktop-based supplementary assessment methods implemented as a part of this BDAR to address information and data gaps are outlined in Table 4-24. Supplementary field survey activities undertaken to support these analyses included:

- LiDAR survey incorporating high resolution aerial imagery to support vegetation and habitat mapping, vegetation height modelling and the development of avoidance strategies.
- Opportunistic ground-truthing surveys to validate the desktop surface rock mapping, aquatic habitats, threatened frog habitat mapping, potential karsts and cliffline areas.
- Over-the-fence surveys from public roads, existing transmission line easements and accessible private properties to inform constraints within adjacent lands that could not be directly accessed for survey.

Table 4-24: Supplementary assessment methods supporting the preparation of this BDAR

Component of the assessment	Supplementary methods	Details of approach	Limitations and assumptions
Vegetation	Vegetation zone mapping	Desktop extrapolation of existing datasets (Section 4.5.1), field-based vegetation zone mapping within nearby lands, observations from over the fence surveys and review of high-resolution aerial imagery was utilised to delineate and map vegetation zones within inaccessible lands. Additionally, geology, topography, canopy density, surrounding land use, Category 1 exempt land mapping and the survey team's knowledge from nearby surveyed areas, was used to inform PCT and condition assignment.	PCTs, condition classes and associated VI scores may vary from that present on the ground. However, a conservative approach was broadly adopted whereby a high condition class was generally adopted unless data and existing knowledge of the surrounding locality was available to refine this any further. For example, derived grasslands and thinned grassy woodlands were generally in low to very low condition within lands subject to agricultural land use and Category 1 exempt lands.
Threatened species habitat suitability	Desktop mapping of surface rock	Surface rock was mapped for the amended project footprint by means of a review of high-resolution aerial imagery and field data. Surface rock was generally mapped for all lands supporting areas of visible surface rock greater than 5 by 5 m. This is considered an appropriate scale for the mapping of suitable habitats for candidate threatened species.	Surface rock could not be clearly delineated from aerial imagery within lands supporting tree canopy cover. As such, surface rock was assumed present within these areas. Where mapped areas of surface rock were accessible during field surveys, the areas were ground-truthed and assessed accordingly.
	Desktop mapping of tree hollows and old growth trees	Data informing the location of hollow-bearing and old-growth trees was collected for all accessible lands, as follows: Point location of hollow-bearing trees were recorded wherever possible, incorporating the collection of the following data: • Tree species • Condition • Number of hollows • Hollow(s) size classes (cm) • Hollow(s) type and location	All hollow size classes were assumed present within vegetated lands that could not be accessed. This is likely to have resulted in a significant over-representation of suitable habitats for hollow-dependent candidate threatened fauna species, particularly within the Inland Slopes IBRA subregion which supported the largest proportion of inaccessible lands.

Component of the assessment	Supplementary methods	Details of approach	Limitations and assumptions
		• Hollow(s) height from the ground (m) • Signs of use • Trunk DBH (cm). Where hollow-bearing trees were too dense to map efficiently, polygon data was collected to map the hollow size classes and approximate density of tree hollows present. More specifically this included the collection of the following data: • Presence of hollows • Hollows per ha (0-5 cm) • Hollows per ha (5-10 cm) • Hollows per ha (10-20 cm) • Hollows per ha (>20 cm) • Number of large old trees per ha. This assessment type was a broad approach applied in the field to provide an indication of hollow-densities and hollow types within a given area. Where land access could not be facilitated, the following data was used to inform the presence/ absence of hollow-bearing and/ or old-growth trees: • High resolution aerial imagery was used to delineate areas of woody vegetation • LiDAR data was used to inform vegetation height and lands likely to support a tree canopy layer. • Vegetation zone mapping and BAM plot data gathered from accessible lands was used to inform the likely floristics and age class of the canopy layer. • Tree hollows of all size classes were assumed present within vegetation zones identified as supporting a tree canopy layer and for which the age class and floristics was likely to support tree hollow development. • Hollow density estimates were applied based on observations from accessible lands.	
	Mapping of perennial and non-perennial stream habitats	Publicly available hydrolines and waterbody spatial data layers (DPI, 2023a) were used to delineate the extent of perennial/ non-perennial stream habitats and dams across the entire alignment. These were cross-referenced with high-resolution aerial imagery and aquatic habitat assessment data collected throughout the broader footprint to characterise the nature and condition of stream environments likely present.	Mapped stream locations may vary slightly from that present on the ground.
	Mapping of threatened frog habitat	The frog stream mapping layer was developed combining field-collected data, and publicly available hydrolines and waterbody spatial data layers (DPI, 2023a). In lieu of ground-truthed data, the supporting spatial layers were used to delineate the extent of potentially suitable threatened frog habitats across the entire amended project footprint. These were cross-referenced with high-resolution aerial imagery and aquatic habitat assessment data collected throughout the amended project footprint to characterise the	Mapped frog habitats may vary slightly from that present on the ground. First order Strahler order streams were excluded from the assessment based on the assumption that they are primarily ephemeral and unlikely to support suitable breeding habitat for the listed candidate frog species.

Component of the assessment	Supplementary methods	Details of approach	Limitations and assumptions
		nature and condition of stream environments likely present. Based on advice provided during NSW DCCEEW consultation, and a thorough literature review of individual species habitat requirements, habitats were mapped for the following species: • Yellow-spotted Bell Frog *(Litoria castanea)* • Stuttering Frog *(Mixophyes balbus)* • Southern Corroboree Frog *(Pseudophryne corroboree)* • Sloane's Froglet *(Crinia sloanei).*	Farm dams void of aquatic/ riparian vegetation or isolated (e.g., greater than 500 m from a nearby stream, or no connecting riparian vegetation) were excluded from the assessment based on the very low likelihood of the habitat being suitable to support threatened frog species.
	LiDAR tree height layers	LIDAR imagery was used to extract canopy tree height information. The layer was filtered, and stratified into canopy height classes to exclude canopy heights below 10 and 20 metres: • Vegetation height =>10 m (from LiDAR dated 2017, and May 2022) • Vegetation height =>20 m (from LiDAR dated 2017, and May 2022). The developed canopy tree height layers were used as a surrogate for informing where potential hollow-dependant species and canopy stick nest habitat may occur, in lieu of ground-truthed field data, and for areas where no access was permitted over the course of surveys.	Canopy height below 10 m was conservatively excluded based on the assumption that trees below 10 m canopy height are less likely to have an adequate trunk width, and maturity required to form suitable shaped and sized hollows that would support gliders, breeding parrots, owls, or cockatoos (Manning *et al*., 2004; Smith *et al*., 2007; Garnett et al., 1999; Webster *et al*., 1999; Kavanagh & Murray, 1996). Remnants with a canopy height greater than 10 m were assumed as potentially supporting suitable breeding for gliders, breeding parrots, owls, or cockatoos. Remnants with a canopy height greater than 20 m were assumed as potentially supporting suitable nesting habitat for raptors (Debus, 2019).
	Mapping of potential karst and cliffline habitats	Potential karst and cliffline habitats that may offer suitable roosting opportunities for candidate microchirpoteran species were mapped using the approach documented below. These sites were ground-truthed to confirm the presence/absence of roosts within accessible lands. Where lands could not be accessed, microbat breeding within these habitats has been assumed. **Karst mapping** Karst mapping involved a review of BioNet (NSW DCCEEW, 2024a) records and literature review to establish known bat roost sites within the broader locality (within 50 km of the amended project footprint) including the following data sources: • Geoscience Australia (including caves mapping (Geoscience Australia, 2006)) datasets. • Scientific literature on known karst sites, age, and formation processes	Areas of potential karst and clifflines were determined based on suitable regional geological mapping, API, elevation modelling, and nearby records. Assumptions regarding the location of potential karst and cliff lines are considered relatively accurate. However, not all potential features could be ground-truthed within some parts of the alignment and as such there is potential for mapping errors. These mapping layers were developed to identify where potential cave/cliffline dependant microbat species and Brush-tailed Rock Wallaby habitat may occur

Component of the assessment	Supplementary methods	Details of approach	Limitations and assumptions
		• NSW Seamless Geology (DRNSW, 2022) • Contour mapping to determine areas where there were obvious high topographic relief/cliffline areas. Regional karst information was overlayed with known cave / roost locations (eg, Church Cave, Wee Jasper), and the NSW Seamless Geology layer. Where similar geologies occurred within the amended project footprint to those of confirmed cave/roost sites (eg, Yarrangobilly, Bungonia and Wee Jasper) or where landscapes containing carbonate bedrocks with a similar deposition age (usually limestone, dolomite, or marble) were identified, these landscapes were filtered, refined, and saved as separate layers referred to as "Karst Geology". A Digital Elevation Model (DEM) was developed using 10 m contour mapping and ortho tiles. Areas considered "high potential" for karst formations were those with a slope greater than 30 degrees and intersecting the Karst Geology layer (above). The polygons produced by the intersection of slopes greater than 30 degrees and karstic geologies were reviewed individually using high-resolution aerial imagery, a review of nearby bat records (NSW DCCEEW, 2024a), and on-the-ground data collection (habitat mapping, survey results, vegetation mapping, etc). Polygons were stratified as low, moderate, or high potential for karsts based on multiple lines of evidence (eg presence of nearby records, availability, and quality of habitat based on field data, photos, lithology, deposition age, and aerial interpretation showing signs of cliffs, uplift or other signs of metamorphism). This method of determining areas of karstic landscapes was developed based on the knowledge of Australian karsts typically having distinctive topography in which the landscapes are largely shaped by the dissolution of carbonate bedrocks. This process results in unusual surface and subsurface features ranging from sinkholes, vertical shafts, disappearing streams, and springs, to complex underground drainage systems and caves (Magee, 2009; Spate & Baker, 2018). Further, Bent-winged bats are known to occupy caves and vertical shafts, with a large, domed chamber providing warm and humid conditions to facilitate growth of the young (like a humid-crib) (Dwyer & Hamilton-Smith, 1965). Majority of these high potential karst areas were subsequently ground-truthed, and targeted surveys for breeding bats (via harping trapping) were conducted during the Summer 2023 survey period. **Cliff line mapping** For cliff line mapping within the amended project footprint, a DEM was developed using 5 m contour	within the amended project footprint. All areas were then ground-truthed and assessed accordingly. Brush-tailed Rock Wallaby habitat was adequately discounted from the amended project footprint as the ground-truthed assessment identified no areas of suitable habitat for this species.

Component of the assessment	Supplementary methods	Details of approach	Limitations and assumptions
		mapping and ortho tiles. Areas considered high potential for overhangs were those with a slope greater than 45 degrees. The polygons produced by the slope filter were reviewed individually using high-resolution aerial imagery, review of nearby bat records (NSW DCCEEW, 2024a) and on-the-ground data collection (habitat mapping, survey results, vegetation mapping etc). Polygons were considered high potential to support cliff line habitat if there was: • presence of nearby (within 10 km) cave-dependant bat records (NSW DCCEEW, 2024a) • presence of cliff line habitat, and nearby suitable foraging resources endorsed by field data, and photos • aerial interpretation showing signs of cliffs, steep gullies etc. Cliff line modelling was developed to identify potential roost sites for Large-eared Pied Bat, and potential habitat for Brush-tailed Rock Wallaby. Potentially suitable habitat for Brush-tailed Rock-Wallaby was identified to the north of the Tarlo River national park portion of the amended project footprint. During Spring 2023 surveys, this area was ground-truthed and assessed, and it was determined that the habitat was unsuitable for the species in the locality. Further, remote cameras that were deployed in the area did not identify the species (further details regarding the assessment are outlined in Attachment 1). The closest known maternity sites for the Large-eared Pied Bat includes a granitic mine tunnel in northern New South Wales (Dwyer, 1966) (250 km north of the amended project footprint), and another sandstone cave in central New South Wales with a low ceiling providing stable temperatures at approximately 15º C (Pennay, 2008) (360 km north of the amended project footprint). At both sites, clusters of bats were observed roosting in ceiling indentations or cracks. No known maternity roosts, or species records for Large-eared Pied Bat occur within the amended project footprint, or within 10 km of the amended project footprint. However, as a precautionary approach for this species, cliffline habitat has been mapped (determined by API, field collected data, geological mapping and a DEM using 10-m interval contour mapping).	
	Identification of potential artificial roosts	Potential artificial roost sites (culverts and bridges) were identified by performing an intersection analysis in ArcGIS between the NSW Road Segment and Hydrology (Strahler order greater than or equal to 3) layers within the amended project footprint. In line with the TBDC (NSW DCCEEW, 2024b), which states for Large Bent-winged Bat, Little Bent-winged Bat, and Southern Myotis, species polygon boundaries should have a 100 m radius buffer around an accurate	Mapped culvert and bridge locations may vary slightly from that present on the ground.

Component of the assessment	Supplementary methods	Details of approach	Limitations and assumptions
		GPS point location centred on the cave/feature entrance. A 100 m buffer was then applied to the locations where the roads, waterways and amended project footprint intersected to determine potential artificial roosting habitat for Large Bent-winged Bat, Little Bent-winged Bat, and Southern Myotis. Buffered features were reviewed individually using high-resolution aerial imagery, a review of nearby bat records, and on-the-ground data collection (habitat mapping, survey results etc). The data was then appended into the fauna habitat layer, for attributes to be used in Large Bent-winged Bat, Little Bent-winged Bat, and Southern Myotis species habitat mapping.	
Bushfire impacts	Identifying severely burnt vegetation	FESM mapping (NSW DCCEEW, 2020) was used to inform the extent of severely burnt vegetation within inaccessible lands.	Field assessment data collected from accessible lands is considered sufficient to inform the nature of bushfire impacts to vegetation communities and associated threatened species. Whilst the extent of bushfire impacts could not be ground-truthed for inaccessible lands, field survey activities suggested the FESM mapping was generally representative of impacts observed on the ground.

5 Landscape context

This chapter addresses the landscape context of the amended project in accordance with Section 3 of the BAM (DPIE, 2020a). Landscape features that occur within the landscape assessment area (i.e., within a 500 metre buffer for linear developments) are detailed in Section 5.2 below. These are presented separately in relation to each of the IBRA subregions that intersect the landscape assessment area (Section 5.1).

5.1 IBRA regions and subregions

The Landscape assessment for the amended project intersects three IBRA regions and six IBRA subregions, as detailed in Table 5-1 and shown in Figure 5-1 (Attachment 5). Almost half of the amended project footprint (43 per cent) occurs within the Inland Slopes subregion.

Table 5-1: IBRA regions and subregions

IBRA region	IBRA subregion	Extent within the landscape assessment area (ha)	Landscape assessment area (%)
South-Eastern Highlands	Bondo	10,483.03	16%
	Bungonia	2,900.59	4%
	Crookwell	8,615.69	13%
	Murrumbateman	10,891.49	16%
NSW South-Western Slopes	Inland Slopes	28,596.17	43%
Australian Alps	Snowy Mountains	5,100.54	8%
Total		**66,587.52 ha**	**100%**

5.2 Landscape features

This section outlines the landscape features relevant to each IBRA subregion within the landscape assessment area (refer to Table 5-2 to Table 5-7). These have been used to inform the suitability of habitats for threatened species. Landscape features identified for each IBRA subregion are shown in Figure 5-1 (Attachment 5).

5.2.1 Bungonia IBRA subregion

Table 5-2: Landscape features of the Bungonia IBRA subregion

Landscape features	Description
NSW (Mitchell) Landscapes	South Eastern highlands (SEH) Crookwell Basalts, Crookwell Basalts and Sands – 217.23 ha SEH Oberon, Rockley Plains – 1,163.09 ha SEH Bungonia, Wollondilly - Bindook Tablelands and Gorges – 1,520.28 ha
Rivers, streams and estuaries and Strahler stream order	Within the Bungonia IBRA subregion there are 270 first order, 129 second order, 64 third order and 48 fourth order waterways.
Wetlands within and adjacent to the amended project footprint	The NSW Wetlands (NSW DCCEEW, 2010) dataset identifies one unnamed dam within the Bungonia IBRA subregion.
Connectivity features	Within the landscape assessment area, patches of woodland and forest provide some connectivity to Tarlo River National Park and unnamed adjoining vegetation.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	NSW Seamless Geology (DRNSW, 2022) suggests the occurrence of the following soil types within the Bungonia portion of the amended project footprint: • Alluvial Soils - Medium Textured (Loams, Clay Loams) • Kraznozems • Lithosols • Soloths • Yellow Podzolic Soils - less fertile (granites and metasediments). These occur over the following rock groups recorded in the landscape assessment: • Adaminaby Group • Alluvium • Bendoc Group • Bindook Group • Colluvium • Crookwell Volcanic Complex • Lambie Group • Mount Fairy Group • Residual deposits. No cliffs were noted in the amended project footprint during field surveys, however areas of minor rock outcrops (ranging from 0.2% to 30% cover) and areas of loose surface rock (with rock cover ranging from 0.1% to 40%) were recorded.
Areas of Outstanding Biodiversity Value (AOBVs)	There are no Areas of Outstanding Biodiversity Value within the Bungonia portion of the amended project footprint and surrounds.

5.2.2 Crookwell IBRA subregion

Table 5-3: Landscape features of the Crookwell IBRA subregion

Landscape features	Description
NSW (Mitchell) Landscapes	SEH Crookwell Basalts, Crookwell Basalts and Sands – 1,629.69 ha SEH Monaro, Gundary Plains – 1,082.28 ha SEH Murrumbateman Granites, Gunning Hills – 87.94 ha SEH Northern Granites, Oberon – Kialla Granites – 1,164.54 ha SEH Oberon, Rockley Plains – 3,605.00 ha SEH Crookwell, Towrang Ranges – 1,046 ha
Rivers, streams and estuaries and Strahler stream order	Within the Crookwell IBRA subregion there are 431 first, 191 second, 131 third, 39 fourth, 51 fifth and 5 sixth order waterways.
Wetlands within and adjacent to the amended project footprint	The NSW Wetlands dataset identifies one reservoir (Pejar Dam) mapped within the Crookwell IBRA subregion.
Connectivity features	The majority of the Crookwell IBRA subregion is cleared with patches of disconnected vegetation. Within the landscape assessment area there is connectivity to Back Arm Nature Reserve to the north of the alignment and some connectivity to Tarlo River National Park at the eastern extent of the subregion. Connectivity is patchy between the alignment and Back Arm Nature Reserve
Karst, caves, crevices, cliffs, rocks and other geological features of significance	NSW Seamless Geology (DRNSW, 2022) suggests the occurrence of the following soil types within the Crookwell portion of the landscape assessment area: • Chernozems • Chocolate Soils • Kraznozems • Lithosols • Red Earths – more fertile (volcanics and granodiorites) • Red Podzolic Soils – more fertile (volcanics and granodiorites) • Solodic Soils • Soloths • Water • Weisenboden • Yellow Earths • Yellow Podzolic Soils – less fertile (granites and metasediments) • Yellow Podzolic Soils – more fertile (volcanics and granodiorites). These occur over the following rock groups recorded in the landscape assessment area: • Adaminaby Group • Alluvium • Bendoc Group • Bishopthorpe Suite • Campbells Group • Colluvium • Crookwell Volcanic Complex • Gunning Suite • Lambie Group • Mount Fairy Group • Parkesbourne Suite • Residual deposits • Turrallo Suite. No karst, crevices, caves, or cliffs were noted in the landscape assessment area during field surveys, however one area containing boulders and areas of minor rock outcrops (ranging from 0.2% to 10% cover) and areas of loose surface rock (with rock cover ranging from 0.1% to 40%) were recorded.

Landscape features	Description
AOBVs	There are no Areas of Outstanding Biodiversity Value within the Crookwell portion of the amended project footprint and surrounds.

5.2.3 Murrumbateman IBRA subregion

Table 5-4: Landscape features of the Murrumbateman IBRA subregion

Landscape features	Description
NSW (Mitchell) Landscapes	NSW South Western Slopes (NSS) Upper Slopes, Boorowa Volcanics – 2,2905.89 ha SEH Lake Basins, Breadalbane Swamps and Lagoons – 0.03 ha SEH Murrumbateman, Burrinjuck Ridges – 1,317.38 ha SEH Crookwell Basalts, Crookwell Basalts and Sands – 6.49 ha SEH Crookwell, Dalton Hills – 3,643.29 ha SEH Murrumbateman, Doura Volcanics - 10.61 ha SEH Monaro, Gundary Plains – 2.38 ha SEH Murrumbateman Granites, Gunning Hills – 1,047.37 ha NSS Upper Slopes, Marilba Range – 1,744.83 ha NSS Upper Slopes, Upper Lachlan Channels and Floodplains – 160.94 ha SEH Murrumbateman, Upper Murrumbidgee Gorge – 52.53 ha
Rivers, streams and estuaries and Strahler stream order	Within the Murrumbateman IBRA subregion there are 358 first, 160 second, 69 third, 41 fourth, 47 fifth and 10 sixth order waterways.
Wetlands within and adjacent to the amended project footprint	The NSW Wetlands dataset identifies one unnamed wetland mapped within the Murrumbateman IBRA subregion.
Connectivity features	The majority of the Murrumbateman IBRA subregion is cleared. The southern extent of Bango Nature Reserve is located within the landscape assessment area north of the alignment, with patches of trees providing some connectivity between the alignment and Bango Nature Reserve. There are also areas of unnamed forest within the alignment and landscape assessment area, which provides connectivity to larger areas of vegetation to the south.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	NSW Seamless Geology (DRNSW, 2022) suggests the occurrence of the following soil types within the Murrumbateman portion of the landscape assessment area: • Lithosols • Red Brown Earths • Solodic Soils • Yellow Earths • Yellow Podzolic Soils - less fertile (granites and metasediments). These occur over the following rock groups recorded in the landscape assessment area: • Adaminaby Group • Alluvium • Bendoc Group • Black Range Group • Colluvium • Douro Group • Gunning Suite • Hattons Corner Group • Margules Group • Residual deposits • Unassigned Devonian intrusions. One area of limestone outcropping was identified outside the amended project footprint during desktop karst mapping assessment. However, due to access constraints, this area could not be ground-truthed during the summer 2023 surveys. Two areas containing boulder fields and areas of minor rock outcrops (ranging from

Landscape features	Description
	0.2% to 50% cover), and areas of loose surface rock (with rock cover ranging from 0.1% to 80%) were recorded within the amended project footprint.
AOBVs	There are no Areas of Outstanding Biodiversity Value within the Murrumbateman portion of the amended project footprint and surrounds.

5.2.4 Inland Slopes IBRA subregion

Table 5-5: Landscape features of the Inland Slopes IBRA subregion

Landscape features	Description
NSW (Mitchell) Landscapes	NSS Upper Slopes Granites, Adelong Granite Ranges – 3,799.39 ha NSS Upper Slopes, Adrah Hills and Ranges – 3,005.64 ha NSS Upper Slopes, Boorowa Volcanics – 2,004.94 ha SEH Murrumbateman, Burrinjuck Ridges – 298.52 ha NSS Upper Slopes, Carabost Hills and Ranges – 3,122.81 ha NSS Upper Slopes Granites, Coffin Rock Granite Hills – 610.57 ha NSS Ultramatfcs, Cootamundra – Tumut Serpentinite and Ultramafics – 451.36 ha SEH Murrumbateman, Doura Volcanics – 2,153.02 ha NSS Upper Slopes, Minjary Hills and Ranges – 3,178.08 ha SEH Bondo Basalts, Mt Bundarbo Basalt Caps – 110.44 ha NSS Upper and Lower Slopes, Murrumbidgee – Tarcutta Channels and Floodplains – 2,789.66 ha SEH Bondo Granites, Tooma Granite Ranges – 2,140.68 ha NSS Upper Slopes, Tumut Channels and Floodplain – 339.70 ha SEH Murrumbateman, Upper Murrumbidgee Gorge – 238.15 ha NSS Upper Slopes, Wonga Hills and Ranges – 482.95 ha NSS Upper Slopes and Granites, Young Hills and Slopes – 3,939.44 ha
Rivers, streams and estuaries and Strahler stream order	Within the Inland Slopes IBRA subregion there are 1,398 first, 688 second, 277 third, 228 fourth, 97 fifth, 42 sixth, 9 seventh, 3 eighth and 11 ninth order waterways.
Wetlands within and adjacent to the amended project footprint	The NSW Wetlands dataset identifies two unnamed wetlands mapped within the Inland Slopes IBRA subregion.
Connectivity features	The Inland Slopes IBRA subregion is predominantly cleared farmland. Minjary National Park is located partly within the landscape assessment area and directly west of the alignment. There is connectivity to Green Hills State Forest to the south of the subregion, and connectivity to Red Hill State Forest in the north. There is connectivity to unnamed vegetation at the southern extent of the subregion, which provides connectivity to a larger patch of to the north. The subregion also maintains some connectivity to Tumut State Forest and larger patches of vegetation in the neighbouring subregions.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	NSW Seamless Geology (DRNSW, 2022) suggests the occurrence of the following soil types within the Inland Slopes portion of the landscape assessment area: • Alluvial Soils – Light Sandy Textured (Sands to Sandy Loams) • Alluvial Soils – Medium Textured (Loams, Clay Loams) • Brown Podzolic Soils • Euchrozems • Grey, Brown, and Red Clays • Kraznozems • Lithosols • Non-Calcic Brown Soils • Red Brown Earths • Red Earths – less fertile (granites and metasediments) • Red Podzolic Soils – less fertile (granites and metasediments) • Red Podzolic Soils – more fertile (volcanics and granodiorites) • Solodic Soils • Soloths • Yellow Earths • Yellow Podzolic Soils – less fertile (granites and metasediments). These occur over the following rock group suits recorded in the landscape assessment area: • Adaminaby Group • Alluvium

Landscape features	Description
	• Black Range Group • Boggy Plain Suite • Bogong Suite • Colluvium • Coolac Ophiolite Suite • Douro Group • Hattons Corner Group • Residual deposits • Snowy Mountains Volcanic Complex • Tom Groggin Suite • Unassigned Central Lachlan Silurian Granites • Unassigned Devonian intrusions • Unassigned Maragle Batholith units • Unassigned Palaeozoic intrusions • Ungrouped Central Lachlan Silurian units • Ungrouped Mt Foster-Tumut Zone units • Young Suite. One area of limestone outcrop potentially supporting caves and crevices was identified. No cliffs were noted in the landscape assessment area during field surveys, however areas of minor rock outcrops (ranging from 0.1% to 50% cover) and areas of loose surface rock (with rock cover ranging from 0.1% to 70%) were recorded.
AOBVs	There are no Areas of Outstanding Biodiversity Value within the Inland Slopes portion of the amended project footprint and surrounds.

5.2.5 Bondo IBRA subregion

Table 5-6: Landscape features of the Bondo IBRA subregion

Landscape features	Description
NSW (Mitchell) Landscapes	NSS Upper Slopes Granites, Adelong Granite Ranges – 914.92 ha AA Alpine, Cabramurra – Kiandra Basalt Caps and Sands – 20.45 ha NSS Upper Slopes, Carabost Hills and Ranges – 1,165.37 ha NSS Ultramafics, Cootamundra - Tumut Serpentinite and Ultramafics – 3.06 ha NSS Upper Slopes, Minjary Hills and Ranges – 39.05 ha SEH Bondo Basalts, Mt Bundarbo Basalt Caps – 168.51 ha SEH Bondo Granites, Tooma Granite Ranges – 7,203.18 ha NSS Upper Slopes and Granites, Young Hills and Slopes – 803.52 ha
Rivers, streams and estuaries and Strahler stream order	Within the Bondo IBRA subregion there are 410 first, 156 second, 89 third, 81 fourth, 28 fifth and 5 sixth order waterways.
Wetlands within and adjacent to the amended project footprint	The NSW Wetlands dataset does not identify any wetlands mapped within the Bondo IBRA subregion.
Connectivity features	The landscape assessment area in the Bondo IBRA subregion is almost entirely vegetated. It is highly connected to Bago State Forest and Green Hills State Forest to the west and Red Hill State Forest to the north. There is some connectivity to surrounding reserves, including Maragle State Forest and unnamed adjoining vegetation.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	NSW Seamless Geology (DRNSW, 2022) suggests the occurrence of the following soil types within the Bondo portion of the landscape assessment area: • Alluvial Soils - Medium Textured (Loams, Clay Loams) • Euchrozems • Kraznozems • Lithosols • Red Brown Earths • Red Earths - less fertile (granites and metasediments) • Red Podzolic Soils - less fertile (granites and metasediments) • Red Podzolic Soils - more fertile (volcanics and granodiorites). These occur over the following rock group suits recorded in the landscape assessment area: • Alluvium • Colluvium • Coolac Ophiolite Suite • Residual deposits • Snowy Mountains Volcanic Complex • Tom Groggin Suite • Unassigned Devonian intrusions • Unassigned Maragle Batholith units • Ungrouped Central Lachlan Silurian units • Young Suite. One area of limestone outcrop potentially supporting caves and crevices was identified. No cliffs were noted in the landscape assessment area during field surveys; however one potential overhang (45°+) was identified by the DEM. Areas of minor rock outcrops (ranging from 5% to 10% cover) and areas of loose surface rock (with rock cover ranging from 0.1% to 10%) were recorded.
AOBVs	There are no Areas of Outstanding Biodiversity Value within the Bondo portion of the amended project footprint and surrounds.

5.2.6 Snowy Mountains IBRA subregion

Table 5-7: Landscape features of the Snowy Mountains IBRA subregion

Landscape features	Description
NSW (Mitchell) Landscapes	AA Alpine, Cabramurra - Kiandra Basalt Caps and Sands – 1,683.92 ha SEH Bondo Granites, Tooma Granite Ranges – 3,416.62 ha
Rivers, streams and estuaries and Strahler stream order	Within the Snowy Mountains IBRA subregion there are 199 first, 91 second, 53 third, 29 fourth and 8 fifth order waterways.
Wetlands within and adjacent to the amended project footprint	The NSW Wetlands dataset does not identify any wetlands mapped within the Snowy Mountains IBRA subregion. There are five bogs and/or fens mapped which were ground-truthed during the field survey (Section 6.5.5).
Connectivity features	Most of the Snowy Mountains comprises woodland, native forests, and pine forests. The landscape assessment area includes parts of Kosciuszko National Park to the east of the amended project footprint. In the south, there is connectivity to Maragle State Forest and Bago State Forest. This subregion neighbours the Bondo Subregion and the Australian Capital Territory, both of which are substantially vegetated and maintain further connectivity.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	NSW Seamless Geology (DRNSW, 2022) suggests the occurrence of the following soil types within the Snowy Mountains portion of the landscape assessment area: • Kraznozems • Lithosols • Neutral to Alkaline Peats • Red Earths - more fertile (volcanics and granodiorites) • Red Podzolic Soils - more fertile (volcanics and granodiorites) • Yellow Podzolic Soils - less fertile (granites and metasediments). These occur over the following rock group suits recorded in the landscape assessment area: • Adaminaby Group • Snowy Mountains Volcanic Complex • Tom Groggin Suite. No karst, crevices, caves, or cliffs were noted in the landscape assessment area during field surveys, however areas of minor rock outcrops (ranging from 0.1% to 70% cover) and areas of loose surface rock (with rock cover ranging from 0.1% to 70%) were recorded.
AOBVs	There are no Areas of Outstanding Biodiversity Value within the Snowy Mountains portion of the amended project footprint.

5.3 Site context

5.3.1 Native vegetation cover

For each subregion, native vegetation cover was assessed within a 500-metre buffer to the amended project footprint in accordance with the methodology outlined in Section 4.1.1. Native vegetation cover is detailed in Table 5-8 and shown in Figure 5-1 for each IBRA subregion relevant to the amended project.

Table 5-8: Native vegetation cover

IBRA subregion	Total landscape assessment area (ha)	Native vegetation cover (ha)				Native vegetation cover per IBRA subregion	
		0-10%	>10-30%	>30-70%	>70%	ha	%
Bondo	10,483.03	110.62	1,107.32	702.35	273.11	2,193.40	21%
Bungonia	2,900.59	23.11	125.13	1,095.85	3.83	1,247.92	43%
Crookwell	8,615.69	175.82	728.42	817.87	0.07	1,722.18	20%
Murrumbateman	10,891.49	249.89	873.36	1,168.16	5.37	2,296.78	21%
Inland Slopes	28,596.17	431.09	2,740.27	3,934.80	76.71	7,182.88	25%
Snowy Mountains	5,100.54	0.00	0.19	6.00	4,730.07	4,736.26	93%
Total	**66,587.52**	**990.54**	**5,574.68**	**7,725.04**	**5,089.16**		

5.3.2 Patch size

The majority (96.5 per cent) of native woody vegetation within the amended project footprint was assigned to the highest patch size class. A small proportion (0.4 to 3.0 per cent) of woody vegetation within the Bungonia, Bondo, Crookwell, Murrumbateman, and Inland Slopes IBRA subregions were assigned to patch sizes less than five hectares and five to 25 hectares. Approximately 2.5 per cent of native woody vegetation in the Crookwell IBRA subregions was assigned to the 25 to 100 hectares patch size class.

All non-woody vegetation zones including derived grasslands within the amended project footprint were assigned to the highest patch size class (ie greater than or equal to 100 hectares).

Table 5-9: Native woody vegetation patch size classes according to IBRA subregion

Patch size class	All IBRA subregions (ha)	Bungonia (ha)	Crookwell (ha)	Murrumbateman (ha)	Inland Slopes (ha)	Bondo (ha)	Snowy Mountains (ha)
< 5 ha	207.24	5.65	49.30	46.83	93.98	10.94	0.54
5 to <25 ha	81.21	-	31.85	12.67	35.82	0.86	-
25 to <100 ha	80.93	-	36.36	-	44.56	-	-
>=100 ha	31,821.61	1,495.17	2766.61	6,507.00	13,678.88	2,520.53	4,889.42

6 Native vegetation

This chapter addresses native vegetation in accordance with Section 5 of the BAM. Planted native vegetation is addressed in Section 6.7. Approach to scattered trees is addressed in Section 4.1.

6.1 Native vegetation extent

The amended project footprint includes approximately 8,804.84 ha of land, comprising 1,958.67 ha of Category 1 - exempt land, 28.03 ha of planted vegetation and 52.61 ha of surface water (i.e., streams and waterbodies). Of the 6,786.47 ha of remaining vegetation, 1,561.00 ha comprises non-native vegetation and 5,225.47 ha native vegetation. Table 6-1 outlines the extent of native and non-native vegetation within the amended project footprint and updated indicative disturbance area relative to each IBRA subregion. The data presented in Table 6-1 excludes Category 1 – exempt land, planted vegetation and surface water as documented above. Native vegetation recorded during field surveys is described in the following sections. Areas of non-native vegetation included Pine (i.e., *Pinus radiata*) plantations, exotic shelter belts and exotic dominated pastures.

Vegetation was considered native when the groundcover was comprised of least 30% native species. Given this, grasslands used for grazing were commonly mapped as native vegetation due to the moderate to high cover of native grasses. Grass species were typically common with a high tolerance for disturbance (e.g. *Microlaena stipoides* (Weeping Grass) and *Sporobolus spp*. (Rat' Tail Grass)). The condition of these grasslands is often reflected by a lower VI score (below 15) and is therefore mapped as Very low condition. Additionally, where native canopy is present, but the groundcover is predominantly exotic, native vegetation was mapped to where the canopy extended. For example, in areas of exotic pasture with scattered canopy species.

Table 6-1: Extent of native and non-native vegetation within the amended project footprint and updated indicative disturbance area

IBRA subregions	Vegetation	Amended project footprint (ha)	Amended project footprint (%)	Updated indicative disturbance area (ha)	Updated indicative disturbance area (%)
Bondo	Native	111.82	2%	38.27	3%
	Non-native	785.98	12%	343.31	23%
Bungonia	Native	283.30	4%	49.15	3%
	Non-native	30.50	0%	7.84	1%
Crookwell	Native	745.87	11%	114.75	8%
	Non-native	98.95	1%	20.35	1%
Inland Slopes	Native	2,404.44	35%	333.32	23%
	Non-native	467.21	7%	149.82	10%
Murrumbateman	Native	1,057.07	16%	128.33	9%
	Non-native	104.66	2%	56.17	4%
Snowy Mountains	Native	622.97	9%	202.67	14%
	Non-native	73.70	1%	35.35	2%
Total		**6,786.47**	**100.00%**	**1,479.34**	**100.00%**

6.2 Plant Community Types

Native vegetation recorded within the amended project footprint falls within twelve vegetation formations that occur within the six IBRA subregions, including:

- Alpine Complex
- Dry Sclerophyll Forests (Shrub/grass sub-formation)
- Dry Sclerophyll Forests (Shrubby sub-formation)
- Eastern Riverine Forests
- Forested Wetlands
- Freshwater Wetlands
- Grasslands
- Grassy Woodlands
- Semi-arid Woodlands (Shrubby sub-formation)
- Western Slopes Grassy Woodlands
- Wet Sclerophyll Forests (Grassy sub-formation)
- Wet Sclerophyll Forests (Shrubby sub-formation).

These vegetation formations include 45 PCTs that have been mapped within the amended project footprint. These are shown in Figure 6-1 (Attachment 5) and described in Attachment 15.

6.3 Vegetation Zones

PCTs within the amended project footprint were stratified into five broad condition classes in accordance with the methodology detailed in Section 4.4.2. A summary of the survey effort for each vegetation zone is provided in Section 4.4.3 including a discussion of the process applied to address any plot shortfall where relevant.

Vegetation zone mapping refinements were implemented following field data collection, to address changes to the amended project footprint and in consideration of EIS submissions received. Following submission of the EIS, this incorporated a review of the VI score of each individual BAM plot to confirm the VI sat broadly within a range appropriate for the assigned condition class. The analysis was undertaken in excel using the PCT benchmark data (version 1.2) and relevant BAM-C equations. Where VI scores did not align, a desktop assessment of the associated vegetation was undertaken, and further mapping refinements implemented as necessary. This resulted in the reassignment of condition zones across some PCTs, particularly within the low and moderate condition zones associated with grassy woodland PCTs.

Following finalisation of the vegetation zone mapping for the amended project footprint, the VI score was obtained for each vegetation zone by entering the compiled BAM plot data into the BAM-C. The data provides quantitative measures of composition, structure and function for each vegetation zone (Attachment 11). The BAM-C compares the values recorded in each vegetation zone in the amended project footprint with the benchmark for the PCT as described in the BioNet Vegetation Classification database (DCCEEW, 2024c) to provide the VI score. This score represents the overall condition, health and function of the vegetation compared to the benchmark value (out of 100).

The following sections detail the VI scores within each vegetation zone within each of the six IBRA subregions. TECs listed under the BC Act are also noted where associated with a vegetation zone. Figure 4-1 and Figure 6-1 (Attachment 5) show the extent of native vegetation and TECs mapped within the amended project footprint.

PCT mapping and vegetation zone allocation on inaccessible lands was completed through desktop extrapolation of existing datasets (Section 4.5.1) in conjunction with existing field-based mapping of nearby land. For further detail regarding the vegetation zone mapping approach applied to inaccessible lands, refer to Table 4-25. Surrogate or benchmark plot data was used for these assigned vegetation zones as detailed in Section 4.4.4. Vegetation mapping on inaccessible land will be confirmed once access is gained, with detail provided in the Supplementary Biodiversity Assessment Strategy (SBAS) (refer to mitigation measure B5).

6.3.1 Vegetation zones within the Bungonia IBRA subregion

Table 6-2 details native vegetation VI scores in relation to the amended project footprint within the Bungonia IBRA subregion. The native vegetation extent documented excludes Category 1 exempt lands.

Table 6-2: PCTs, Keith formations and vegetation zones of the amended project footprint within the Bungonia IBRA subregion

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
283	Apple Box – Blakely's Red Gum moist valley and footslopes grass-forb open forest	Grassy Woodlands	Western Slopes Grassy Woodlands	91	White Box Yellow Box Blakely's Red Gum Woodland	Low	47.8	70	8.3	30.3
						Moderate	74	18.4	45.5	39.6
870	Grey Gum - Thin-leaved Stringybark grassy woodland	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Central Gorge Dry Sclerophyll Forests	10	No TEC association	Very high	62.4	91.2	94.5	81.3
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	61	No TEC association	Low	28.1	29	11.2	20.9
						Moderate	32.6	58.8	53	46.7
						High	77.9	59.7	74.7	70.3
						Very high	88.9	71.9	97.5	85.4
1097	Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux	Wet Sclerophyll Forests (Grassy sub-formation)	Southern Tableland Wet Sclerophyll Forests	95	Tableland Basalt Forest	Very low	0.8	1	40.2	3.2
						Low	5.9	29.3	49.5	20.5
1107	River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes	Wet Sclerophyll Forests (Shrubby sub-formation)	Southern Escarpment Wet Sclerophyll Forests	10	Tableland Basalt Forest	High	96.5	67.7	44.7	66.3
1150	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges	Dry Sclerophyll Forests (Shrubby sub-formation)	South-East Dry Sclerophyll Forests	40	No TEC association	Very low	22	8.6	0.4	4.3
						Low	33.7	22.1	14.9	22.3
						Moderate	50.7	25.3	41.8	37.7
						High	64.9	70.4	93.9	75.4
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Grassy Woodlands	Southern Tableland Grassy Woodlands	94	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Very low	13.9	30.1	16.8	19.1
						Low	27	56.3	16.1	29
						Moderate	36.3	52	28.7	37.9
						High	92.2	60	93.3	80.2
						Very high	94	58	94.3	80.1

6.3.2 Vegetation zones within the Crookwell IBRA subregion

Table 6-3 details native vegetation zones and VI scores in relation to the amended project footprint within the Crookwell IBRA subregion. The native vegetation extent documented excludes Category 1 exempt lands.

Table 6-3: PCTs, Keith formations and vegetation zones of the amended project footprint within the Crookwell IBRA subregion

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
280	Red Stringybark - Blakely's Red Gum/- Long-leaved Box shrub/grass hill woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	80	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Moderate	28.1	28.1	93.5	42
283	Apple Box – Blakely's Red Gum moist valley and footslopes grass-forb open forest	Grassy Woodlands	Western Slopes Grassy Woodlands	91	White Box Yellow Box Blakely's Red Gum Woodland	Very low	26.5	22.9	4.6	14
						Low	47.8	70	8.3	30.3
						Moderate	45.7	78.6	33.8	49.5
						High	61.6	86.3	51.2	64.8
679	Black Sallee - Snow Gum low woodland of montane valleys, South-Eastern Highlands Bioregion and Australian Alps Bioregion	Grassy Woodlands	Subalpine Woodlands	35	Monaro Tableland Cool Temperate Grassy Woodland	Low	45.4	49.8	32.2	41.8
						Moderate	45.4	49.8	32.2	41.8
						High	70.7	56.8	70.1	65.5
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	50	No TEC association	Low	46.7	44.9	0.2	7.5
						Moderate	65.5	60.4	28.7	48.5
						Very high	85.3	80.2	93.1	86
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	Grassy Woodlands	Southern Tableland Grassy Woodlands	80	No TEC association	Low	57.7	47.6	3.9	22.1
						High	66.8	69.8	52.4	62.5
						Very High	74.8	73.5	100	81.9
952	Mountain Gum - Narrow-leaved Peppermint - Snow Gum dry shrubby open forest on undulating tablelands	Grassy Woodlands	Subalpine Woodlands	50	Tableland Basalt Forest	Low	19.7	48.9	19.9	26.8
						Moderate	24.6	61.8	72.9	48
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	61	No TEC association	Very low	15.1	28.7	0	0.9
						Low	46.7	33.5	14.3	28.2
						Moderate	65.4	39	51.6	50.9
						High	86.6	63.5	59.1	68.7
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Dry Sclerophyll Forests (Shrubby sub-formation)	South-East Dry Sclerophyll Forests	90	No TEC association	High	67.6	64.8	95.4	74.8
						Very high	88.2	61.7	100	81.6
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Grassy Woodlands	Subalpine Woodlands	95	Monaro Tableland Cool Temperate Grassy Woodland	Very low	7.1	2.4	10.1	5.6
						Moderate	21.1	78.3	31	37.1
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Grassy Woodlands	Southern Tableland Grassy Woodlands	94		Very low	11.8	2.9	0.3	2.1
						Low	15.8	49.8	13	21.7

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
					White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Moderate	66.4	53.5	19.1	40.8
						High	67.6	84.6	87.3	79.3
						Very High	80.1	82.1	80.9	81.1

6.3.3 Vegetation zones within the Murrumbateman IBRA subregion

Table 6-4 details native vegetation zones and VI scores in relation to the amended project footprint within the Murrumbateman IBRA subregion. The native vegetation extent documented excludes Category 1 exempt lands.

Table 6-4: PCTs, Keith formations and vegetation zones of the amended project footprint within the Murrumbateman IBRA subregion

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
266	White Box grassy woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	94	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Very low	2.6	1.7	0.1	0.9
						Low	36.9	37.5	69	45.7
						Moderate	19.1	82.2	69.5	47.8
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Grassy Woodlands	Western Slopes Grassy Woodlands	94	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Low	12.8	26.8	63.1	27.9
280	Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	80	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Very low	43.5	75.2	0.1	6.9
						Low	50.1	70.8	6.5	28.5
						Moderate	30.9	64.7	32.3	40.1
						High	60.7	41	96.1	62.1
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	Grassy Woodlands	Western Slopes Grassy Woodlands	91	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	High	48.7	59.8	60	55.9
						Very high	82	82.8	83.5	82.8
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	67	No TEC association	Very low	12.6	30.5	0.3	4.8
						Low	18.8	26.2	48.6	28.8
						Moderate	20.9	61.2	57	41.7
322	Inland Scribbly Gum - Red Stringybark - Black Cypress Pine hillslope shrub-tussock grass open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	33	No TEC association	Low	28.5	30.8	15	23.6
						High	75.4	62.8	91.5	75.7
349	Inland Scribbly Gum - Red Stringybark open forest on hills composed of siliceous substrates	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	50	No TEC association	Very low	45.1	28.9	2.9	15.6
						Low	68	29.2	9.6	26.7
						Moderate	71.7	33.5	53.9	50.6
						Very high	90.6	68.8	75	77.6
351	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	60	No TEC association	Very low	24.9	29.9	1.4	10.2
						Low	19.2	36.8	21.4	24.7
						Moderate	45	53.8	75.2	56.7
						High	66.4	82.8	71.4	73.2
352				86	White Box - Yellow Box - Blakely's Red Gum Grassy	Very low	2	42.1	0.6	3.6
						Low	32.3	29	2.9	14

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests		Woodland and Derived Native Grassland	Moderate	26.6	79.9	26.5	38.3
731	Broad-leaved Peppermint - Red Stringybark grassy open forest	Grassy Woodlands	Southern Tableland Grassy Woodlands	80	No TEC association	High	52.2	81.5	76.1	69.5
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	61	No TEC association	Very low	29.7	28.8	0.4	6.8
						Low	69.7	48.3	3.4	22.5
						Moderate	74.3	56.3	46.3	57.9
						Very high	72.8	89.3	88.2	83.1
1256	Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands	Freshwater Wetlands	Montane Bogs and Fens	85	Montane Peatlands and Swamps	Very low	9.2	83.8	n/a	27.8
						Moderate	17.6	68.7	n/a	34.7
1330	Yellow Box – Blakely's Red Gum grassy woodland on the tablelands	Grassy Woodlands	Southern Tableland Grassy Woodlands	94	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Very low	30.8	48	0.4	8.6
						Low	26.9	59.6	2.6	16.1
						Moderate	36.3	49.2	54.2	45.9
						High	67.4	80.1	64	70.2
						Very high	78.4	60.6	81.5	72.9

6.3.4 Vegetation zones within the Inland Slopes IBRA subregion

Table 6-5 details native vegetation zones and VI scores in relation to the amended project footprint within the Inland Slopes IBRA subregion. The native vegetation extent documented excludes Category 1 exempt lands.

Table 6-5: PCTs, Keith formations and vegetation zones of the amended project footprint within the Inland Slopes IBRA subregion

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
5	River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains	Forested Wetlands	Inland Riverine Forests	40	N/A	Low	44.8	37.2	6.5	22.1
						Moderate	18.9	65.4	66.1	43.4
266	White Box grassy woodland in the upper slopes sub-region of the NSW South-Western Slopes Bioregion	Grassy Woodlands	Western Slopes Grassy Woodlands	94	White Box Yellow Box Blakely's Red Gum Woodland	Very low	58.3	55.9	0.1	5.7
						Low	42	85.2	45	54.4
						Moderate	61	86.5	91.5	78.5
						High	59.3	90.1	77.2	74.4
268	White Box – Blakely's Red Gum - Long-leaved Box – Norton's Box - Red Stringybark grass-shrub woodland on shallow soils on hills	Grassy Woodlands	Western Slopes Grassy Woodlands	63	White Box Yellow Box Blakely's Red Gum Woodland	Very low	53.2	0.6	1.3	3.5
						Low	47.5	56.2	17.4	36
						Moderate	80.2	34.2	23.9	40.3
						High	87.1	73.3	48	67.4
						Very high	99.7	87.2	60.8	80.8
277	Blakely's Red Gum - Yellow Box grassy tall woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	94	White Box Yellow Box Blakely's Red Gum Woodland	Very low	40.8	56.3	0.6	11
						Low	20.8	56.1	44.2	37.2
						Moderate	47.5	75.9	65.2	61.7
						High	67.8	85.5	74.2	75.5
278	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Grassy Woodlands	Western Slopes Grassy Woodlands	80	White Box Yellow Box Blakely's Red Gum Woodland	Very low	62.4	56.9	0.1	6.2
						Low	22.7	65.3	18.6	30.2
						High	75.6	88.4	72.4	78.4
280	Red Stringybark – Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	80	White Box Yellow Box Blakely's Red Gum Woodland	Very low	15.4	55.2	0.5	7.4
						Low	27.6	52	13.2	26.6
						Moderate	26.7	83.4	46.9	47.1
						High	55.3	89.2	61.1	67.1
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	67	N/A	Very low	55.4	4	79.8	26
						Low	55.4	4	79.8	26
						Moderate	34.9	52.6	62	48.5
						High	57.3	27.3	98.8	53.7
						Very high	100	100	100	100
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass -	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	67	N/A	Very low	20.6	19.8	2.6	10.2
						Low	33.6	21	53.9	33.6
						Moderate	80.8	37.1	39.6	49.1

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
	shrub low open forest on hills					High	86	80.8	58.8	74.2
294	Nortons Box – Red Box – White Box tussock grass open forest	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	47	N/A	Low	28.8	13.2	62.7	28.8
						Moderate	67.6	16.9	57.6	40.4
295	Nortons Box - Red Box - White Box tussock grass open forest of the southern section of the NSW South Western Slopes Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	47	N/A	Low	88.2	22.7	31.6	39.8
297	Broad-leaved Peppermint – Norton's Box - Red Stringybark tall open forest on red clay on hills	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	38	N/A	Very low	23.1	19.8	1.2	8.2
						Low	21	25.1	17	20.8
						Moderate	69.6	29.6	70	52.7
299	Riparian Ribbon Gum – Robertson's Peppermint - Apple Box riverine very tall open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	50	No TEC association	Very low	7.6	2.1	4	4
						Low	75.6	19.2	62.1	44.9
						Moderate	75.6	19.2	62.1	44.9
301	Drooping Sheoke - Ricinocarpus bowmannii - grasstree tall open shrubland of the Coolac - Tumut Serpentinite Belt	Grassy Woodlands	Western Slopes Grassy Woodlands	72	Coolac-Tumut Serpentinite Shrubby Woodland	Very low	16.8	1.7	0	0.4
						Low	35.4	54	13.6	29.7
						Moderate	87.3	75	15.7	46.9
						High	89.6	90.4	35.8	66.2
306	Red Box - Red Stringybark – Norton's Box hill heath shrub - tussock grass open forest of the Tumut region	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	33	No TEC association	Very low	15.2	19.7	10.6	14.7
						Low	10.5	30.4	40.1	23.4
314	Apple Box - Red Stringybark basalt scree open forest in the upper Murray River region	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	50	No TEC association	Very low	2.2	19.3	0.1	1.8
						Low	14.2	19.1	43.1	22.7
						Moderate	39.5	38.6	46.5	41.4
						Very high	100	100	74.7	90.7
316	Norton's Box - Red Box - Red Stringybark +/- Nodding Flax Lily forb-grass open forest	Grassy Woodlands	Western Slopes Grassy Woodlands	63	No TEC association	Very low	26.6	55.2	0.1	4.3
						Low	31.3	88	24	40.4
						Very high	88.9	93.4	89	90.4
319	Tumbledown Red Gum - White Cypress Pine hill woodland	Semi-arid Woodlands (Shrubby sub-formation)	Inland Rocky Hill Woodlands	60	No TEC association	Low	23.9	27.5	10.9	19.3
						Moderate	64.2	78.8	31.2	54.1
343	Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	88	No TEC association	Very low	19	21.3	0.8	7
						Low	37.8	20.2	42.4	31.8
						Moderate	39.3	61.8	54.9	51.1

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
	woodland on metamorphic substrates									
352	Red Stringybark – Blakely's Red Gum hillslope open forest on meta-sediments	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	86	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Very low	21.5	23.6	4.4	13.1
						Low	36.5	23.8	3	13.7
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	Grassy Woodlands	Southern Tableland Grassy Woodlands	80	No TEC association	Very low	65.3	36.1	3.9	21
						Low	65.3	36.1	3.9	21
1191	Snow Gum - Candle Bark woodland on broad valley flats	Grassy Woodlands	Subalpine Woodlands	95	No TEC association	Very low	14.1	4.9	19.4	11

6.3.5 Vegetation zones within the Bondo IBRA subregion

Table 6-6 details native vegetation zones and VI scores in relation to the amended project footprint within the Bondo IBRA subregion. The native vegetation extent documented excludes Category 1 exempt lands.

Table 6-6: PCTs, Keith formations and vegetation zones of the amended project footprint within the Bondo IBRA subregion

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	75	No TEC association	Low	15.9	62.3	28.6	30.5
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	67	No TEC association	High	83.9	89.9	89.3	87.7
						Very high	83.9	89.9	89.3	87.7
						Low	26	28.9	47.7	32.9
295	Robertson's Peppermint - Broad-leaved Peppermint – Norton's Box - stringybark shrub-fern open forest	Wet Sclerophyll Forests (Grassy sub-formation)	Southern Tableland Wet Sclerophyll Forests	40	No TEC association	Moderate	25.8	59.9	69.1	47.4
299	Riparian Ribbon Gum – Robertson's Peppermint - Apple Box riverine very tall open forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	50	No TEC association	Very low	11.4	28.7	0	2
						Moderate	66.4	58.6	61.3	62
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Wet Sclerophyll Forests (Grassy sub-formation)	Southern Tableland Wet Sclerophyll Forests	20	No TEC association	Low	12.9	12.5	93.2	24.7
						Moderate	12.9	12.5	93.2	24.7
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	86	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Low	33.3	29	2.9	14.1
					No TEC association					

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	Wet Sclerophyll Forests (Grassy sub-formation)	Montane Wet Sclerophyll Forests	5		Very low	48.3	0.9	13.9	8.4
						Low	46.2	48.9	30.2	40.9
						High	50.4	74.4	59.3	60.6
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	5	Tableland Basalt Forest	Very low	57.8	36.3	0.8	11.8
						Moderate	63.7	76.6	59.3	66.1

6.3.6 Vegetation zones within the Snowy Mountains IBRA subregion

Table 6-7 details native vegetation zones and VI scores in relation to the amended project footprint within the Snowy Mountains IBRA subregion. The native vegetation extent documented excludes Category 1 exempt lands. PCT 637 will not be impacted by the amended project and therefore has not been added to the BAM-C to obtain a VI score.

Table 6-7: PCTs, Keith formations and vegetation zones of the amended project footprint within the Snowy Mountains IBRA subregion

PCT ID	PCT name	Formation	Class	% Cleared	TEC	Condition	Composition score	Structure score	Function score	VI score
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps in the NSW South Western Slopes	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Upper Riverina Dry Sclerophyll Forests	75	No TEC association	Low	25.4	33.6	40.4	32.5
300	Ribbon Gum - Narrow-leaved (Robertson's) Peppermint montane fern - grass tall open forest on deep clay loam soils	Wet Sclerophyll Forests (Grassy sub-formation)	Southern Tableland Wet Sclerophyll Forests	20	No TEC association	Low	53.3	44.6	15.2	33.1
						Moderate	87	73.9	15	45.9
						Very high	86	81	79	82
637	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	Alpine Complex	Alpine Bogs and Fens	5	Montane Peatlands and Swamps	High	58	97.4	n/a	75.2
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	Wet Sclerophyll Forests (Grassy sub-formation)	Montane Wet Sclerophyll Forests	5	No TEC association	Low	53.6	24.5	30.2	34.1
						Moderate	70.2	39.9	33.4	45.4
						High	86.7	36.4	91.7	66.1
679	Black Sallee - Snow Gum low woodland of montane valleys	Grassy Woodlands	Subalpine Woodlands	35	No TEC association	Low	46	50.4	15.4	32.9
						High	61.9	65.2	84.2	69.8
939	Montane wet heath and bog of the eastern tablelands	Freshwater Wetlands	Montane Bogs and Fens	50	Montane Peatlands and Swamps	High	73.2	84.7	n/a	78.7
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	Dry Sclerophyll Forests (Shrubby sub-formation)	Southern Tableland Dry Sclerophyll Forests	5	No TEC association	Low	57.6	23.9	15.1	27.5
						Moderate	60.1	47.8	59.6	55.5
						High	80.7	56	97.2	76
						Very high	87.7	74.2	90.7	83.9
1196	Snow Gum - Mountain Gum shrubby open forest of montane areas	Grassy Woodlands	Subalpine Woodlands	5	No TEC association	Low	62.7	39.5	17.3	35
						High	61.1	68	95.1	73.4
1224	Sub-alpine dry grasslands and heathlands of valley slopes	Grasslands	Temperate Montane Grasslands	5	No TEC association	High	83.3	93.7	n/a	88.4

6.4 Weeds

High Threat Weeds (HTW), Priority weeds (Riverina, Murray and Southeastern regions) and Weeds of National Significance (WoNS) recorded within the amended project footprint are detailed in Table 6-8. Note: an ‘x’ indicates the weed was recorded within the relevant IBRA subregion. The vegetation zones in which these weeds were recorded are also detailed.

Table 6-8: Weed species recorded in BAM plots and incidental recordings

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
Agrostis capillaris	Browntop Bent	0-Non-native, 1093-Moderate, 1093-Very low	Yes	-	-	-	No		x	x			
Axonopus fissifolius	Narrow-leafed Carpet Grass	0-Non-native, 1093-Low, 1330-Very low, 283-Very high, 952-Low, 952-Moderate,	Yes	-	-	-	No	x	x	x			
Bidens pilosa	Cobbler's Pegs	1330-Low, 1330-Very low	Yes	-	-	-	No	x					
Briza subaristata	-	1093-Moderate, 1151-Low, 1330-High, 1330-Moderate, 280-High, 280-Low, 283-Very high, 727-Moderate, 731-High, 731-Low	Yes	-	-	-	No		x	x			
Bromus diandrus	Great Brome	1330-Low, 266-High, 266-Low, 266-Very low, 277-High, 277-Low, 280-High, 280-Low, 280-Very low, 283-Very high, 287-Moderate, 290-High, 290-Very low, 314-Low, 314-Moderate, 314-Very low, 343-Moderate, 679-High, 952-Low, 9996-Non-native	Yes	-	-	-	No		x	x	x		

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
Carthamus lanatus	Saffron Thistle	0-Non-native, 1330-Low, 1330-Very low, 266-High266-Low, 266-Moderate, 266-Very low, 277-High277-Moderate, 277-Very low, 280-High, 280-Very low, 287-Very low, 295-Moderate, 301-High, 301-Low, 351-Very low, 352-Low, 352-Moderate, 952-Low, 9996-Non-native	Yes	-	-	-	No	x	x	x	x	x	
Cenchrus ciliaris	Buffel Grass	266-High, 268-Very high	Yes	-	-	-	No				x		
Cenchrus clandestinus	Kikuyu	0-Non-native, 280-Low, 319-Low	Yes	-	-	-	No	-	-	-	x	-	-
Crataegus monogyna	Hawthorn	1093-Moderate, 1330-High, 283-High	Yes	-	-	-	No	x	x	-	-	-	-
Cyperus eragrostis	Umbrella Sedge	1093-Low, 1330-Low, 1330-Very low, 268-High, 283-High, 283-Moderate, 283-Very low, 351-Very low	Yes	-	-	-	No	x	x	x	x	-	-
Delairea odorata	Cape Ivy	299-Moderate	Yes	-	-	-	No	-	-	-	-	x	-
Ehrharta calycina	Perennial Veldtgrass	266-Low	Yes	-	-	-	No	-	-	-	x	-	-

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
Ehrharta erecta	Panic Veldtgrass	1330-Very low, 277-Low, 277-Very low, 278-Very low, 280-Low, 290-High, 299-Moderate, 314-Low, 314-Moderate, 5-Moderate	Yes	-	-	-	No	x	-	-	x	x	-
Eragrostis curvula	African Lovegrass	1330-Very low, 278-Very low, 299-Moderate	Yes	-	-	-	No	-	-	x	x	x	-
Heliotropium amplexicaule	Blue Heliotrope	319-Low	Yes	-	-	-	No	-	-	-	x	-	-
Hypericum perforatum	St. John's Wort	0-Non-native, 1196-Low, 1330-Low, 1330-Moderate, 1330-Very high, 1330-Very low, 266-High, 266-Low, 266-Very low, 268-Low, 268-Very high, 277-High, 277-Low, 277-Very low, 278-Very low, 280-High, 280-Low, 280-Very low, 283-High, 287-Low, 287-Very low, 290-High, 290-Very low, 295-Moderate, 297-Moderate, 297-Very low, 299-Very low, 300-Low, 301-Low, 314-Low, 314-Moderate, 316-Low, 316-Very high, 316-Very low, 343-Very low, 352-Low,	Yes	-	-	-	No	-	x	x	x	x	x

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
		352-Very low, 638-Low, 638-Very low, 679-High, 679-Low, 727-Very low, 731-High, 731-Low, 731-Very high, 952-Moderate, 953-High, 953-Low, 953-Moderate, 9996-Non-native											
Ligustrum sinense	Small-leaved Privet	299-Moderate	Yes	-	-	-	No	-	-	-	-	x	-
Nassella neesiana	Chilean Needle Grass	1330-Very low, 277-Very low, 727-Moderate, 952-Low	Yes	Yes - Prohibition on certain dealings; Regional Recommended Measure	Yes - Prohibition on certain dealings; Regional Recommended Measure	Yes - Prohibition on certain dealings	Yes		x	x	x	-	-
Nassella trichotoma	Serrated Tussock	0-Non-native, 1330-High, 1330-Low, 1330-Moderate, 1330-Very low, 280-Moderate, 283-High, 283-Moderate, 352-	Yes	Yes - Prohibition on certain dealings; Regional Recommended Measure	Yes - Prohibition on certain dealings; Regional Recommended Measure	Yes - Prohibition on certain dealings	Yes	x	x	x	-	-	-

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
		Low, 952-Low, 9998-Non-native											
Paspalum dilatatum	Paspalum	0-Non-native, 1093-Low, 1330-Low, 1330-Moderate, 1330-Very low, 266-Moderate, 266-Very low, 277-Low, 277-Very low, 278-Low, 280-High, 280-Moderate, 280-Very low, 283-High, 283-Moderate, 283-Very low, 319-Low, 349-Very low, 351-Very low, 638-Very low, 952-Very low	Yes	-	-	-	No	x	x	x	x	x	-
Pinus radiata	Radiata Pine	0-Non-native, 285-Very high, 290-Very low, 297-Low, 297-Moderate, 299-Moderate, 638-High, 638-Very low	Yes	-	-	-	No	-	-	-	x	x	-
Rosa rubiginosa	Sweet Briar	0-Non-native, 1097-Moderate, 1191-Very low, 1330-High, 1330-Low, 1330-Very high, 266-Low, 277-Very low, 278-Low, 278-Very low, 280-Moderate, 283-High, 283-	Yes	-	-	-	No	x	x	x	x	x	x

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
		Moderate, 283-Very low, 295-Moderate, 299-Moderate, 299-Very low, 316-Very high, 679-High, 731-Low											

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
Rubus fruticosus sp. agg.	Blackberry complex	0-Non-native, 1093-High, 1093-Low, 1093-Moderate, 1093-Very high, 1097-Moderate, 1107-High, 1150-Very low, 1151-Very high, 1191-Very low, 1196-High, 1330-High, 1330-Low, 1330-Moderate, 1330-Very high, 1330-Very low, 266-High, 266-Low, 266-Very low, 268-High, 268-Very high, 277-High, 277-Low, 277-Very low, 280-High, 280-Moderate, 280-Very low, 283-High, 283-Very low, 285-Low, 285-Very high, 287-Low, 287-Moderate, 287-Very low, 290-High, 290-Very low, 295-Moderate, 297-Low, 297-Moderate, 299-Moderate, 299-Very low, 300-Moderate, 300-Very high, 316-Low, 316-Very high, 351-Low, 351-Very low, 352-Low, 352-	Yes	Yes - Prohibition on certain dealings; Regional Recommended Measure	Yes - Prohibition on certain dealings	Yes - Prohibition on certain dealings	Yes	x	x	x	x	x	x

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
		Moderate, 352-Very low, 638-High, 638-Low, 638-Moderate, 638-Very low, 679-High, 679-Moderate, 727-Moderate, 727-Very high, 731-Low, 731-Very high, 939-High, 952-Moderate, 952-Very low, 953-High, 953-Low, 953-Moderate, 9996-Non-native, 9998-Non-native											

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
Rumex acetosella	Sheep Sorrel	0-Non-native, 1093-High, 1093-Low, 1093-Moderate, 1093-Very high, 1093-Very low, 1097-Moderate, 1150-Low, 1150-Moderate, 1150-Very low, 1151-High, 1151-Low, 1151-Very high, 1191-Very low, 1256-Moderate, 1330-High, 1330-Low, 1330-Moderate, 1330-Very high, 1330-Very low, 266-High, 266-Low, 266-Very low, 268-High, 268-Low, 277-High, 277-Low, 277-Moderate, 277-Very low, 278-High, 278-Low, 278-Very low, 280-High, 280-Low, 280-Moderate, 280-Very low, 283-High, 283-Moderate, 283-Very high, 283-Very low, 287-Low, 287-Moderate, 290-High, 290-Very low, 295-Moderate, 297-Low, 297-Moderate, 297-	Yes	-	-	-	No	x	x	x	x	x	x

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
		Very low, 299-Very low, 301-Low, 314-Low, 314-Moderate, 314-Very low, 316-Low, 316-Very high, 316-Very low, 319-Low, 319-Moderate, 343-Moderate, 343-Very low, 349-Very low, 351-Low, 351-Very low, 352-Low, 352-Very low, 5-Moderate, 638-Very low, 679-High, 727-Moderate, 727-Very high, 727-Very low, 731-High, 731-Low, 870-Very high, 952-Low, 952-Moderate, 952-Very low, 953-Low, 9996-Non-native											

Scientific name	Common name	Vegetation zones	HTW	Priority Weeds - Murray	Priority Weeds - Riverina	Priority Weeds - Southeast	WoNS	IBRA subregion					
								BUN	CRO	MUR	INL	BON	SNO
Salix rubens	-	1330-Low	Yes	Yes - Prohibition on certain dealings	Yes - Prohibition on certain dealings	Yes - Prohibition on certain dealings	Yes	-	-	x	-	-	-
Senecio madagascariensis	Fireweed	1093-Moderate, 1330-Low, 1330-Very low, 266-High, 283-Moderate, 300-Very high, 5-Moderate, 953-High	Yes	Yes - Prohibition on certain dealings	Yes - Prohibition on certain dealings; Regional Recommended Measure	Yes - Prohibition on certain dealings	Yes	x	x	-	x	-	-
Xanthium occidentale	Noogoora Burr	0-Non-native, 1330-Low, 1330-Very low, 266-Very low, 277-High, 5-Moderate	Yes	-	-	-	No	x	-	-	x	-	-
Xanthium strumarium	-	266-High, 277-Low, 277-Very low, 278-Low	Yes	-	-	-	No	-	-	-	x	-	-

Note: HTW – High Threat Weed, WoNS – Weeds of National Significance, Priority Weeds- Weeds required to be managed by the relevant local government under the NSW Biosecurity Act (2015). In NSW all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. For further information regarding the specific biosecurity duties of the species listed above in each region, please refer to NSW WeedWise.

6.5 Threatened ecological communities

A total of five TECs listed under the BC Act and/or EPBC Act were recorded within the amended project footprint during field surveys. In relation to the inaccessible lands, the TECs mapped during the field survey were used in conjunction with desktop assessments, to extrapolate the likely presence and distribution of TECs therein. Table 6-9 details the TECs, associated PCTs (as per BioNet) and presence within each IBRA subregion. The extent of known and likely TECs in relation to the amended project footprint is shown in Figure 6-1 (Attachment 5).

The TECs mapped within the amended project footprint include:

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (White Box Yellow Box Blakely's Red Gum Woodland)
- *Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions* (Coolac-Tumut Serpentinite Shrubby Woodland)
- *Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions* (Tableland Basalt Forest)
- *Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion* (Monaro Tableland Cool Temperate Grassy Woodland)
- *Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands and Australian Alps bioregions* (Montane Peatlands and Swamps).

An assessment of PCT alignment with each potentially occurring BC Act and EPBC Act TEC was undertaken using information within the BioNet Vegetation Classification Database (NSW DCCEEW, 2024c) and relevant key criteria and thresholds documented within the relevant Commonwealth conservation advice. TECs in a derived state were determined based on landscape position, neighbouring vegetation communities and grazing resistant grass and forb species in the understorey. The results of the assessment are presented in Sections 6.5.1 to 6.5.6.

Two TECs with the potential to occur within the amended project footprint were excluded from this assessment, *Robertson Basalt Tall Open-forest in the Sydney Basin and South-Eastern Highlands Bioregions* (listed as a CEEC under the BC Act) and *Mt Canobolas Xanthoparmelia Lichen Community* (listed as an EEC under the BC Act).

Two PCTs were identified as comprising a partial subset of the TEC *Robertson Basalt Tall Open-forest in the Sydney Basin and South-Eastern Highlands Bioregions* (listed as a CEEC under the BC Act). These are:

- PCT 1097 – Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux, Sydney Basin Bioregion and South-Eastern Highlands Bioregion
- PCT 1107 – River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes, Sydney Basin Bioregion and South-East Corner Bioregion.

However, the *Robertson Basalt Tall Open-forest in the Sydney Basin and South-Eastern Highlands Bioregions* TEC is not considered likely to occur within the amended project footprint given the following:

- Robertson Basalt Tall Open-forest is mainly known from the Sydney Basin Bioregion and has been reported in the Southern Highlands on the Robertson plateau and Cambewarra Range (30 kilometres southwest of the amended project footprint).
- Robertson Basalt Tall Open-forest rarely occurs in areas receiving less than 1000 mm of annual rainfall while the converse is true for Tableland Basalt Forest, the amended project footprint in Bungonia would receive 800-1000 mm of rainfall.
- Species recorded in the floristic plots more closely align to the Tableland Basalt Forest TEC (*Hydrocotyle laxiflora, Viola betonicifolia, Eucalyptus viminalis* and *Plantago varia*). No species recorded in the floristic plots are characteristic of Robertson Basalt Tableland Tall Open-Forest alone.

PCT 1097 and PCT 1107 are also a partial subset of the TEC *Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions* (listed as an EEC under the BC Act), and given the above, have been assigned to this TEC (Section 6.5.3).

Three PCTs mapped in the Snowy Mountains IBRA Subregion were identified as comprising a partial subset of the TEC *Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions* (listed as an EEC under the BC Act). These are:

- PCT 952 – Mountain Gum - Narrow-leaved Peppermint - Snow Gum dry shrubby open forest on undulating tablelands, southern South Eastern Highlands Bioregion
- PCT 953 – Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 1196 – Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion

Tableland Basalt Forest TEC is not known to occur in the Snowy Mountains IBRA Subregion. Therefore, the above PCTs have been disqualified from aligning to the TEC in the Subregion.

PCT 679 Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion mapped in the Snowy Mountains IBRA Subregion and PCT 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion mapped in the Inland Slopes IBRA Subregion are both identified as comprising a partial subset of the TEC *Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion* (listed as an CEEC under the BC Act). However, the *Monaro Tableland Cool Temperate Grassy Woodland* TEC is not known to occur in the Snowy Mountains or the Inland Slopes IBRA Subregions. Therefore, PCT 679 and 1191 have been disqualified from aligning to the TEC in these Subregions.

Two PCTs within the amended project footprint partially align to the TEC *Mt Canobolas Xanthoparmelia Lichen Community* (listed as an EEC under the BC Act). These are:

- PCT 351 – Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South-Eastern Highlands Bioregion
- PCT 727 – Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South-Eastern Highlands Bioregion.

As per the BioNet Vegetation Classification Database (NSW DCCEEW, 2024c) both PCT 351 and PCT 727 partially align to the TEC. However, the *Mt Canobolas Xanthoparmelia Lichen Community* TEC is not considered to occur within the amended project footprint and is restricted to the Mt Canobolas SCA, outside of the Orange township (over 130 kilometres north of the amended project footprint) as stated in the NSW Scientific Committee final determination (NSW TSSC, 2001a). The TEC has been excluded on this basis.

See Chapter 11 of the BDAR for further assessment of TECs under the EPBC Act.

Table 6-9: Threatened ecological communities recorded within the amended project footprint

BC Act TEC	EPBC Act TEC	SAII	PCT ID	IBRA subregion					
				BON	BUN	CRO	MUR	INL	SNO
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 Bioregion	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Y	PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South-Western Slopes Bioregion				X	X	
			PCT 268 - White Box - Blakely's Red Gum - Long-leaved Box – Norton's Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South-Western Slopes Bioregion					X	
			PCT 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South-Western Slopes Bioregion			X	X	X	
			PCT 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South-Western Slopes Bioregion				X	X	
			PCT 280 - Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland of the NSW South-Western Slopes Bioregion			X	X	X	
			PCT 283 - Apple Box – Blakely's Red Gum moist valley and footslopes grass-forb open forest of the NSW South-Western Slopes Bioregion		X	X	X		
			PCT 352 - Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region of the NSW South- Western Slopes Bioregion and South-Eastern Highlands Bioregion	X			X	X	
			PCT 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South-Eastern Highlands Bioregion		X	X	X	X	
Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South- Eastern Highlands Bioregions	N/A	Y	PCT 301 - Drooping Sheoke - *Ricinocarpos bowmannii* - grasstree tall open shrubland of the Coolac - Tumut Serpentinite Belt					X	

BC Act TEC	EPBC Act TEC	SAII	PCT ID	IBRA subregion					
				BON	BUN	CRO	MUR	INL	SNO
Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	N/A	Y	PCT 952 - Mountain Gum - Narrow-leaved Peppermint - Snow Gum dry shrubby open forest on undulating tablelands, southern South-Eastern Highlands Bioregion			X			
			PCT 953 - Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South-Eastern Highlands Bioregion and Australian Alps Bioregion	X					
			PCT 1097 - Snow Gum - Mountain Gum tussock grass-herb forest of the South-Eastern Highlands Bioregion		X				
			PCT 1107 - River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes, Sydney Basin		X				
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands and Australian Alps bioregion	Alpine Sphagnum Bogs and Associated Fens	N	PCT 637 - Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion						X
			PCT 939 - Montane wet heath and bog of the eastern tablelands, South-Eastern Highlands Bioregion						X
			PCT 1256 - Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South-Eastern Highlands Bioregion			X	X		
Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion	N/A	Y	PCT 679 - Black Sallee - Snow Gum low woodland of montane valleys, South-Eastern Highlands Bioregion and Australian Alps Bioregion			X			
			PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South-Eastern Highlands Bioregion			X			

6.5.1 White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland

White Box Yellow Box Blakely's Red Gum Woodland TEC is listed as Critically Endangered under the BC Act and EPBC Act. A total of eight PCTs potentially align to the BC Act and EPBC Act listed TEC as detailed in Table 6-9.

The State listing and description for the TEC is provided in NSW Scientific Committee (2020) *Final Determination - 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 Commonwealth listing and description is detailed in the *Approved Conservation Advice (including listing advice) for White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* (DEH, 2006).

A comparison of the final determination for BC Act listed White Box Yellow Box Blakely's Red Gum Woodland TEC and candidate PCTs is provided in Table 6-10. Each element of the final determination including locality, species composition, characteristic species and resilience was compared to each condition class for candidate PCTs to determine if vegetation recorded was consistent with the listing criteria.

The criteria for an area to qualify as the EPBC Act listed CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland and Derived Grassland) are slightly different to the NSW determination. Under the EPBC Act, remnants can exist in one of 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 (ie derived grassland with greater than 50 per cent native perennial cover)
- both a native understorey and an overstorey of Eucalypts exist in conjunction (DEH, 2006).

The Threatened Species Scientific Committee (TSSC) 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. Although some native species may remain, in most of these areas the native understorey is effectively irretrievable. In order for an area to be included in the listed ecological community, a patch must have a predominantly native understorey (DEH, 2006).

Vegetation communities with the potential to be the locally occurring EPBC Act listed CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland and Derived Grassland), were analysed in detail by using the criteria in Table 6-11.

In summary, all eight PCTs in all condition classes were found to align to the BC Act listed White Box Yellow Box Blakely's Red Gum Woodland TEC. This is summarised in Table 6-10. Alignment of the PCTs to the EPBC Act listed community was more complex. Vegetation zones of all eight PCTs in relatively better condition aligned to the EPBC Act listed community (generally those areas in very high, high and moderate condition) while patches in poorer condition (low and very low condition) did not. A summary of the alignment of each of the condition classes to the EPBC Act listed TEC is provided in Table 6-11.

Table 6-10: Correlation of BC Act-listed White Box Yellow Box Blakely's Red Gum Woodland and associated PCTs

BC Act Scientific Determination	PCT 266	PCT 268	PCT 277	PCT 278	PCT 280	PCT 283	PCT 352	PCT 1330
The site is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South-Eastern Highlands or NSW South-Western Slopes Bioregions	Yes, South-Eastern Highlands and NSW South-Western Slopes.	Yes, NSW South-Western Slopes.	Yes, South-Eastern Highlands and NSW South-Western Slopes.	Yes, South-Eastern Highlands and NSW South-Western Slopes.	Yes, South-Eastern Highlands and NSW South-Western Slopes.	Yes, NSW South-Western Slopes.	Yes, South-Eastern Highlands and NSW South-Western Slopes.	Yes, South-Eastern Highlands.
There are native species in the understorey, and/or the site is likely to respond to assisted natural regeneration	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.	Yes Native species were recorded in the understorey in all vegetation zones.
The site has trees OR The site is treeless, but is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing:	The plots sampled in Moderate and High condition vegetation recorded canopy species. Low condition vegetation was often mapped adjacent to woodland, and/or paddock trees (White Box) were present.	The plots sampled in High and Moderate condition vegetation recorded canopy species. Low condition vegetation was often mapped adjacent to woodland dominated by White Box and/or Blakely's Red Gum.	The plots sampled in High, Moderate and Low condition vegetation recorded canopy species. Very low condition vegetation was often mapped adjacent to woodland, and/or paddock trees were present.	The plots sampled in High condition vegetation recorded canopy species. Moderate and Very low condition vegetation was often mapped adjacent to woodland and/or paddock trees (Blakely's Red Gum and/or Yellow Box) were present.	The plots sampled in High, Moderate, Low and Very low condition vegetation recorded canopy species. Very low condition vegetation was often mapped adjacent to woodland, and/or paddock trees were present.	The plots sampled in Very high, High, Moderate and Low condition vegetation recorded canopy species. Very low condition vegetation was often mapped adjacent to woodland, and/or paddock trees were present.	The plots sampled in Moderate and Low condition vegetation recorded canopy species. Very low condition vegetation was often mapped adjacent to woodland where Blakely's Red Gum is present.	The plots sampled in Very high, High, Moderate and Low condition vegetation recorded canopy species. Very low condition vegetation was often mapped adjacent to woodland, and/or paddock trees (Blakely's Red Gum and/or Yellow Box) were present.

BC Act Scientific Determination	PCT 266	PCT 268	PCT 277	PCT 278	PCT 280	PCT 283	PCT 352	PCT 1330
White Box, Yellow Box or Blakely's Red Gum, or a combination of these species, are or were present	White Box is dominant in this PCT. Blakely's Red Gum was also recorded.	White Box and Blakely's Red Gum are co-dominant in this PCT. Yellow Box was also recorded.	Blakely's Red Gum dominant, then Yellow and White Box.	Blakely's Red Gum and/or Yellow Box present in every non-grassland plot. Overall cover of these canopy species was less than 37.5% of total canopy cover. However, in most plots, Blakely's Red Gum or Yellow Box was recorded as the dominant or codominant species.	This PCT is dominated by Red Stringybark, however the canopy composition often varied across the PCT with Blakely's Red Gum, Yellow Box and White Box frequently present. Plots indicate that when present, Blakely's Red Gum, Yellow Box and/or White Box were frequently dominant or codominant.	Blakely's Red Gum dominates this vegetation PCT. Yellow Box was also recorded in low densities.	Blakely's Red Gum dominates this PCT.	Blakely's Red Gum and Yellow Box co-dominate this PCT.
Does the PCT meet the criteria for this TEC?	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**	**Yes** **All condition classes of this PCT align to the BC Act listed TEC**

Table 6-11: Correlation of EPBC Act-listed White Box Yellow Box Blakely's Red Gum Woodland and associated PCTs

Criteria	EPBC Act	PCT 266	PCT 268	PCT 277	PCT 278	PCT 280	PCT 283	PCT 352	PCT 1330
1	**Is, or was previously, at least one of the most common overstorey species White**	Yes White Box is dominant in this PCT. Blakely's Red Gum was also recorded.	Yes White Box and Blakely's Red Gum are co-dominant in this zone. Yellow	Yes Blakely's Red Gum dominant, then Yellow and White Box.	Yes Less than 37.5% Blakely's Red Gum and Yellow Box. However, the	Yes This PCT is dominated by Red Stringybark, however Blakely's Red	Yes Blakely's Red Gum dominates this vegetation zone. Yellow Box was also	Yes Blakely's Red Gum dominates this vegetation zone.	Yes Blakely's Red Gum and Yellow Box co-dominate this vegetation zone.

Criteria	EPBC Act	PCT 266	PCT 268	PCT 277	PCT 278	PCT 280	PCT 283	PCT 352	PCT 1330
	Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Greg Box in the Nandewar Bioregion)?		Box was also recorded.		precautionary principle has been applied.	Gum, Yellow Box and White Box were sub dominant species.	recorded in low densities.		
2	**Does the 'patch' have a predominantly native understorey (>50% perennial native cover)?**	Yes For the plots sampled High, Moderate and Low condition the understorey comprised over 50% native species.	Yes For the plots sampled in High, Moderate and Low condition the understorey comprised over 50% native species.	Partial For the plots sampled in High, Moderate and Low condition the understorey comprised over 50% native species. The plots sampled in Very low condition were under 50%, therefore PCT 277 Very low does not meet this threshold.	Partial For the plots sampled in Moderate and High condition the understorey comprised over 50% native species. The plots sampled in Very low condition were under 50%, therefore PCT 278 Very low does not meet this threshold.	Partial For the plots sampled in High, Moderate and Low condition the understorey comprised over 50% native species. The plots sampled in Very low condition were under 50%, therefore PCT 280 Very low does not meet this threshold.	Partial For the plots sampled in Very high, High, Moderate and Low condition the understorey comprised over 50% native species. The plots sampled in Very low condition were under 50%, therefore PCT 283 Low does not meet this threshold.	Partial For the plots sampled in Moderate and Low condition the understorey comprised over 50% native species. The plots sampled in Very low condition were under 50%, therefore PCT 352 Very low does not meet this threshold.	Yes For the plots sampled in Very high, High, Moderate, Low and Very low condition the understorey comprised over 50% native species.
3	**Is the patch 0.1 ha or greater in size?**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4a	**Are there 12 or more native understorey species present (excluding grasses)?**	High conditions meets this threshold. However, less than 12 non-grass species	High and Moderate conditions meet this threshold. However, less than 12 non-	High and Moderate condition meets this threshold. However, less than 12 non-	High and Moderate condition vegetation meets this threshold.	High, Moderate and Low conditions meet this threshold.	More than 12 non-grass species were recorded in Very High, High Moderate and	Moderate condition vegetation meets this threshold. However, less	Very high, High and Moderate condition vegetation meets this threshold.

Criteria	EPBC Act	PCT 266	PCT 268	PCT 277	PCT 278	PCT 280	PCT 283	PCT 352	PCT 1330
		were recorded in the Moderate and Low condition vegetation.	grass species were recorded in the Low condition vegetation.	grass species were recorded in the Low and Very low condition vegetation.	However, less than 12 non-grass species were recorded in the Moderate and Very low condition vegetation.		Low conditions and therefore meet this threshold.	than 12 non-grass species were recorded in the Low condition vegetation.	However, less than 12 non-grass species were recorded in the Low and Very low condition vegetation.
4b	**There must be at least one important species.**	There is at least one important species in the High, Moderate and Low condition vegetation.	There is at least one important species in the High, Moderate and Low condition vegetation.	There is at least one important species in the High, Moderate, Low and Very low condition vegetation.	There is at least one important species in the High, Moderate and Very Low condition vegetation.	There is at least one important species in the High, Moderate, Low and Very low condition vegetation.	There is at least one important species in the Very high, High, Moderate, Low and Very low condition vegetation.	There is at least one important species in the Moderate, Low and Very low condition vegetation.	There is at least one important species in the Very high, High, Moderate, Low and Very low condition vegetation.
For condition classes that do not meet criteria 1-4:									
6	**Where patches do not meet the criteria 4a and 4b, is the patch 2 ha or greater in size?**	Moderate and Low condition is greater than 2 ha in size.	Low condition is greater than 2 ha in size.	Low and Very low condition is greater than 2 ha in size.	Moderate and Very low condition is greater than 2 ha in size.	Very low condition is greater than 2 ha in size.	Very low condition is greater than 2 ha in size.	Low and Very low condition is greater than 2 ha in size.	Low and Very low condition is greater than 2 ha in size.
7	**Does the 2 ha patch have 40 or more trees with a DBH >40 cm? (ie 20 per ha) Or is there natural regeneration of the dominant**	The Low condition vegetation does not meet this large tree threshold. Additionally, no regeneration was recorded in	Based on the plots sampled, the Low condition vegetation does not meet this large tree threshold or	Based on the plots sampled, the Low and Very low condition vegetation does not meet this large tree threshold or	Based on the plots sampled, the Moderate and Very low condition vegetation does not meet this large tree threshold or	Based on the plots sampled, the Low and Very low condition vegetation does not meet this large tree threshold or	Very low condition vegetation does not meet this large tree threshold.	Based on the plots sampled, the Low and Very low condition vegetation does not meet this large tree threshold or	The Low and Very low condition vegetation does not meet this large tree threshold. No regeneration was recorded in

Criteria	EPBC Act	PCT 266	PCT 268	PCT 277	PCT 278	PCT 280	PCT 283	PCT 352	PCT 1330
	overstorey Eucalypts?	the Low condition.	regeneration threshold.	regeneration threshold.	regeneration threshold.	regeneration threshold.		regeneration threshold.	the Very low condition. however, plots sampled in Low condition vegetation mostly recorded regeneration.
Does the PCT meet the criteria for this TEC?		**High and Moderate – yes.** High condition meet all criteria. Moderate condition does not meet criteria 4a however meets the additional criteria 6 and 7. **Low – no.** Low condition does not meet criteria 4a or criteria 7 and therefore does not align to the TEC.	**High and Moderate – yes.** High and Moderate condition meet all criteria. **Low – no.** Low condition does not meet criteria 4a or criteria 7 and therefore does not align to the TEC.	**High and Moderate – yes. High and** Moderate condition meet all criteria. **Low and Very low – no.** Very low condition does not meet criteria 2. Low does not meet criteria 4a or criteria 7 and therefore does not align to the TEC.	**High – yes.** High condition meets all criteria. **Moderate and Very low – no.** Very low condition does not meet criteria 2. Moderate does not meet criteria 4a or criteria 7 and therefore does not align to the TEC.	**High and Moderate – yes.** High and Moderate condition meet all criteria. **Low and Very low – no.** Very low condition does not meet criteria 2. Low condition does not meet criteria 4a or criteria 7 and therefore does not align to the TEC.	**Very high, High, Moderate and Low – yes.** Very High, High, Moderate and Low condition meet all criteria. **Very low – no.** Very low condition does not meet criteria 2.	**Moderate – yes.** Moderate condition meets all criteria. **Low and Very low – no.** Very low condition does not meet criteria 2. Low condition does not meet criteria 4a or criteria 7 and therefore does not align to the TEC.	**Very high, high Moderate and Low – yes.** Very High, High and Moderate condition meet all criteria. Low condition does not meet criteria 4a. However, Low condition meets criteria 6 and 7 and therefore aligns with the TEC. **Very Low – no.** Very low condition does not meet criteria 4a.

6.5.2 Coolac-Tumut Serpentinite Shrubby Woodland

Coolac-Tumut Serpentinite Shrubby Woodland TEC is listed as Endangered under the BC Act. One PCT is identified as potentially aligning to this TEC (PCT 301).

The State listing and description for the TEC is provided in NSW Scientific Committee (2015) Final Determination - Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions – endangered ecological community listing.

A comparison of the final determination for Coolac-Tumut Serpentinite Shrubby Woodland TEC and candidate PCT is provided in Table 6-12. Each element of the final determination including locality, species composition, characteristic species and resilience is compared to each condition class for the candidate PCT to determine if vegetation recorded is consistent with the listing criteria. Based on this assessment and undertaking a conservative approach, PCT 301 was considered to align with the Coolac-Tumut Serpentine Shrubby Woodland TEC listed under the BC Act.

Table 6-12: Correlation of BC Act-listed Coolac-Tumut Serpentinite Shrubby Woodland and associated PCT 301

BC Act Scientific Determination	PCT 301
Coolac-Tumut Serpentinite Shrubby Woodland occurs within the NSW South-Western Slopes and South-Eastern Highlands Bioregions.	All areas of mapped PCT 301 occur within the NSW South-Western Slopes (Inland Slopes) or South-Eastern Highlands Bioregion (Bondo) bioregions.
Characteristic flora species of the Coolac-Tumut Serpentinite Shrubby Woodland TEC present*.	Characteristic species of the TEC are present throughout PCT 301. The most common species were *Allocasuarina verticillata* (Drooping Sheoak), *Xanthorrhoea glauca* and *Ricinocarpos bowmanii* (Western Wedding Bush). *Eucalyptus nortonii* (Long-leaved Box) was recorded in one plot. All of these species are characteristic of this TEC.
Associated serpentinite geology formations mapped at the site.	Of the PCT 301 mapped in the amended project footprint, 87% is mapped as occurring on Cootamundra - Tumut Serpentinite and Ultramafics Mitchell Landscape which is an associated serpentinite geology formation for the TEC. Of the remaining mapped PCT 301, 12% is mapped on the Carabost Hills and Ranges Landscape and 1% on the Adelong Granite Ranges Landscape (DECC, 2002). These Mitchell Landscapes are not associated serpentinite geology formations.
Soils are commonly shallow to skeletal with much exposed rock.	Of the PCT 301 mapped in the amended project footprint, 87% is mapped as occurring on Cootamundra - Tumut Serpentinite and Ultramafics Mitchell Landscape, 12% on the Carabost Hills and Ranges Landscape and 1% on Adelong Granite Ranges Landscape (DECC, 2002). The Tumut Serpentinite and Ultramafics landscape is described as having narrow ridges of extended linear outcrops. The Carabost Hills and Ranges landscape is characterised as having thin stony gradational red brown earth and red-yellow texture-contrast soils. The Adelong Granite Ranges Landscape is associated with rocky outcrops (DECC, 2002). These soil types generally align with the shallow to skeletal soils with exposed rock associated with the TEC. Field observations also support this, with exposed rock described as being present throughout PCT 301.
Does the PCT meet the criteria for this TEC?	**Partial** 87% of PCT 301 within the amended project footprint meets the criteria for this TEC. Based on a review of available geology mapping, the remaining 13% does not. However, given limitations with regard to the accuracy and coverage of geology mapping, a conservative approach has been adopted and TEC status assigned to the entire of PCT 301.

* See the Final Determination listing for characteristic species (2015).

6.5.3 Tableland Basalt Forest

Tableland Basalt Forest TEC is listed as Endangered under the BC Act. Four PCTs potentially align with this TEC as detailed in Table 6-9.

The State listing and description for the TEC is provided in NSW Scientific Committee (2011) Final Determination - Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions.

A comparison of the final determination for Tableland Basalt Forest and candidate PCTs is provided in Table 6-13. Each element of the final determination including locality, species composition, characteristic species and resilience is compared to each condition class for candidate PCTs to determine if vegetation recorded is consistent with the listing criteria. The consideration of whether the PCT meets the TEC listing criteria is made considering all of the listing criteria as a whole, therefore where a PCT does not or only partially meets one of the listing criteria, it does not preclude the PCT meeting the overall criteria for the TEC, if most other criteria are met.

The final determination for Tableland Basalt Forest identifies the TEC as occurring in the Southern Eastern Highlands IBRA Bioregion, however, does not detail specific IBRA subregions. A BAM-C case assigned to the Bondo IBRA subregion (within the Southern Eastern Highlands IBRA Bioregion) currently does not provide the associated Tableland Basalt Forest TEC for PCT 953. The below justification has adopted a conservative approach and assumes PCT 953 in Bondo aligns to the associated Tableland Basalt Forest TEC.

PCT 953 is mapped in the Snowy Mountains IBRA subregion which is in the Australian Alps IBRA Bioregion. Given Tableland Basalt Forest TEC is only associated with the Sydney Basin and South Eastern Highlands Bioregions, PCT 953 in the Snowy Mountains does not align to the TEC.

Characteristics of each of the four PCTs within the amended project footprint were found to be consistent with the listing criteria and are thus considered the TEC.

Table 6-13: Correlation of BC Act-listed Tableland Basalt Forest and associated PCTs

BC Act determination	PCT 952	PCT 953	PCT 1097	PCT 1107
The site is located 600–900 metres Australian Height Datum (mAHD) in the Sydney Basin and South-Eastern Highlands Bioregions	**Yes** All of PCT 952 situated within the amended project footprint occurs within 771 – 898 m AHD Crookwell Subregion) (ICSM, 2022).	**Yes** All of PCT 953 situated within the amended project footprint occurs within 400 – 900 mAHD (Bondo Subregion).	**Yes** All of PCT 1097 situated within the amended project footprint occurs within 659 – 770 mAHD and 771 – 898 mAHD (Bungonia Subregion) (ICSM, 2022).	**Yes** All of PCT 1107 situated within the amended project footprint occurs within 659–770 mAHD (Bungonia Subregion) (ICSM, 2022).
Mean annual rainfall varies from approximately 750 mm up to 1,100 mm	**Yes** PCT 952 in the amended project footprint occurs in an area that receives 600-800 mm of rain (BoM, 2024).	**Yes** All of PCT 953 in the amended project footprint occurs in an area that receives 1,000-1,200 mm of rain (BoM, 2024).	**Yes** PCT 1097 in the amended project footprint occurs in an area that receives 600-800 mm of rain (BoM, 2024).	**Yes** PCT 1107 in the amended project footprint occurs in an area that receives 600-800 mm of rain (BoM, 2024).
Is the site on relatively fertile loam or clay soils derived mainly from basalt but also from other substrates?	**Yes** 56% of PCT 952 is mapped in the Crookwell Basalts and Sands Mitchell Landscape, and 44% is mapped in the Towrang Ranges which is not characterised by fertile loam or clay soils (DECC, 2002).	**No** All of PCT 953 is mapped on sandy soils (Minjary Hills Ranges Mitchell Landscapes) (DECC, 2002).	**Partial** 50% of PCT 1097 is mapped on Crookwell Basalts and Sands Mitchell Landscape. The remaining vegetation is mapped on the Rockley Plains landscape (48%) and Wollondilly - Bindook Tablelands and Gorges landscape (2%) (DECC, 2002).	**No** The PCT 1107 occurs on the mapped Rockley Plains Mitchell Landscape (DECC, 2002).
Is the vegetation a grassy open forest or woodland, or a native grassland (where trees and shrubs have been removed)?	**Yes** Plots sampled in PCT 952 show a high cover of grass and grass-like species and low cover of shrub species.	**Yes** Plots sampled in PCT 953 show a high cover of grass and grass-like species and low to moderate cover of shrub species.	**Yes** Plots sampled in PCT 1097 show a moderate cover of grass and grass-like species and a low cover of shrub species.	**Yes** Plots sampled in PCT 1107 show a moderate cover of grass and grass-like species and a low cover of shrub species.
Does the tree layer, if present, contain any of the following: ribbon gum, narrow-leaved peppermint, mountain gum or white sally (snow gum)?	**Yes** The canopy is dominated by *Eucalyptus pauciflora* (White Sally).	**Yes** The canopy is dominated by *Eucalyptus pauciflora* (White Sally) and *Eucalyptus dalrympleana* subsp. *dalrympleana* (Mountain Gum).	Yes The canopy is dominated by *Eucalyptus radiata* (Narrow-leaved Peppermint) and *Eucalyptus viminalis* (Ribbon Gum).	**Yes** Both *Eucalyptus radiata* (Narrow-leaved Peppermint) and *Eucalyptus viminalis* (Ribbon Gum) are present in this PCT.

BC Act determination	PCT 952	PCT 953	PCT 1097	PCT 1107
Does the PCT meet the criteria for this TEC?	**Yes**	**Yes**	**Yes**	**Yes**

6.5.4 Monaro Tableland Cool Temperate Grassy Woodland

Monaro Tableland Cool Temperate Grassy Woodland TEC is listed as Critically Endangered under the BC Act. Two PCTs potentially align to this TEC (PCT 679 and PCT 1191 in the Crookwell IBRA subregion).

A comparison of the final determination for Monaro Tableland Cool Temperate Grassy Woodland and candidate PCTs is provided in Table 6-14. Each element of the final determination including locality, species composition, characteristic species and resilience is compared to each condition class for candidate PCTs to determine if vegetation recorded is consistent with the listing criteria.

PCT 679 and PCT 1191 are mapped in the Snowy Mountains IBRA subregion which is in the Australian Alps IBRA Bioregion. Similarly, PCT 1191 is mapped in the Inland Slopes IBRA subregion which is part of the NSW South-Western Slopes IBRA Bioregion. Given the Monaro Tableland Cool Temperate Grassy Woodland TEC is only associated with the South Eastern Highlands Bioregion, PCT 679 and PCT 1191 in the Snowy Mountains and PCT 1191 in the Inland Slopes do not align to the TEC.

Characteristics of each of the two PCTs within the amended project footprint were found to be consistent with the listing criteria and are thus considered the TEC.

Table 6-14: Correlation of BC Act-listed Monaro Tableland Cool Temperate Grassy Woodland and associated PCTs

BC Act	PCT 679	PCT 1191
Is the vegetation characterised by a sparse to very sparse tree stratum dominated by *Eucalyptus pauciflora* or co-dominant with *Acacia melanoxylon*, *Eucalyptus rubida* subsp. *rubida*, *Eucalyptus stellulata* or *Eucalyptus viminalis.**	**Yes** *Eucalyptus pauciflora* was the dominant species in all the plots sampled. The characteristic canopy species, *Eucalyptus stellulata* was also recorded in this PCT.	**Yes** *Eucalyptus pauciflora* was the dominant species in all the plots sampled. The characteristic canopy species, *Eucalyptus rubida* subsp. *rubida* was also recorded in this PCT.
Monaro Tableland Cool Temperate Grassy Woodland occurs on broad valley floors and the slopes and low rises of the moderately undulating tablelands.	**Yes** Most of PCT 679 is distributed across three Mitchell Landscapes: the Cabramurra - Kiandra Basalt Caps and Sands (hills on the high plains), Gundary Plains (Wide open valleys) and Tooma Granite Ranges (Rounded hills, ranges and plateau).	**Yes** Most of PCT 1191 in the amended project footprint occurs on the Rockley Plains Mitchell Landscape which is characterised by low rolling hills on plateau surface.
Does the vegetation occur at elevation 700–1,200 m above sea level.	**Yes** All of PCT 679 in the amended project footprint occurs between 771 – 1,213 m above sea level.	**Yes** Majority of PCT 1191 in the amended project footprint occurs between 771 – 898 m above sea level. A small portion of PCT 1191 in the amended project footprint is planted vegetation and has been assigned PCT 1191 as the best fit, this vegetation is below 700 m above sea level. and does not align to the TEC.
Does the vegetation occur in an area with an average annual rainfall 600–800 mm.	**Partial** All of PCT 679 occurs in an area with an average annual rainfall of 600 - 800 mm.	**Yes** Majority of PCT 1191 occurs in an area with an average annual rainfall of 600 - 800 mm. A small portion of PCT 1191 in the amended project footprint is planted vegetation and has been assigned PCT

BC Act	PCT 679	PCT 1191
		1191 as the best fit. This vegetation is in an area with an average annual rainfall 800 – 1,000 mm. It does not align to the TEC.
Does the PCT meet the criteria for this TEC?	**Yes**	**Yes**

* See the Final Determination listing for characteristic species (NSW TSSC, 2019a).

6.5.5 Montane Peatlands and Swamps

Montane Peatlands and Swamps TEC is listed as Endangered under the BC and EPBC Acts. Three PCTs potentially align to these TECs (PCT 637, 939 and PCT 1256).

The State listing and description for the TEC is provided in NSW TSSC (2004) *Final Determination - Montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands and Australian Alps bioregions*, whilst the Commonwealth listing and description is detailed in the Approved Conservation Advice (including listing advice) for Alpine Sphagnum Bogs and Associated Fens (DEWHA, 2008).

The final determination for Montane Peatlands and Swamps identifies the TEC as occurring in the Southern Eastern Highlands IBRA Bioregion, however, does not detail specific IBRA subregions. A BAM-C case assigned to the Crookwell IBRA subregion (within the Southern Eastern Highlands IBRA Bioregion) currently does not provide the associated Montane Peatlands and Swamps TEC for PCT 1256. The below justification has adopted a conservative approach and assumed PCT 1256 in Crookwell aligns to the TEC.

A comparison of the final determination for Montane Peatlands and Swamps and candidate PCTs is provided in Table 6-15 and Table 6-16. Each element of the final determination including locality, species composition, characteristic species and resilience is compared to each condition class for candidate PCTs to determine if vegetation recorded is consistent with the listing criteria.

In summary, all three PCTs were found to align to the BC Act listed TEC. PCT 637 and 939 were found to align with the EPBC Act listed TEC; PCT 1256 did not meet four of the six defining criteria required.

Table 6-15: Correlation of BC Act-listed Montane Peatlands and associated PCTs

BC Act determination	PCT 637	PCT 939	PCT 1256
Is the site above 400 m in the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands or Australian Alps bioregion?	**Yes** All areas of PCT 637 are within the Australian Alps Bioregion and are above 1,100 m above sea level (ICSM, 2022).	**Yes** All areas of PCT 939 are within the Australian Alps Bioregion and are above 1,100 m above sea level (ICSM, 2022).	**Yes** All areas of PCT 1256 are present within the South-Eastern Highlands Bioregion and are between 560 – 830 m above sea level (ICSM, 2022).
Is the site on a generally boggy flat area near the headwaters of a stream?	**Yes** PCT 637 is mapped in boggy areas of impeded drainage near the headwaters of streams.	**Yes** PCT 939 is mapped in boggy areas of impeded drainage near the headwaters of streams.	**Yes** PCT 1256 is mapped in boggy areas of impeded drainage near the headwaters of streams.
Is the site associated with accumulated peaty or organic-mineral sediments generally in catchments with soil derived from basalt or fine-grained sedimentary substrates or, occasionally, granite and metamorphic sediments?	**Yes** PCT 637 mostly occurs on the Tooma Granite Ranges Mitchell landscape (DECC, 2002) and is associated with granite derived soils. Detailed soil mapping showing areas of peat soils is not available for the area. Therefore, the precautionary principle	**Yes** PCT 939 occurs on the Tooma Granite Ranges Mitchell landscape (DECC, 2002) and is associated with granite derived soils. Detailed soil mapping showing areas of peat soils is not available for the area. Therefore, the precautionary principle has been applied and it is	**Yes** PCT 1256 occurs within the Rockley Plains, Boorowa Volcanics and Marilba Range Mitchell landscapes (DECC, 2002). The Rockley Plains Mitchell landscape is associated with Silurian and Ordovician slate, phyllites, felspathic sandstones and interbedded volcanics. The Boorowa

BC Act determination	PCT 637	PCT 939	PCT 1256
	has been applied and it is assumed all areas of PCT 637 lie in areas associated with these soil types.	assumed all areas of PCT 939 lie in areas associated with these soil types.	Volcanics Mitchell Landscape is associated with volcanic rocks varying in composition from felsic to intermediate and associated sedimentary rocks while the Marilba Range Mitchell landscape is also associated with steep dipping Devonian rhyolite, dacite, andesite, tuff and shale (DECC, 2002). Detailed soil mapping showing areas of peat soils is not available for the area. Therefore, the precautionary principle has been applied and it is assumed all areas of PCT 1256 lie in areas associated with these soil types.
Does the site have a noticeably low number to complete absence of trees?	**Yes** Trees were absent.	**Yes** Trees were absent or present in low abundance.	**Yes** Trees were absent or present in low abundance.
Does the site contain more than trace amounts of Sphagnum moss (if the community is highly stressed from drought or otherwise Sphagnum may be rare on site to completely absent)?	**Yes** *Sphagnum cristatum* was recorded (outside of plot collected).	**Yes** *Sphagnum cristatum* was recorded in 939 Very high condition.	**No** *Sphagnum* sp. were recorded.
Is there a reasonable representation of the shrubs and groundcover species present from those listed as characteristic of Montane Peatlands and Swamps*?	**Yes** Eight species characteristic of Montane Peatlands and Swamps were recorded within PCT 637 (from one plot). These included: • *Carex gaudichaudiana* • *Baloskion australe* • *Carex gaudichaudiana* • *Epacris microphylla* • *Epilobium gunnianum* • *Gonocarpus micranthus* • *Spiranthes australis* • *Stylidium graminifolium.*	**Yes** 22 species characteristic of Montane Peatlands and Swamps were recorded within PCT 939. These included: • *Acaena novae-zelandiae* • *Asperula gunnii* • *Baeckea utilis* • *Blechnum nudum* • *Blechnum penna-marina subsp. alpina* • *Carex appressa* • *Deyeuxia quadriseta* • *Empodisma minus* • *Epacris breviflora* • *Geranium neglectum* • *Gonocarpus micranthus* • *Gratiola peruviana* • *Hakea microcarpa* • *Juncus planifolius*	**No** Three species characteristic of Montane Peatlands and Swamps were recorded within PCT 1256. These included: • *Carex appressa* • *Carex gaudichaudiana* • *Poa labillardierei var. labillardierei.* However, the presence of these three species is not considered to be a reasonable representation of the shrubs and groundcover species characteristic of the TEC.

BC Act determination	PCT 637	PCT 939	PCT 1256
		• *Juncus sarophorus* • *Leptospermum myrtifolium* • *Mitrasacme serpyllifolia* • *Poa labillardierei var. labillardierei* • *Poa sieberiana* • *Ranunculus lappaceus* • *Sphagnum cristatum* • *Stellaria pungens.*	
Does the PCT meet the criteria for this TEC?	**Yes** While there is no detailed soil mapping available, PCT 637 is considered to align with the TEC based on the other characteristics and the precautionary principle.	**Yes** While there is no detailed soil mapping available, all areas of PCT 939 are considered to align with the TEC based on the other characteristics and the precautionary principle.	**Yes** All areas of PCT 1256 are precautionarily considered to align with the TEC despite the lack of detailed soil mapping and absence of Sphagnum moss and other characteristic species.

* See the Final Determination listing for characteristic species (NSW TSSC, 2004).

Table 6-16: Correlation of EPBC Act listed Alpine Sphagnum Bogs and Associated Fens and associated PCTs

EPBBC Act determination	PCT 637	PCT 939	PCT 1256
Is the site in one of the following IBRA Regions: Australian Alps, the Tasmanian Central Highlands and the Tasmanian Southern Ranges IBRA bioregions. Or, it is also found in a small area of the Bondo subregion of the South-Eastern Highlands IBRA bioregion on mainland Australia	Yes Situated within the Australian Alps IBRA bioregion.	Yes Situated within the Australian Alps IBRA bioregion.	No The mapped occurrences are situated within the Murrumbateman and Crookwell Sub-region of the South-Eastern Highlands IBRA bioregion.
Typical plant species found in the Alpine Sphagnum Bogs and Associated Fens ecological community are present? *	Yes Seven species found in the Alpine Sphagnum Bogs and Associated Fens were recorded within PCT 637. These included: • *Carex gaudichaudiana* • *Baloskion australe* • *Carex gaudichaudiana* • *Luzula modesta* • *Brachyscome obovata* • *Epilobium gunnianum* • *Gonocarpus micranthus.*	Yes 11 species found in the Alpine Sphagnum Bogs and Associated Fens were recorded within PCT 939. These included: • *Asperula gunnii* • *Baeckea utilis* • *Blechnum penna-marina subsp. alpina* • *Carex appressa* • *Empodisma minus* • *Epacris breviflora* • *Gonocarpus micranthus* • *Poa labillardierei var. labillardierei* • *Poa sieberiana* • *Ranunculus lappaceus* • *Sphagnum cristatum.*	No Only 3 species were found that corelated with the species found in the listing advice: • *Carex appressa* • *Carex gaudichaudiana* • *Poa labillardierei var. labillardierei.*
Is any species of *Sphagnum* present? *However, there are some sites… where Sphagnum has been depleted or lost due to disturbance. In these cases, the site may still be considered to be part of this ecological community if other key species are present and a peat substratum is evident.*	Yes *Sphagnum cristatum* was recorded near the plot sampled.	Yes *Sphagnum cristatum* was recorded in 939 Very high.	No *Sphagnum sp*. was not recorded.
A peat layer is present?	Assumed Detailed soil mapping showing areas of peat soils is not available for the area. Therefore, the precautionary principle has been applied and it is assumed all areas of PCT 637 lie in areas	Assumed Detailed soil mapping showing areas of peat soils is not available for the area. Therefore, the precautionary principle has been applied and it is assumed all areas of	Assumed Detailed soil mapping showing areas of peat soils is not available for the area. Therefore, the precautionary principle has been applied and it is assumed all areas of PCT 1256 lie in areas

EPBBC Act determination	PCT 637	PCT 939	PCT 1256
	associated with a peat layer.	PCT 939 lie in areas associated with a peat layer.	associated with a peat layer.
Is the site in a permanently wet area, such as along a stream, valley edge or valley floor?	Yes PCT 637 is mapped in boggy areas of impeded drainage near the headwaters of streams.	Yes PCT 939 is mapped in boggy areas of impeded drainage near the headwaters of streams.	Yes PCT 1256 is mapped in boggy areas of impeded drainage near the headwaters of streams.
The site is above 1,000 m above sea level	Yes All areas of PCT 637 are above 1,100 m above sea level (ICSM, 2022).	Yes All areas of PCT 939 are above 1,100 m above sea level (ICSM, 2022).	No All areas of PCT 1256 are between 560 – 830 m above sea level (ICSM, 2022).
Outcome	Yes, it is the TEC	Yes, it is the TEC	Not the TEC

* See the Threatened Species Scientific Committee listing for characteristic species (2009a).

6.6 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems that rely on access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements to maintain their communities of plants and animals, ecological processes and ecosystem services (BoM, 2017). GDEs include aquifers, caves, lakes, palustrine wetlands, lacustrine wetlands, rivers and vegetation (BoM, 2017).

A review of the Atlas of GDEs (BoM, 2017) indicates moderate and high potential terrestrial GDEs are mapped as occurring within the amended project footprint. These generally corresponded with the location of large streams and waterways as follows:

Table 6-17: Large streams and watercourses within amended project footprint.

IBRA sub region	Large streams and waterways within region
Bungonia	Bannaby, Connors and Kerrawary Rivers.
Crookwell	Cowpers, Humes, Melamalong, Middle, Myrtle, Pejar and Turrallo Rivers.
Murrumbateman	Bowning, Derringullen, Flacknell, Jerrawa, Jugiong, Lachlan, Merrill, Oolong and Washpen Rivers.
Inland Slopes	Adjungbilly, Bango, Big Spring, Brungle, Cart Road, Cockatoo, College, Comatawa, Cooks, Darlows, Derringullen, Foleys, Galvins, Gocup, Keajura, Killimicat, Kyeamba, Murrumbidgee, Nacki Nacki, Oak, O'Briens, Right Arm, Rocky, Sandy, Sawpit, Tarcutta, Tooles, Tumut, Tywong, Umbango, Windowie and Yaven Yaven Rivers.
Bondo	Adelong, Bago, Saw Mill and Snubba Rivers.
Snowy Mountains	Buddong, Honeysuckle, Long, Mandys, Sheepyardand Snubba Rivers.

Mapped GDEs within the amended project footprint were subject to ground-truthing as a part of the field campaign (depending on land access) to confirm landscape position (i.e. alluvial) and associated floristic composition. A total of 32 PCTs within the amended project footprint have been identified as potential terrestrial GDEs. Their GDE potential and relative extent within the amended project footprint is detailed in Table 6-18 and shown in Figure 6-2 (Attachment 5). The calculations presented in Table 6-18 includes Category 1 exempt lands. An assessment of amended project impacts to GDEs is presented in Chapter 13 of this BDAR.

Table 6-18: Potential groundwater dependant ecosystems within the amended project footprint

Groundwater-dependent PCTs	Associated TEC	GDE potential (BoM, 2017)	GDE extent (ha)	Total PCT extent (ha)	% PCT
PCT 5 – River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South-Western Slopes Bioregion and the eastern Riverina Bioregion.	-	Moderate potential GDE	6.04	8.79	68.66
PCT 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 Woodland	High potential GDE	0.56	369.81	0.15
		Moderate potential GDE	1.73	369.81	0.47
PCT 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 Woodland	High potential GDE	21.43	786	2.73
		Moderate potential GDE	0.25	786	0.03
PCT 278 – Riparian Blakelys Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	High potential GDE	3.44	89.63	3.84
PCT 280 – Red Stringybark – Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland of the NSW South-Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	Medium potential GDE	25.11	560.99	4.48
PCT 283 – Apple Box – Blakelys Red Gum moist valley and footslopes grass-forb open forest of the NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	Medium potential GDE	9.14	48.52	18.84
PCT 285 – Broad-leaved Sally grass – sedge woodland on valley flats and swamps in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	-	High potential GDE	1.05	29.62	3.55
PCT 287 – Long-leaved Box – Red Box – Red Stringybark mixed open forest on hills and hillslopes in the NSW South Western Slopes Bioregion	-	High potential GDE	0.24	79.47	0.3
		Moderate potential GDE	3.69	79.47	4.64
PCT 300 – Ribbon Gum – Narrow-leaved (Robertson's) Peppermint montane fern – grass tall open forest on deep clay loam soils in the upper NSW South-Western Slopes Bioregion and western Kosciuszko escarpment	-	Moderate potential GDE	0.42	54.88	0.77
PCT 322 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine hillslope shrub-tussock grass open forest on mainly sandstone ranges in the NSW central western slopes	-	High potential GDE	0.20	9.24	2.17
PCT 335 – Tussock grass – sedgeland fen – rushland – reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion	-	Moderate potential GDE	0.07	3.38	2.07
PCT 349 – Inland Scribbly Gum – Red Stringybark open forest on hills composed of silicous substrates in the mid-Murrumbidgee and upper Lachlan catchments mainly in the western South Eastern Highlands Bioregion	-	High potential GDE	0.37	53.63	0.69
	-	High potential GDE	5.49	112.72	4.87

Groundwater-dependent PCTs	Associated TEC	GDE potential (BoM, 2017)	GDE extent (ha)	Total PCT extent (ha)	% PCT
PCT 351 – Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion		Moderate potential GDE	21.75	112.72	19.3
PCT 352 – Red Stringybark – Blakely's Red Gum hillslope open forest on meta-sediments in the Yass – Boorowa – Crookwell region of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	High potential GDE	15.89	123.39	12.88
		Moderate potential GDE	7.13	123.39	5.78
PCT 637 – Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion	Montane Peatlands and Swamps	High potential GDE	3.67	3.86	95.08
PCT 638 – Alpine Ash – Mountain Gum moist shrubby tall open forest of montane areas, southern South-Eastern Highlands Bioregion and Australian Alps Bioregion	-	High potential GDE	0.02	148.99	0.01
PCT 679 – Black Sallee – Snow Gum low woodland of montane valleys, South-Eastern Highlands Bioregion and Australian Alps Bioregion	Monaro Tableland Cool Temperate Grassy Woodland	High potential GDE	2.36	33.60	7.02
		Moderate potential GDE	2.96	33.60	8.81
PCT 727 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest on the South Eastern Highlands Bioregion	-	Moderate potential GDE	0.75	38.81	1.93
PCT 731 – Broad-leaved Peppermint – Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	-	Moderate potential GDE	2.87	75.97	3.78
PCT 939 – Montane wet heath and bog of the eastern tablelands, South-Eastern Highlands Bioregion	Montane Peatlands and Swamps	High potential GDE	0.04	2.54	1.58
PCT 952 – Mountain Gum – Narrow-leaved Peppermint – Snow Gum dry shrubby open forest on undulating tablelands, southern South Eastern Highlands Bioregion	Tableland Basalt Forest	Moderate potential GDE	1.18	76.83	1.54
PCT 953 – Mountain Gum – Snow Gum – Broad-leaved Peppermint shrubby open forest of montane ranges, South-Eastern Highlands Bioregion and Australian Alps Bioregion	Tableland Basalt Forest	High potential GDE	12.22	314.86	3.88
		Moderate potential GDE	3.11	314.86	0.99
PCT 1093 – Red Stringybark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	-	High potential GDE	0.97	393.93	0.25
		Moderate potential GDE	13.80	393.93	3.5
PCT 1097 – Ribbon Gum – Narrow-leaved Peppermint grassy open forest on basalt plateaux, Sydney Basin Bioregion and South Eastern Highlands Bioregion	Tableland Basalt Forest	Moderate potential GDE	1.49	16.49	9.04
PCT 1107 – River Peppermint – Narrow-leaved Peppermint open forest on sheltered escarpment slopes, Sydney Basin Bioregion and South-East Corner Bioregion	Tableland Basalt Forest	Moderate potential GDE	0.87	2.94	29.59
PCT 1150 – Silvertop Ash – Blue-leaved Stringybark shrubby open forest on ridges, north-east South-Eastern Highlands Bioregion	-	Moderate potential GDE	2.79	76.76	3.64

Groundwater-dependent PCTs	Associated TEC	GDE potential (BoM, 2017)	GDE extent (ha)	Total PCT extent (ha)	% PCT
PCT 1151 – Silvertop Ash – Broad-leaved Peppermint dry shrub forest of the South Eastern Highlands Bioregion	-	Moderate potential GDE	1.07	59.70	1.79
PCT 1191 – Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	Monaro Tableland Cool Temperate Grassy Woodland	Moderate potential GDE	0.72	13.80	5.22
PCT 1196 – Snow Gum – Mountain Gum shrubby open forest of montane areas, South-Eastern Highlands Bioregion and Australian Alps Bioregion	-	High potential GDE	3.05	92.70	3.29
		Moderate potential GDE	5.07	92.70	5.47
PCT 1224 – Sub-alpine dry grasslands and heathlands of valley slopes, southern South-Eastern Highlands Bioregion and Australian Alps Bioregion	-	High potential GDE	4.72	5.12	92.19
PCT 1256 – Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion	Montane Peatlands and Swamps	High potential GDE	1.92	8.02	23.94
		Moderate potential GDE	0.77	8.02	9.6
PCT 1330 – Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South-Eastern Highlands Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	High potential GDE	39.75	1122.17	3.54
		Moderate potential GDE	28.67	1122.17	2.56

6.7 Planted native vegetation

In accordance with Section 2.2,1(c) of the BAM (DPIE, 2020a), planted native vegetation may be assessed using a streamlined assessment module, where the vegetation is planted for purposes such as street trees or other roadside plantings, windbreaks, landscaping in parks and gardens and voluntary revegetation for environmental rehabilitation.

Throughout the amended project footprint, there is approximately 44.95 ha of mapped Planted Native Vegetation, 16.9 ha (37.6%) of which is situated within Category–1 - exempt lands (Table 6-19). This vegetation is largely planted along the boundaries of paddocks, for the purposes of windbreaks within agricultural landscapes.

An assessment of planted native vegetation is presented in Attachment 16 in accordance with the BAM Attachment D Planted Native Vegetation Streamlined Assessment Module.

It should be noted that a BAM operational manual was published in December 2022 for the Planted Native Vegetation Streamlined Assessment Module (DPE, 2022c). Some of the assessments conducted as part of this BDAR were completed prior to the release of this manual.

Table 6-19: Planted native vegetation within the amended project footprint

IBRA subregion	Amended project footprint (ha)	Updated indicative disturbance area (ha)
Bondo	0.0	0.0
Bungonia	1.54	0.64
Crookwell	15.83	2.60
Inland Slopes	19.36	4.03
Murrumbateman	8.23	1.28
Snowy Mountains	0.0	0.0
Total	**44.95**	**8.54**

7 Threatened species

This chapter addresses threatened species in accordance with Section 6 of the BAM (DPIE, 2020a).

7.1 Candidate species credit species assessment process

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. Threatened species to be assessed for species credits are identified for an amended project by the BAM-C. In the BAM-C, these species are referred to as candidate species.

Assessing habitat suitability for a species credit species involves the following steps:

- Step 1: Identify species credit species for assessment
- Step 2: Assess the habitat constraints and vagrant species for species credit species on the biodiversity assessment development footprint
- Step 3: Further assessment of candidate species credit species
- Step 4: Determine the presence of a candidate species credit species
- Step 5: Determine the area or count, and location of suitable habitat for a species credit species (a species polygon)
- Step 6: Determine the habitat condition within the species polygon for species assessed by area.

The list of candidate threatened flora and fauna species (species credit species) generated via the BAM-C is provided in Table 7-1 and Table 7-4. No additional threatened flora and fauna species were identified as requiring assessment.

Given the size of the amended project and the complexity of the assessment (i.e., involving consideration of many candidate species over six different IBRA subregions) a mapping process was applied in ESRI ArcGIS to delineate the extent of suitable habitats for candidate threatened flora and fauna species in which further assessment of species presence/ absence would be required by means of targeted surveys, an expert report or assumed presence.

The mapping process applied broadly followed the principles outlined in the BAM (DPIE, 2020a) (step 2, 5 and 6 above) incorporating the use of the TBDC and BioNet species profile information (NSW DCCEEW, 2024a; NSW DCCEEW, 2024b), field data and site observations, BAM-C outputs, supplementary desktop and mapping methods (Section 4.10) and species-specific feedback received from NSW DCCEEW as a part of the amended project consultation. In summary, the process to map suitable habitat for candidate species credit species includes the following steps applied consecutively:

- vegetation zones forming a known PCT habitat association were identified
- listed geographic constraints were mapped and excluded
- habitats were excluded where the patch size assigned to each vegetation polygon did not meet the patch size[4] threshold for the candidate species, as per the TBDC (NSW DCCEEW, 2024b)

[4] Note: consideration of patch size can be undertaken at any stage of the assessment as it does not influence the outcome

- habitats were excluded where the native woody vegetation cover score assigned to each vegetation polygon did not meet the vegetation cover threshold for the candidate species, as per the TBDC (Attachment 1 identifies candidate species with higher vegetation cover thresholds for which this filter was applied)
- habitat constraints listed within the TBDC (NSW DCCEEW, 2024b) were considered provided these could be confidently mapped for all lands (including inaccessible private lands within the amended project footprint). Relevant habitat constraints applied as a part of the mapping process included:
  - semi-permanent/ ephemeral wet areas
  - riparian areas and drainage lines
  - cliffs
  - karst
  - rocky areas
  - hollow presence/ absence and associated hollow size class (i.e., hollows greater than 20 centimetres diameter)
- degraded habitats were defined and excluded where necessary microhabitats for candidate species were considered absent. Where relevant, degraded habitats generally incorporated:
  - low and very low condition PCTs subject to significant land use disturbance as a result of historical clearing, cropping and intensive grazing practices
  - PCTs under-scrubbed or lacking a native understorey
  - Category 1 exempt lands and scattered trees completely enveloped by these lands.

Attachment 1 provides details of the mapping approach applied for relevant candidate threatened flora and fauna species associated with IBRA subregions within the amended project footprint.

7.2 Threatened flora

7.2.1 Candidate threatened flora species

A total of 70 threatened flora species (candidate species) with potential habitat within the amended project footprint were identified by means of the BAM-C (refer to Section 4.5.1).

A summary of the results of the habitat suitability assessment (Step 2 above) for each species is provided in Table 7-1, including justification for species inclusion/exclusion from further assessment. Of the 70 potential candidate species, 14 species were excluded from further assessment based on lack of suitable habitat/habitat constraints/geographic limitations or vagrancy as described in Table 7-1.

A total of 56 threatened flora species were identified as requiring further assessment. Many of these candidate species occur across multiple IBRA subregions. Of the 56 candidate species identified, the following number occur in each of the IBRA subregions associated with the amended project:

- 19 in Bungonia
- nine in Crookwell
- 10 in Murrumbateman
- 17 in Inland Slopes
- four in Bondo
- 21 in Snowy Mountains.

Species-specific information presented in Table 7-1 below was obtained from the information sources outlined in Section 4.5.1.

See Chapter 11 of the BDAR for further assessment of threatened flora under the EPBC Act.

Table 7-1: Candidate threatened flora species credit species

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON[5]	BUN[6]	CRO[7]	MUR[8]	INL[9]	SNO[10]	
Acacia ausfeldii	Ausfeld's Wattle	V	-	-	Other; footslopes and low rises on sandstone	-	-	-	-	Included	-	**Included** Found east of Dubbo in the Mudgee-Ulan-Gulgong area of the NSW South-Western Slopes IBRA bioregion with some records also in South-Eastern highlands. Associated with PCTs and habitat that occurs in the Inland Slopes IBRA subregion.
Acacia bynoeana	Bynoe's Wattle	E	V	-	N/A	-	Included	Included	-	-	-	**Included** Bynoe's wattle is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Associated with PCTs and habitat that occurs in the amended project footprint.
Acacia clunies-rossiae	Kanangra Wattle	V	-	-	N/A	-	Included	-	-	-	-	**Included** Kanangra Wattle grows in the Kowmung and Coxs River areas entirely within Kanangra-Boyd and Blue Mountains National Parks.

[5] Bondo IBRA subregion
[6] Bungonia IBRA subregion
[7] Crookwell IBRA subregion
[8] Murrumbateman IBRA subregion
[9] Inland Slopes IBRA subregion
[10] Snowy Mountains IBRA subregion

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
Acacia flocktoniae	Flockton Wattle	V	V	-	N/A	-	Included	-	-	-	-	**Included** Flockton Wattle is found only in the Southern Blue Mountains (at Mt Victoria, Megalong Valley and Yerranderie).
Acacia phasmoides	Phantom Wattle	V	V	Yes	N/A	-	-	-	-	Exclude d	-	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 4) The species is only known from one location in NSW: Woomargama National Park in Greater Hume Shire, approximately 80 km south-west of the amended project footprint. Consultation with NSW DCCEEW confirms the species can be considered vagrant given its known distribution and distance from the amended project footprint.
Ammobium craspedioides	Yass Daisy	V	V	-	N/A	Included	-	Included	Included	Included	-	**Included** Found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South-western Slopes. Most populations are in the Yass region. Associated with PCTs and habitat that occurs in the Bondo, Crookwell, Murrumbateman, and Inland Slope IBRA subregions.
Baloskion longipes	Dense Cord-rush	V	V	-	N/A	-	Included	-	-	-	-	**Included** Dense Cord-rush has been recorded from the Kanangra-Boyd

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												area to the Southern Tablelands, but all populations are small. Associated with PCTs and habitat that occurs in the amended project footprint. Associated with PCTs and habitat that occurs in the Bungonia IBRA subregion.
Bossiaea fragrans	-	CE	CE	Yes	N/A	-	-	-	-	Included	-	**Included** Currently only known from the Abercrombie Karst Conservation Reserve, south of Bathurst on the NSW central tablelands.
Bossiaea oligosperma	Few-seeded Bossiaea	V	V	-	N/A	-	Included	-	-	-	-	**Included** Few-seeded Bossiaea is found in the Windellama area in Goulburn Mulwaree Shire, where it is locally abundant. Associated with PCTs and habitat that occurs in the amended project footprint.
Caesia parviflora var. *minor*	Small Pale Grass-lily	E	-	-	N/A	-	-	-	-	Included	-	**Included** Known outlying population in NSW, in Barcoongere State Forest, between Grafton and Coffs Harbour. This species may be more common than currently known, as Pale Grass-lilies are often not identified to variety level. Associated PCTs mapped in Inland Slopes.
Caladenia concolor	Crimson Spider Orchid	E	V	Yes	West of Jingellic	Included	-	-	Included	Included	-	**Included** There are two known populations, one population comprising of a

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												few hundred plants on private property near Bethungra and the other of about 100 plants occurs in Burrinjuck Nature reserve.
Caladenia montana	-	V	-	-	N/A	Included	-	-	-	-	Included	**Included** The species was detected as a part of the Snowy 2.0 project approximately 2.3 km east of the amended project footprint. Suitable habitat for the species occurs within PCT 300, 638, 679, 953 and 1196.
Caladenia tessellata	Thick Lip Spider Orchid	E	V	Yes	N/A	-	Exclude d	-	-	-	-	**Excluded- Vagrant** (as per section 5.2 of the BAM, Step 4) The species is known from three subpopulations in NSW, in Wyong, Ulladulla and Braidwood, all located more than 70 km from the amended project footprint. The species has been considered vagrant following consultation with NSW DCCEEW.

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
Calotis glandulosa	Mauve Burr-daisy	V	V	Yes	North of Eucumbene	-	-	-	-	-	Included	**Included** The distribution of the Mauve Burr-daisy is centred on the Monaro and Kosciuszko regions. There are three known sites in the upper Shoalhaven catchment. There are old and possibly dubious records from near Oberon, the Dubbo area and Mt Imlay. Associated with PCTs and habitat that occurs in the Snowy Mountains IBRA subregion.
Calotis pubescens	Max Mueller's Burr-daisy	E	-	-	N/A	-	-	-	-	-	Included	**Included** This species has been recorded from five sites in the Snowy Mountains of NSW (four of which, all in Kosciuszko National Park and are extant). Associated PCTs are mapped within the amended project footprint.

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
Carex raleighii	Raleigh Sedge	E	-	-	N/A	-	-	-	-	-	Included	**Included** Raleigh Sedge occurs in Alpine heath areas, grassland and woodland, grows in sphagnum bogs and high mountain wetlands, as well as damp grasslands and stream-edges of sub-alpine plains. In NSW Raleigh Sedge is found only in areas above about 1,000 metres on the Southern Tablelands. Most populations are in Kosciuszko National Park (eg. Charlottes Pass area, Muellers Pass, Tantangara area and the upper Tooma and Tumut valleys). Also occurs in vicinity of Snowy Plain (private land and travelling stock reserve) and on the coastal escarpment at the headwaters of Tantawangalo Creek within South East Forests National Park. There is one old (1950s) record within 9 km of the amended project footprint. This record was validated by Karen Wilson of the National Herbarium of NSW, however no search of this locality has been carried out to determine the extent of the population (NSW NPWS, 2001a).
Commersonia prostrata	Dwarf Kerrawang	E	E	-	N/A	-	-	Included	-	-	-	**Included** Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands (one plant at Penrose State Forest, and one plant at Tallong, a small population near

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												the Corang and about 2,000 plants at Rowes Lagoon). Associated with PCTs and habitat that occurs in the Bungonia and Crookwell IBRA subregions.
Cullen parvum	Small Scurf-pea	E	-	-	N/A	-	-	-	-	Included	-	**Included** The Small Scurf-pea is known in NSW from only two herbarium collections: one from Wagga Wagga in 1884 and the other from Jindera (near Albury) in 1967. Associated with PCTs and habitat that occurs in the amended project footprint.
Dillwynia glaucula	Michelago Parrot-pea	E	-	-	N/A	-	Included	-	-	-	-	**Included** Michelago Parrot-pea is recorded from five areas on the NSW Southern Tablelands: near Windellama, where the species is locally abundant, near Mongarlowe, in Nadgigomar Nature Reserve near Braidwood, north-east of Michelago and at Numeralla. There is potential habitat between the known sites.
Discaria nitida	Leafy Anchor Plant	V	-	-	Riparian areas or within 50 m of riparian areas	-	-	-	-	-	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 4) The location of the amended project footprint in relation to *Discaria nitida*'s known and predicted distribution was reviewed by the accountable NSW

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												DCCEEW officer and determined likely to be outside the extent of the population (email correspondence dated 8 March 2023).
Diuris aequalis	Buttercup Doubletail	E	E	-	Within 20 km of the Great Dividing Range	-	Included	Included	-	-	-	**Included** The Buttercup Doubletail has been recorded in Kanangra-Boyd National Park, Gurnang State Forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago, and Bungendore. Associated with PCTs and habitat that occurs in the amended project footprint.
Diuris ochroma	Pale Golden Moths	E	V	Yes	N/A	-	-	-	-	-	Included	**Included** Recorded in south-eastern NSW on the sub-alpine plains of Kosciuszko National Park and the Kybean area. Associated with PCTs and habitat that occurs in the amended project footprint.

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
Diuris tricolor	Pine Donkey Orchid	V	-	-	N/A	-	-	-	-	Included	-	**Included** Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include Red Hill north of Narrandera, Coolamon, and several sites west of Wagga Wagga. Associated with PCTs within the amended project footprint.
Eucalyptus aggregata	Black Gum	V	V	-	N/A	-	-	Included	Included	Included	-	**Included** Black Gum is found in the NSW Central and Southern Tablelands, with small, isolated populations in Victoria and the ACT. In NSW it occurs in the South-Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands, for example in the Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts. Associated with PCTs and habitat that occurs in the amended project footprint.
Eucalyptus alligatrix subsp. *alligatrix*	-	V	V	Yes	N/A	-	-	-	-	Excluded	-	**Excluded- Vagrant** (as per section 5.2 of the BAM, Step 4) Detected in 1992 within the Inland Slopes IBRA subregion north of

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												Kandos Quarries, approximately 170 km north of the amended project footprint. Based on consultation with NSW DCCEEW, the species is considered a vagrant within the central and southern portions of the Inland Slopes IBRA subregion that intersect the amended project footprint.
Eucalyptus cannonii	Capertee Stringybark	V	-	-	N/A	-	-	-	-	Included	-	**Excluded – Vagrant** The Capertee Stringybark is predominantly restricted to the central tablelands and slopes of NSW between the Golden Highway in the north, and the Mitchell Highway in the south. The species' distribution is bounded from east of Bathurst to Wallerawang near Lithgow, north along the western edge of Wollemi National Park and north-west to Mudgee; isolated occurrences are known from a short way north of Goulburn River National Park between Dunedoo and Merriwa. Within this area the species is often locally frequent. Given its known occurrence / distribution is over 100 kilometres from the amended project footprint, the species has been considered a vagrant based on consultation with NSW DCCEEW.

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Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	E	-	N/A	-	Included	-	-	-	-	**Included** Paddy's River Box has a moderately restricted distribution. It is currently recorded from the Moss Vale District to Kanangra-Boyd National Park. In the Southern Highlands it occurs mainly on private land, often as isolated individuals in, or on the edges of roads and paddocks. It is not well reserved but does occur within Cecil Hoskins Nature Reserve in the Southern Highlands. In Kanangra-Boyd National Park isolated stands occur in the north-west part of the range on the Boyd Plateau.
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	V	V	Yes	N/A	-	-	Included	-	Excluded	-	**Included** Associated with PCTs and habitat that occurs in the Crookwell IBRA subregion only. Associated PCTs within the Inland Slopes IBRA subregion were degraded and exclude from consideration (refer to Attachment 1).
Euphrasia arguta	-	CE	CE	Yes	N/A	-	-	-	-	Excluded	-	**Excluded- Vagrant** (as per section 5.2 of the BAM (DPIE, 2020a), Step 4) Rediscovered in the Nundle area of the NSW north-western slopes and tablelands in 2008. Prior to this, it had not been collected for 100 years. Historically, has only been

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												recorded from relatively few places within an area extending from Sydney to Bathurst and north to Walcha. The Royal Botanic Gardens Specimen Register records an additional location reported and vouchered in 2002 from near the Hastings River; and *Euphrasia arguta* was also recorded from the Barrington Tops in 2012. There are no known records of the species within 195 km of the amended project footprint. The species has been considered a vagrant based on consultation with NSW DCCEEW.
Euphrasia scabra	Rough Eyebright	E	-	Yes	Montane bogs or within 50 m	-	-	-	-	-	Included	**Included** There are ten old herbarium collections of Rough Eyebright from NSW (including Port Jackson, Bathurst Plains, Lake George, Jindabyne, Yarrangobilly Caves and Tumbarumba). There are three extant populations in NSW: Bondi State Forest, South-east Forests National Park and near Nunnock Swamp. Total NSW population is between 250 and 500 plants. This number varies with season with few plants appearing in some years. Associated with PCTs and

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												habitat that occurs in the amended project footprint.
Genoplesium superbum	Superb Midge Orchid	E	-	Yes	N/A	-	Included	-	-	-	-	**Included** The Superb Midge Orchid is restricted to the Central and Southern Tablelands of NSW where it has been recorded from 2 locations near Nerriga, about 20 km apart, and north of Wallerawang. Some plants occur in Morton National Park. Associated with PCTs and habitat that occurs in the amended project footprint.
Glycine latrobeana	Clover Glycine	CE	V	Yes	N/A	-	-	-	-	-	Included	**Included** The Clover Glycine is endemic to south-eastern Australia, where it is widely distributed. It was recently discovered in Kosciuszko National Park. Associated with PCTs and habitat that occurs in the amended project footprint.
Grevillea iaspicula	Wee Jasper Grevillea	CE	E	Yes	Rocky areas; Limestone rock substrate	Included	-	-	Included	-	-	**Included** The Wee Jasper Grevillea is found only in the Wee Jasper area and on the shores of Lake Burrinjuck near Burrinjuck village on the border of the Southern Tablelands and South-Western Slopes (approximately 12 km from the amended project footprint). Only inhabits rocky areas on limestone substrate.

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Grevillea renwickiana	Nerriga Grevillea	E	-	Yes	East of the Shoalhaven River	-	Exclude d	-	-	-	-	**Excluded – Geographic Limitations** Restricted to a small area between Mongarlowe (Nettletons Creek) and Nerriga.
Grevillea wilkinsonii	Tumut Grevillea	CE	CE	Yes	N/A	-	-	-	-	Included	-	**Included** The Tumut Grevillea has a highly restricted distribution in the NSW South-west Slopes region. Its main occurrence is along 6 km stretch of the Goobarragandra River approximately 20 km east of Tumut where about 1,000 plants are known. The other occurrence is a small population that straddles the boundary of two private properties at Gundagai where only eight mature plants survive. A total of 17 records of this species occur within 20 km of the amended project footprint (Attachment 2), however, associated PCTs occur in the amended project footprint.
Hakea dohertyi	Kowmung Hakea	E	E	-	N/A	-	Included	-	-	-	-	**Included** Kowmung Hakea is confined to a small area (18 square km) in the Kowmung Valley in Kanangra Boyd National Park. Population varies, but up to 7,000 plants have been counted. Additional small populations occur in Bindook area and at Tonalli Cove on Lake Burragorang. Three records of the species occur in the Bungonia

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												subregion, none of which occur within 20 km of the amended project footprint (Attachment 2), however associated PCTs occur in the amended project footprint.
Haloragis exalata subsp. *exalata*	Square Raspwort	V	V	-	Waterbodies; Edges of coastal lakes after flooding has removed other vegetation, creek banks within flood zone, areas close to these features subject to human disturbance including road verges and transmission line easements or within 100 m	-	-	-	-	-	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 4) *Haloragis exalata* subsp. *exalata* in the Snowy Mountains IBRA subregion has recently been identified as a new taxon and renamed to *Haloragis milesei* (not listed as threatened under the BC or EPBC Act).
Irenepharsus magicus	Elusive Cress	E	-	Yes	N/A	Excluded	-	-	-	-	Excluded	**Excluded- Vagrant** (as per section 5.2 of the BAM, Step 4) Although the location information provided with the single NSW collection is vague, it would appear that it was made in the vicinity of Geehi Dam, which is within Kosciuszko National Park. Following consultation with NSW DCCEEW the species has been considered vagrant.

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Kunzea cambagei	Cambage Kunzea	V	V	-	N/A	-	Included	-	-	-	-	**Included** Mainly occurs in the western and southern parts of the Blue Mountains, NSW, mainly the Yerranderie/Mt Werong area, with four main populations with 20 to 150 individuals. Associated with PCTs and habitat that occurs in the amended project footprint.
Lepidium hyssopifolium	Aromatic Peppercress	E	E	-	N/A	-	-	Included	-	-	-	**Included** In NSW, there is a small population near Bathurst, one population at Bungendore, and one near Crookwell.
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	E	E	-	N/A	-[11]	Included	Included	Included	Included	Included	**Included** Endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT. In NSW it currently occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega and Goulburn, with a few scattered localities know from beyond this region. Associated with PCTs and habitat that occurs in the Bondo, Bungonia, Crookwell,

[11] *Leucochrysum albicans* subsp. *tricolor* was dropping in and out of the Bondo IBRA subregion BAM-C as a candidate species for the amended project with each update to the BAM-C. This species has been excluded from the Bondo IBRA subregion as habitat is marginal.

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												Murrumbateman, Inland Slopes and Snowy Mountains IBRA subregions.
Persoonia marginata	Clandulla Geebung	V	V	-	N/A	-	-	-	-	Included	-	**Included** The Clandulla Geebung occurs between Kandos and Clarence in the western Blue Mountains. Populations are largely disjunct and include Clandulla, Ben Bullen and Sunny Corner State forests; isolated populations have also been recorded from Turon and Gardens of Stone National Parks.
Persoonia mollis subsp. *revoluta*	-	V	-	-	N/A	-	Included	-	-	-	-	**Included** The species is endemic to NSW where it is currently known to occur in seven populations, primarily in the area between Mittagong, Paddys River and High Range in the Southern Highlands with an outlying population in the Bindook Highlands. Most of the populations occur between 600 and 800 m above sea level, and with an average annual rainfall across the range of between 700 and 900 mm.
Phyllota humifusa	Dwarf Phyllota	V	V	-	N/A	-	Included	-	-	-	-	**Included** Known from the southern Blue Mountains (Bimlow Tableland), the Joadja area west of Mittagong

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												and Penrose area near Paddys River.
Pimelea bracteata	-	CE	CE	Yes	N/A	Included	-	-	-	-	-	**Included** *Pimelea bracteata* is a localised shrub of bogs and stream edges in high altitude treeless subalpine valleys. It has been recorded in wet heathland, and closed heath. These overlap with subalpine wet heathland, which extends to lower elevations in State forests. *Pimelea bracteata* typically grows along creek lines, and a population may have a linear distribution along a creek for many kilometres. Suitable habitats for *Pimelea bracteata* occur within the amended project footprint.

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	-	East of Tumut; South of northern Kosciuszko National Park boundary	Included	Included	-	-	-	-	**Included** A very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. The species has also been recorded along the Genoa River in Victoria.
Pomaderris delicata	Delicate Pomaderris	CE	CE	Yes	West of Shoalhaven River	-	Included	-	-	-	-	**Included** Known from only two sites; between Goulburn and Bungonia and south of Windellama (Cullula).
Pomaderris pallida	Pale Pomaderris	V	V	Yes	N/A	-	-	-	Included	-	-	**Included** Recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It is also found along the Murrumbidgee River in the ACT

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												and has been recently recorded in eastern Victoria.
Prasophyllum bagoense	Bago Leek-orchid	CE	CE	Yes	N/A	-	-	-	-	-	Included	**Included** Currently known from a single population on land covered by a Crown Lease on State Forest near Tumbarumba on the Southern Tablelands of NSW. The species occurs over about 12 ha of sub-alpine grassy plain and wetland at an elevation of about 1,100 m. Its distribution may extend into adjacent woodlands. Recent annual surveys suggest that the number of individuals emerging at the site may fluctuate seasonally, with counts ranging from about 20 to 80 in the flowering seasons of 2000 and 2003.
Prasophyllum innubum	Brandy Marys Leek Orchid	CE	CE	Yes	N/A	-	-	-	-	-	Included	**Included** The species is known from a single population comprising about seven small colonies, totalling about 400 individuals, from a small area about 30 km north-west of Cabramurra and about 17 km south of Talbingo, in the Tumbarumba Local Government Area. The species occurs in Bago State Forest and apparently also on adjacent Crown forestry lease and private freehold. The species is not known to occur In any

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						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												conservation reserves. Recorded historically within 80 m of the amended project footprint at McPhersons Plain.
Prasophyllum keltonii	Kelto''s Leek-orchid	CE	CE	Yes	N/A	-	-	-	-	-	Included	**Included** Kelton's Leek-orchid is known from a single population that occurs in a small area known as McPhersons Plain, about 30 km north-west of Cabramurra and about 17 km south of Talbingo, in the Tumbarumba Local Government Area. The known population, which is intermingled with the Bago Leek-orchid, is recorded as comprising approximately 400 plants, of which about 380 occur on the Brandy Marys State Forest Crown Leases, and about 20 on an adjacent private property. Records provided by the FCNSW (2020) indicates a population occurs within sections of Bago State Forest intersecting the amended project footprint. NSW DCCEEW recorded two records of the species within the amended project footprint at McPhersons' Plain on 12 December 2023.
Prasophyllum petilum	Tarengo Leek-orchid	E	E	-	East of Binalong, south and east of Boorowa	-	-	-	Included	Included	-	**Included** Natural populations are known from a total of five sites in NSW. These are near Boorowa,

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												Queanbeyan area, Ilford, Delegate and a newly recognised population 10 km west of Muswellbrook. It also occurs at Hall in the ACT. This species has also been recorded at Bowning Cemetery where it was experimentally introduced, though it is not known whether this population has persisted.
Prasophyllum retroflexum	Kiandra Leek-orchid	V	V	-	Treeless vegetation above 1,000 m in altitude /Kosciuszko National Park	-	-	-	-	-	Excluded	**Excluded – Geographic Limitations** All populations are thought to occur within Kosciuszko National Park (in the Long Plain, Kiandra, Tantangara area).
Prasophyllum sp. *Wybong*	-	-	CE	-	N/A	-	-	-	-	Excluded	-	**Excluded - Vagrant** (as per section 5.2 of the BAM, Step 4) This species is synonymous with *Prasophyllum petilum* and is currently undergoing a taxonomic review. Whilst this species is predicted to occur within the subregion, there are no previous records in the Inland Slopes IBRA subregion. Following consultation with NSW DCCEEW, this species has been excluded from the assessment.
Pterostylis alpina	Alpine Greenhood	V	-	-	N/A	-	-	-	-	-	Included	**Included** The Alpine Greenhood grows in moist forests on foothills and ranges, extending to montane areas in NSW, the ACT and

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												Victoria. In NSW the species occurs in the Southern Tablelands south from Bondo State forest.
Pterostylis foliata	Slender Greenhood	V	-	-	N/A	Included	-	-	-	-	Included	**Included** *Pterostylis foliata* is found in NSW, ACT, Victoria, SA, Tasmania and New Zealand (type location). In NSW the species occurs mainly in the Southern Tablelands south from Batlow.
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	Yes	N/A	-	-	-	-	-	Included	**Included** In NSW, the Blue-tongued Greenhood is known from a few small populations within Kosciuszko National Park and a population of about 40 plants (possibly now extinct) in Bago State Forest and adjoining Crown Leases south of Tumut. The known distribution includes parts of the Snowy River, Tumbarumba and possibly Tumut Local Government Areas. The Blue-tongued Greenhood is also known from the ACT (Brindabella Range) and in montane areas of far north-eastern Victoria.

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
Pultenaea humilis	Dwarf Bush-pea	V	-	-	N/A	-	-	-	-	Included	-	**Included** *Pultenaea humilis* is rare in New South Wales and Tasmania, but relatively common in Victoria. In NSW, *Pultenaea humilis* is currently known from three confirmed localities in the NSW South-Western Slopes bioregion.
Pultenaea pedunculata	Matted Bush-pea	E	-	-	Between Boro and Marulan	-	Excluded	-	-	-	-	**Excluded – Geographic Limitations** Matted Bush-pea is widespread in Victoria, Tasmania, and south-eastern SA. In NSW however, it is represented by just three disjunct populations, in the Cumberland Plains in Sydney, the coast between Tathra and Bermagui and the Windellama area south of Goulburn (where it is locally abundant).
Rutidosis leiolepis	Monaro Golden Daisy	V	V	-	N/A	-	-	-	-	-	Included	**Included** The Monaro Golden Daisy is found in scattered populations on the Monaro, and in low subalpine plains of Kosciuszko National Park (eg. Long Plain and Happy Jacks Plain).

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON[5]	BUN[6]	CRO[7]	MUR[8]	INL[9]	SNO[10]	
Rytidosperma vickeryae	Perisher Wallaby-grass	E	-	Yes	Small flats on the edges of creeks and rivers, on small gravel bars and in sphagnum mounds or within 20m	-	-	-	-	-	Included	**Included** *Rytidosperma vickeryae* is endemic to Kosciuszko National Park, at altitudes of 1500-1900 m. Its geographical distribution is highly restricted with most populations having been recorded in tributaries of the upper Snowy River, from Perisher Valley and the Spencers Creek – Betts Creek – Guthrie Creek system east of Charlottes Pass. An outlying population has been recorded at Happy Jacks Plains (north-west of Lake Eucumbene) about 35-45 km away from these main occurrences. *Rytidosperma vickeryae* occurs in subalpine treeless vegetation, and is mainly recorded from stream-sides, the edges of tarns, and in and around bogs; within bogs, it is often found growing in mounds of *Sphagnum cristatum*.
Senecio garlandii	Woolly Ragwort	V	-	-	Within 10 km of Burrinjuck	Included	-	-	-	Included	-	**Included** Found between Temora, Bethungra and Albury and possibly Burrinjuck near Yass. The largest populations are at The Rock and Mt Tabletop (and surrounds). There is a single population in Victoria at Chiltern.
Solanum armourense	-	E	-	Yes	N/A	-	Included	-	-		-	**Included** Confined to a relatively small area west and south-west of Sydney,

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												from the Kowmung Valley within Blue Mountains and Kanangra Boyd national parks south to the Wombeyan area. Most known locations occur within national park and other conservation estate, but the species is also known from private lands.
Swainsona recta	Small Purple-pea	E	E	-	N/A	-	-	-	Included	Included	-	**Included** Small Purple-pea was recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Over 80% of the southern population grows on a railway easement.
Swainsona sericea	Silky Swainson-pea	V	-	-	N/A	-	Included	-	Included	Included	-	**Included** Recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Also found in South Australia, Victoria and Queensland.
Thelymitra alpicola	Alpine Sun-orchid	V	-	-	N/A	-	-	-	-	-	Included	**Included** *T.alpicola* is distributed in south–eastern NSW and north–eastern Victoria. The northern-most

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												populations are in the upper Blue Mountains. The remainder of the New South Wales distribution is from the Snowy Mountains extending north–west to Bago State Forest and to the eastern part of the Great Dividing Range south from Braidwood.
Thesium australe	Austral Toadflax	V	V	-	Kosciuszko National Park	-	Included	Included	Included	-	Included	**Included** Austral Toadflax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Although originally described from material collected in the south-west Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region.
Xerochrysum palustre	Swamp Everlasting	-	V	-	N/A	-	-	-	-	-	Included	**Included** Found in Kosciuszko National Park and the eastern escarpment south of Badja. Also found in eastern Victoria.
Zieria obcordata	Granite Zieria	E	E	Yes	Rocky areas; Land containing granite boulders or rocky outcrops with 100 m	-	-	-	-	Excluded	-	**Excluded- Vagrant** (as per section 5.2 of the BAM, Step 4) Found in Kosciuszko National Park and the eastern escarpment south of Badja, NSW, more than 110 km from the amended project

Scientific name	Common name	BC Act status *	EPBC Act status*	SAII	Habitat/ geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
						BON [5]	BUN [6]	CRO [7]	MUR [8]	INL [9]	SNO [10]	
												footprint. Occurs only in rocky areas or within 100 m of granite boulders or rocky outcrops. Following consultation with NSW DCCEEW, the species is considered unlikely to occur within the amended project footprint.

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

7.2.2 Threatened flora results

Targeted surveys were undertaken to inform the presence/ absence of all relevant candidate threatened flora species. Details regarding field survey methods applied and a summary of survey effort is provided in Section 4.5. Based on the result of the surveys, the following six threatened flora species were directly recorded within the amended project footprint:

- *Ammobium craspedioides* (Yass Daisy) listed as vulnerable under the BC and EPBC Act
- *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) listed as endangered under the BC and EPBC Act
- *Pimelea bracteata* listed as critically endangered under the BC and EPBC Act
- *Prasophyllum bagoense* (Bago Leek-orchid) listed as critically endangered under the BC and EPBC Act. This species was recorded through field survey approximately 130 metres west of the amended project footprint within the Bago State Forest. NSW DCCEEW directly recorded one individual of *P. bagoense* within the amended project footprint in the McPhersons Plain area on 12 December 2023. The species presence within potential habitats within the amended project footprint is considered highly likely, where not directly recorded.
- *Prasophyllum keltonii* (Kelton's Leek-orchid), listed as critically endangered under the BC and EPBC Act. This species was recorded through field survey approximately 750 metres west of the amended project footprint within the Bago State Forest. NSW DCCEEW recorded two individuals within the amended project footprint on 12 December 2023. It has also been historically recorded within the amended project footprint by Canberra Orchid Society and its presence within potential habitats is considered highly likely, where not directly recorded.
- *Xerochrysum palustre* (Swamp Everlasting) listed as vulnerable under the EPBC Act.

The extent of confirmed habitat for these six species equates to 35.50 hectares and includes 0.43 hectares of non-native vegetation (less than one percent of potential flora habitat within the amended project footprint). Two additional species were recorded immediately adjacent to the amended project footprint:

- *Prasophyllum innubum* (Brandy Marys Leek Orchid), listed as critically endangered under the BC and EPBC Act (historically approximately 80 m west of the amended project footprint by Canberra Orchid Society)
- *Thelymitra alpicola* (Alpine Sun-orchid), listed as vulnerable on the BC Act, (approximately 450 m from west of the amended project footprint).

Figure 13-8, Figure 13-11, Figure 13-13 and Figure 13-14 (Attachment 5) shows the location of the threatened flora records in relation to the amended project footprint.

At total of 5,709.02 ha (35%) of potential habitat for threatened flora was sufficiently surveyed across the amended project footprint and excluded from the assessment. All potential habitats for eight candidate flora species were excluded: *Acacia clunies-rossiae* (Kanangra Wattle), *Diuris ochroma* (Pale Golden Moths), *Euphrasia scabra* (Rough Eyebright), *Carex raleighii* (Raheigh Sedge), *Glycine latrobeana, Rytidosperma vickeryae* (Perisher Wallaby-Grass), *Rutidosis leiolepis* (Monaro Golden Daisy) and *Hakea dohertyi* (Kowmung Hakea).

The presence of 48 of the 56 candidate flora species (including a proportion of habitat for five of the eight species directly recorded) has been assumed within the remaining 10,463.82 hectares of potential habitat within the amended project footprint due to a lack of sufficient survey effort during suitable seasonal windows (refer to the limitations noted in Section 4.9). With the exception of the flora species directly recorded within or adjacent to the amended project footprint, the majority of flora species assumed present are considered to have a low to moderate likelihood of occurring (Table 7-2).

Of the flora species recorded or assumed present, 16 species were considered potential Serious and Irreversible Impact candidates in line with section 6.7 of the BC Regulation (Attachment 17). Approximately 767.46 hectares (56%) of all potential SAII flora habitats occurring within the amended project footprint were subject to survey and excluded from the assessment (includes 24.05 ha of non-native habitats and Category 1 lands). A total of 614.73 hectares of potential SAII habitat remains within the amended project footprint, approximately 6% of the total extent of threatened flora habitat (includes 73.33 ha of non-native habitats and Category 1 lands). SAII species presence has been assumed within these remaining habitats where relevant.

Table 7-2 presents a summary of the field survey results for candidate threatened flora species, including the proportion of habitats excluded or confirmed through field survey and the remaining habitat extent for which species presence has been assumed. Attachment 1 provides a detailed overview of the survey effort review and final species polygon development process undertaken to support these outcomes.

Table 7-2: Threatened flora species confirmed, assumed present, or excluded through field survey

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Acacia ausfeldii	Ausfeld's Wattle	V	-	-	PCT 266, 268, 277 and 294	Inland Slopes	134.06	57.76	0.00	76.30	76.30	This species is considered to have a low likelihood of occurrence. The species occurs to the east of Dubbo in the Mudgee-Ulan-Gulgong area of the NSW South Western Slopes bioregion and adjoining bioregions, with the closest record in Grenfell, 120 km from the amended project footprint.
Acacia bynoeana	Bynoe's Wattle	E	V	-	PCT 1093	Bungonia	27.48	21.67	0.00	5.81	5.81	There are recent records of the species from Crookwell, therefore the species is considered to have a moderate likelihood of occurrence in the Bungonia and Crookwell IBRA subregions based on the presence of suitable habitat and associated PCT 1093.
						Crookwell	61.84	22.34	0.00	39.50	39.50	
Acacia clunies-rossiae	Kanangra Wattle	V	-	-	PCT 870	Bungonia	10.59	10.59	0.00	0.00	0.00	*Acacia clunies-rossiae* was not recorded in the amended project footprint despite sufficient targeted survey effort. The species known range is limited to the Kanangra-Boyd and Blue Mountains National Parks (nearest record approximately 36 km north of the amended project footprint (NSW DCCEEW, 2024a)). This species has been confirmed absent through field survey.
Acacia flocktoniae	Flockton Wattle	V	V	-	PCT 870, 1150 and 1330	Bungonia	95.96	38.94	0.00	57.02	57.02	This species has a low likelihood of occurrence within the amended project footprint. Its known range is limited to the Southern Blue Mountains, and there are no previous records of the species across the broader Bungonia IBRA subregion.
	Yass Daisy	V	V	-		Bondo	1.91	0.00	0.24	1.67	1.91	Recorded- 2 individuals within PCT 299

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Ammobium craspedioides					PCT 266, 268, 277, 280, 283, 287, 290, 294, 295, 299, 343, 352, 679, 727, 731, 953, 1093, 1151, 1196, 1256 and 1330	Crookwell	430.99	31.21	3.04	396.74	399.78	Recorded- 172 individuals within PCT 1093 0.40 ha of additional non-native habitat occurs within the project footprint.
						Inland Slopes	1597.09	416.20	0.13	1180.78	1180.9 0	*Ammobium craspedioides* is assumed present within habitats in the Inland Slopes
						Murrumbat eman	717.37	336.27	5.28	375.82	381.10	Recorded- approx. 7,924 individuals within PCT 280 and234 individuals within PCT 1330.
						Snowy Mountains	0.78	0.00	0.89	0.00	0.78	Recorded 6 individuals within PCT 1196 and 10 individuals within PCT 953.
Baloskion longipes	Dense Cord-rush	V	V	-	PCT 1093	Bungonia	27.54	21.73	0.00	5.81	5.81	This species has a low likelihood of occurrence. There are no historic records of the species in the Bungonia IBRA subregion and only a small portion of marginal habitat occurs within the amended project footprint.
Bossiaea fragrans	-	CE	CE	Yes	PCT 268	Inland Slopes	128.86	97.46	0.00	31.39	31.39	The species is only known from the Abercrombie Karst Conservation Reserve (nearest known location is approximately 75 km from the amended project footprint) and within the adjacent travelling stock reserve, south of Bathurst on the NSW central tablelands. It has a highly restricted distribution, with only a small number of discrete known sub-populations and therefore is considered to have a low likelihood of occurrence.
Bossiaea oligosperma	Few-seeded Bossiaea	V	V	-	PCT 1093	Bungonia	34.65	24.72	0.00	9.93	9.93	This species is considered to have a low likelihood of occurrence within the amended project footprint. It is restricted to the Warragamba and Windellama

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												area, both approximately 50 km from the amended project footprint.
Caesia parviflora var. minor	Small Pale Grass-lily	E	-	-	PCT 295 and 297	Inland Slopes	26.09	6.77	0.00	19.32	19.32	There is only one known outlying population in NSW in Barcoongere State Forest, approximately 570 km from the amended project footprint. The species is considered to have a low likelihood of occurrence.
Caladenia concolor	Crimson Spider Orchid	E	V	Yes	PCT 268, 280 and 290	Inland Slopes	255.10	24.59	0.00	230.51	230.51	Known populations are limited to a property near Bethungra and within Burrinjuck Nature Reserve (nearest known location is approximately 4 km from the amended project footprint), therefore the species is considered to have a low likelihood of occurrence.
						Murrumbateman	21.07	6.84	0.00	14.23	14.23	
Caladenia montana	-	V	-	-	PCT 300, 638, 679, 953 and 1196	Bondo	26.35	0.00	0.00	26.35	26.35	The species is known to occur approximately 2.3 km east of the amended project footprint. The species has a high likelihood of occurrence.
						Snowy Mountains	605.72	0.00	0.00	605.72	605.72	
Calotis glandulosa	Mauve Burr-daisy	V	V	Yes	PCT 679, 1196 and 1224	Snowy Mountains	118.50	118.45	0.00	0.06	0.06	12.67 ha of additional non-native habitat occurs within the amended project footprint. The species is known from three sites in the upper Shoalhaven catchment (approximately 20 km from the amended project footprint). Whilst it is a coloniser of disturbed lands it does not tolerate heavy grazing. The species is considered to have a low likelihood of occurrence.
Calotis pubescens	Max Mueller's Burr-daisy	E	-	-	PCT 1224	Snowy Mountains	5.12	5.12	0.00	0.00	0.00	The species is known to occur within the Snowy Mountains of NSW, with populations recorded in Kosciuszko National Park. This species has not been recorded within 20 km of the amended

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												project footprint and is therefore considered to have a low likelihood of occurrence.
Carex raleighii	Raleigh Sedge	E	-	-	PCT 637	Snow Mountains	3.86	3.86	0.00	0.00	0.00	This species was not recorded in the amended project footprint despite sufficient targeted survey effort. There is one historic (1950s) record of this species within 9 km of the amended project footprint. No search of this locality has been carried out to determine if the population persists and to what extent (NSW NPWS, 2001a).
Commersonia prostrata	Dwarf Kerrawang	E	E	-	PCT 1191	Crookwell	10.44	0.35	0.00	10.09	10.09	There are no previous records in the IBRA subregion, therefore the species is considered to have a low likelihood of occurrence.
Cullen parvum	Small Scurf-pea	E	-	-	PCT 5 and 277	Inland Slopes	106.37	0.00	0.00	106.37	106.37	Known primarily from Wagga Wagga and Jindera, with one record within 5 km of the amended project footprint (NSW DCCEEW, 2024a). The species has a moderate likelihood of occurrence.
Dillwynia glaucula	Michelago Parrot-pea	E	-	-	PCT 1093	Bungonia	24.69	18.88	0.00	5.81	5.81	This species is known only from five locations on the NSW Southern Tablelands, all of which are greater than 20 km from the amended project footprint. The species has a low likelihood of occurrence within the amended project footprint.
Diuris aequalis	Buttercup Doubletail	E	E	-	PCT 731, 1093, 1097, 1151 and 1191	Bungonia	39.27	6.68	0.00	32.59	32.59	The likelihood of occurrence for this species is low due to the absence of records within 20 km of the amended project footprint (Bungonia IBRA subregion) and the absence of associated PCTs (Crookwell IBRA subregion).
						Crookwell	247.37	1.83	0.00	245.54	245.54	

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Diuris ochroma	Pale Golden Moths	E	V	Yes	PCT 1224	Snowy Mountains	5.12	5.12	0.00	0.00	0.00	This species was not recorded in the amended project footprint despite sufficient targeted survey effort. Known populations of the species are limited to Kosciuszko National Park and the Kybean area in NSW (approximately 27 km from the amended project footprint). This species has been confirmed absent through field survey.
Diuris tricolor	Pine Donkey Orchid	E	V	-	PCT 731	Inland Slopes	10.90	0.00	0.00	10.90	10.90	The species is sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. There is only one record of the species within 20 km of the amended project footprint which is dated 1917. The species is considered to have a low likelihood of occurrence.
Eucalyptus aggregata	Black Gum	V	V	-	PCT 679, 1191 and 1256	Crookwell	11.01	5.55	0.00	5.46	5.46	The species is considered to have a high likelihood of occurrence within the Crookwell IBRA subregion and a moderate likelihood of occurrence within the Murrumbateman IBRA subregion due to the presence of suitable habitat and associated PCTs. The species is also known to occur in the Inland Slopes IBRA subregion (NSW DCCEEW, 2024a;,Attachment 2), however due to limited previous records (1 only), the potential for the species to occur within Inland Slopes IBRA subregion portion of the amended project footprint is low.
						Inland Slopes	2.20	0.70	0.00	1.50	1.50	
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	E	-	PCT 1097 and 1330	Bungonia	36.42	19.98	0.00	16.44	16.44	Given this species is conspicuous, it is likely to have been recorded either during the threatened flora surveys and/or initial vegetation mapping where

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												canopy species were heavily relied on to confirm PCT ID. Given the moderate survey effort and the conspicuous nature of the species, the likelihood of occurrence is low.
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	V	V	Yes	PCT 727	Crookwell	13.33	8.80	0.00	4.53	4.53	Given the moderate survey effort, conspicuous nature of the species, and that it is known only from the central tablelands of NSW north of Orange to Burraga (approximately 64 km from the amended project footprint), the likelihood of occurrence is low.
Euphrasia scabra	Rough Eyebright	E	-	Yes	PCT 637, 679 and 1224	Snowy Mountains	10.73	10.73	0.00	0.00	0.00	This species was not recorded in the amended project footprint despite sufficient targeted survey effort. There are three known populations of the species in NSW: Bondi State Forest, South East Forests National Park and near Nunnock Swamp (nearest known location is approximately 14 km from the amended project footprint.
Genoplesium superbum	Superb Midge Orchid	E	-	Yes	PCT 1150	Bungonia	75.12	32.92	0.00	42.20	42.20	The species is only known from two locations near Nerriga and Morton National Park in NSW (nearest known location is approximately 71 km from the amended project footprint).
Glycine latrobeana	Clover Glycine	CE	V	Yes	PCT 1224	Snowy Mountains	5.12	5.12	0.00	0.00	0.00	The closest known population is within Kosciuszko National Park (approximately 30 km from the amended project footprint), therefore the species has a low likelihood of occurrence.
Grevillea iaspicula	Wee Jasper Grevillea	CE	E	Yes	PCT 266 and 1330	Murrumbateman	98.39	67.24	0.00	31.16	31.16	The species is only known to occur on the shores of Lake Burrinjuck (approximately 11 km from the amended project

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												footprint), therefore the species has a low likelihood of occurrence.
Grevillea wilkinsonii	Tumut Grevillea	E	-	Yes	PCT 266, 268, 278 and 301	Inland Slopes	186.03	34.53	0.00	151.50	151.50	The species is only known from two locations in NSW: Goobarragandra River and overlapping two properties at Gundagai (nearest known location is approximately 14 km from the amended project footprint), therefore the species has a low likelihood of occurrence.
Hakea dohertyi	Kowmung Hakea	E	E	-	PCT 870	Bungonia	10.59	10.59	0.00	0.00	0.00	*Hakea dohertyi* was not recorded in the amended project footprint despite sufficient targeted survey effort. The species is conspicuous and has a distribution limited to 30 km north of the amended project footprint. This species has been confirmed absent through field survey.
Kunzea cambagei	Cambage Kunzea	V	V	-	PCT 1150	Bungonia	75.12	36.73	0.00	38.39	38.39	The species is considered to have a moderate likelihood of occurrence based on indicative mapping and habitat assessments.
Lepidium hyssopifolium	Aromatic Peppercress	E	E	-	PCT 277, 280, 283 and 1330	Crookwell	405.20	31.40	0.00	373.80	373.80	The species is considered to have a low likelihood of occurrence due to the absence of previous records within 20 km of the amended project footprint.
Leucochrysum albicans var. tricolor	Hoary Sunray	E	E	-	PCT 268, 280, 322, 335, 349, 351, 352, 679, 727, 731, 952, 953, 1093,	Bungonia	191.77	83.15	0.00	108.63	108.63	0.03 ha of additional non-native habitat occurs within the amended project footprint. The species has been recorded in the amended project footprint in the Crookwell and Murrumbateman IBRA subregions. The species was recorded in
						Crookwell	637.07	145.03	15.41	476.63	492.04	
						Inland Slopes	299.46	168.00	0.00	131.46	131.46	
						Murrumbateman	857.81	553.12	7.89	296.80	304.69	

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
					1097, 1151, 1191, 1196 and 1330	Snowy Mountains	425.01	331.79	0.00	93.22	93.22	grasslands, in areas with existing or past disturbance, or on the edges of existing easement. 27,057 individuals were recorded within Crookwell within PCT 952, 1330, 727, 1093, 280, 731 and 679. 113,356 individuals were recorded within Murrumbateman within PCT280, 322, 349, 1093 and 1330. The species is considered to have a low likelihood of occurrence within Bondo, Bungonia, Inland Slopes and Snowy Mountains IBRA subregions.
Persoonia marginata	Clandulla Geebung	V	V	-	PCT 287	Inland Slopes	30.51	0.35	0.00	30.16	30.16	The species has not been recorded in the amended project footprint, but has been assumed present over a portion of the amended project footprint due to survey limitations. Given the fact that there are no previous records in the IBRA subregion, the species has a low likelihood of occurring in the amended project footprint.
Persoonia mollis subsp. *Revoluta*	-	V	-	-	PCT 1107 and 1150	Bungonia	68.69	64.81	0.00	3.88	3.88	Currently known to occur in seven populations, primarily in the area between Mittagong, Paddy's River and High Range (nearest location approximately 22 km from the amended project footprint), therefore the species is considered to have a low likelihood of occurrence.
Phyllota humifusa	Dwarf Phyllota	V	V	-	PCT 1150	Bungonia	67.46	22.01	0.00	45.45	45.45	There are no previous records in the Bungonia IBRA subregion, therefore the species' likelihood of occurrence is considered low.
Pimelea bracteata	-	CE	CE	Yes		Bondo	16.66	3.88	0.00	12.78	12.78	

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
					PCT 285, 637, 679, 939, 953, 1196 and 1224	Snowy Mountains	28.45	25.59	1.08	1.79	2.86	*Pimelea bracteaea* was recorded in the amended project footprint in the Snowy Mountains IBRA sub-region. Approximately 1,502 individuals were recorded in PCT 679 and PCT 953The species has a high likelihood of occurrence elsewhere within the Snowy Mountains and Bondo IBRA subregions region due to the presence of suitable habitats and distance from known records.
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	-	PCT 300 and 1150	Bondo	6.19	0.00	0.00	6.19	6.19	No targeted surveys have been undertaken for this species in the Bungonia IBRA subregion. There are 161 previous records in the IBRA subregion, 110 of which occur within 20 km of the amended project footprint, however none occur within 5 km of the amended project footprint (NSW DCCEEW, 2024a). Given no threatened flora surveys have been undertaken for this species, the proximity of previous records and the potential habitat present in the forested areas of the Bungonia subregion, the likelihood of occurrence is considered moderate.
						Bungonia	67.47	36.49	0.00	30.98	30.98	
Pomaderris delicata	Delicate Pomaderris	CE	CE	Yes	PCT 1150	Bungonia	65.75	61.86	0.00	3.89	3.89	Known from only two sites: between Goulburn and Bungonia and south of Windellama (nearest known location is approximately 32 km from the amended project footprint), therefore the species is considered to have a low likelihood of occurrence.
Pomaderris pallida	Pale Pomaderris	V	V	Yes	PCT 1093	Murrumbateman	103.70	97.24	0.00	6.45	6.45	There are no known records of the species within 20 km of the amended

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												project footprint (nearest known location is approximately 38 km from the amended project footprint), therefore the species is considered to have a low likelihood of occurrence.
Prasophyllum bagoense	Bago Leek-orchid	CE	CE	Yes	PCT 953, 1196 and 1224	Snowy Mountains	61.30	60.69	0.28	0.32	0.61	*Prasophyllum bagoense* was recorded within the Snowy Mountains IBRA subregion adjacent to the amended project footprint (39 individuals). One individual of this species was recorded by NSW DCCEEW within the amended project footprint within the McPherson's Plain area on 12 December 2023. 350 individuals have been historically recorded by the FCNSW (all during 2016) within the vicinity of the amended project footprint. An additional 10 historic records from Canberra Orchid Society (from 2020/2021) occur in the vicinity of the amended project footprint). Five of these historic records directly intersected the amended project footprint. Given the presence of known and historic records within and adjacent to the amended project footprint, the species has a high likelihood of occurrence within remaining habitats where presence has been assumed.
Prasophyllum innubum	Brandy Marys Leek Orchid	CE	CE	Yes	PCT 1221	Snowy Mountains	5.12	0.00	0.00	5.12	5.12	There are seven previous BioNet records in the IBRA subregion, two of which occur within 5 km of the amended project footprint. The species has also been historically recorded within 80 m of the amended project footprint by Canberra Orchid Society. Given the close proximity of previous records, the

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												presence of potential habitat in the amended project footprint and the low number of surveys undertaken, the likelihood of occurrence is considered high.
Prasophyllum keltonii	Kelton's Leek-orchid	CE	CE	Yes	PCT 953, 1196 and 1224	Snowy Mountains	56.35	56.06	0.28	0.00	0.28	*Prasophyllum keltonii* was recorded adjacent to (14 individuals within 750 m) the amended project footprint within the Snowy Mountains IBRA subregion. NSW DCCEEW recorded two individuals of the species within the amended project footprint in the McPherson's Plain area on 12 December 2023. 330 individuals have been historically recorded by the FCNSW (all during 2016) within the vicinity of the amended project footprint. Three of these historic records directly intersected the amended project footprint. There are also two historic records from Canberra Orchid Society within the amended project footprint and an additional nine records on close vicinity of the amended project footprint (all from 2020/2021). Given the presence of known and historic records within the vicinity of the amended project footprint, the species has a high likelihood of occurrence.
Prasophyllum petilum	Tarengo Leek-orchid	E	E	-	PCT 277 and 1330	Inland Slopes	129.16	5.54	0.00	123.62	123.62	*Prasophyllum petilum* was not recorded during targeted surveys. There are no previous records in the Murrumbateman IBRA subregion. There are 26 records in the Inland Slopes IBRA subregion, none of which occur within 20 km of the amended project footprint. This species'
						Murrumbateman	196.35	16.80	0.00	179.55	179.55	

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												likelihood of occurrence is therefore considered low.
Pterostylis alpina	Alpine Greenhood	V	-	-	PCT 679 and 1196	Snowy Mountains	113.39	90.75	0.00	22.64	22.64	The species occurs in the Southern Tablelands south from Bondo State Forest, with one record from 2005 less than 1 km from the amended project footprint. This species is considered to have a moderate likelihood of occurrence.
Pterostylis foliata	Slender Greenhood	V	-	-	PCT 638, 679 and 1196	Bondo	16.39	0.00	0.00	16.39	16.39	This species occurs mainly in the Southern Tablelands south from Batlow, with two records less than 2 km from the amended project footprint. This species is considered to have a moderate likelihood of occurrence.
						Snowy Mountains	245.56	137.27	0.00	108.29	108.29	
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	Yes	PCT 637 and 939	Snowy Mountains	5.41	3.17	0.00	2.24	2.24	There are eight previous records in the IBRA subregion, four of which occur within 20 km of the amended project footprint, and three of which occur within 5 km of the amended project footprint. The species is considered moderately likely to occur.
Pultenaea humilis	Dwarf Bush-pea	V	-	-	PCT 268, 287, 290, 294, 306 and 343	Inland Slopes	258.39	117.47	0.00	140.92	140.92	It is considered to have a low likelihood of occurrence in the Inland Slopes IBRA subregion due to its rarity and the location of the nearest record in Tumut (approximately 10 km from the amended project footprint) (NSW DCCEEW, 2024a).
Rutidosis leiolepis	Monaro Golden Daisy	V	V	-	PCT 1224	Snowy Mountains	5.12	5.12	0.00	0.00	0.00	There are 51 previous records in the Snowy Mountains IBRA subregion, none of which occur within 20 km of the amended project footprint. This species is considered to have a low likelihood of occurrence.

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Rytidosperma vickeryae	Perisher Wallaby-grass	E	-	Yes	PCT 637	Snowy Mountains	3.86	3.86	0.00	0.00	0.00	Perisher Wallaby-grass was not recorded in the amended project footprint but was assumed present due to survey limitations. The species is considered to have a low likelihood of occurrence.
Senecio garlandii	Wooly Ragwort	V	-	-	PCT 287, 290 and 343	Inland Slopes	103.96	14.12	0.00	89.84	89.84	The species is thought to occur in Burrinjuck, approximately 10 km from the amended project footprint, therefore is considered to have a low likelihood of occurrence in the Inland Slopes IBRA subregion.
Solanum armourense	-	E	-	Yes	PCT 870 and 1093	Bungonia	20.87	19.27	0.00	1.60	1.60	There are two nearby records, the closest being 6.5 km from the amended project footprint boundary (NSW DCCEEW, 2024a), and suitable habitat was identified during field surveys. The species is considered moderately likely to occur within the amended project footprint.
Swainsona recta	Small Purple-pea	E	E	-	PCT 266, 268, 277, 280, 294 and 1330	Inland Slopes	674.57	298.18	0.00	376.39	376.39	The species has a low likelihood of occurrence in the Murrumbateman IBRA subregion due to sufficient survey effort and the absence of records within 20 km and a moderate likelihood of occurrence within the Inland Slopes due to presence of records within 20 km of the amended project footprint.
						Murrumbateman	231.05	154.12	0.00	76.93	76.93	
Swainsona sericea	Silky Swainson-pea	V	-	-	PCT 266, 268, 277, 280, 283, 290, 294, 322, 1191 and 1330	Bungonia	65.52	18.37	0.00	47.15	47.15	The species is considered likely to occur within the Inland Slopes and Murrumbateman IBRA subregion based on indicative mapping and previous records within 20 km of the amended project footprint. The species has a low likelihood of occurrence within the
						Inland Slopes	811.49	190.87	0.00	620.62	620.62	
						Murrumbateman	329.91	208.32	0.00	121.59	121.59	

Scientific name	Common name	BC Act Status*	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded -field survey (ha)	Recorded - field survey (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
												Bungonia IBRA subregion due to the absence of previous records.
Thelymitra alpicola	Alpine Sun-orchid	V	-	-	PCT 939	Snowy Mountains	2.54	0.91	0.00	1.63	1.63	One individual was recorded Dec 2019 within 1 km of the amended project footprint. There is also one historic record within 5 km in Maragle State Forest. The species has a high likelihood of occurrence given the proximity of known records.
Thesium australe	Austral Toadflax	V	V	-	PCT 679, 1191, 1196, 1224 and 1330	Bungonia	152.11	1.95	0.00	150.16	150.16	The species is considered likely to occur within the Snowy Mountains IBRA subregion based on indicative mapping and habitat assessments. The species has a low likelihood of occurrence within Bungonia, Crookwell and Murrumbateman IBRA subregions due to absence of previous records.
						Crookwell	382.21	29.59	0.00	352.62	352.62	
						Inland Slopes	3.36	0.00	0.00	3.36	3.36	
						Murrumbateman	606.83	99.28	0.00	507.55	507.55	
						Snowy Mountains	118.50	118.47	0.00	0.03	0.03	
Xerochrysum palustre	Swamp Everlasting	-	V	-	PCT 679 and 939	Snowy Mountains	27.09	24.66	0.66	1.76	2.43	Six individuals recorded within PCTs 679 and 939 within the Snowy Mountains IBRA subregion. The species has a high likelihood of occurrence within suitable habitats in this region.

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

7.3 Threatened fauna

7.3.1 Fauna habitats

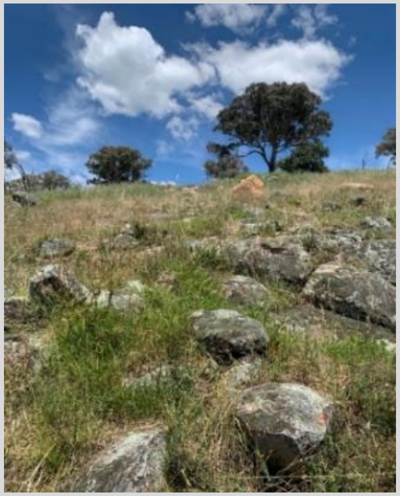
Fauna habitat assessments were undertaken for all accessible lands within the amended project footprint to assess habitat suitability for threatened fauna species (those species known or predicted to occur within the locality from existing data collection, literature, and database review). Based on the collected field data (habitat, vegetation type and condition and features of interest mapping), habitats were stratified into nine general types within the amended project footprint, which included:

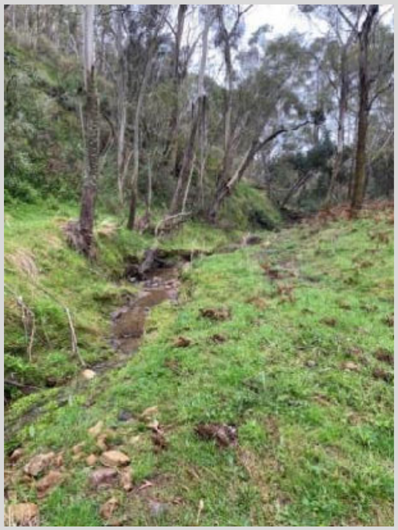
- grassland habitat
- semi-arid woodland
- tall wet sclerophyll forest (old growth)
- dry sclerophyll open woodland
- alpine fen habitat
- aquatic and riparian habitat (wetlands, creeks, and floodplains)
- rocky habitat (outcrops, karsts, and overhangs)
- wet sclerophyll forest
- artificial habitats (including existing road culverts, farm dams and bridges).

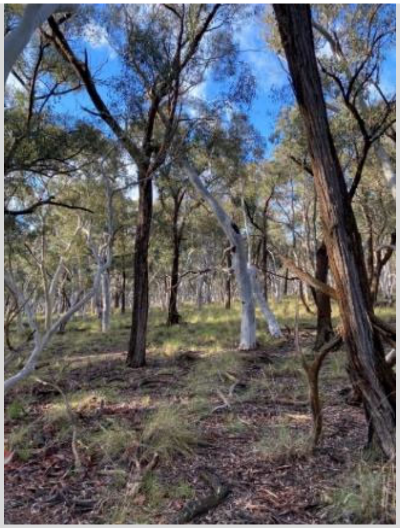
Each general habitat type and key fauna resources are described in detail below in Table 7-3.

See Chapter 11 of the BDAR for further assessment of threatened fauna under the EPBC Act.

Table 7-3: Fauna habitat types present within the amended project footprint

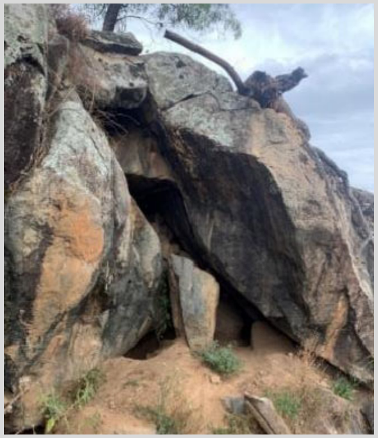
Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
Grassland habitats  *Plate 2 Example of grassland habitat within the Yass area.*	Grassland PCTs: 1224. Grassy woodland Derived Native Grasslands PCTs: 266, 268, 277, 278, 280, 283, 301, 316, 319, 679, 731, 952, 953, 1191, 1196 and 1330.	The grassland habitats within the amended project footprint are typically dominated by moderately tall to tall dense to open native tussock grasses. The community is often treeless, or sparsely treed. The community supports a range of fauna species, some of which are unique to grassland communities or derived native grasslands eg Pink-tailed Legless Lizard, Stripped Legless Lizard and Golden Sun Moth.	**Occasional** - Fallen woody debris is occasionally found on the edge of grassy woodland habitats. Rock outcrops and boulder fields are common within this habitat type and are utilised by insects and reptiles for sheltering and foraging.	**Common –** Grazing (grass roots and seeds) grounds for species like Eastern Grey Kangaroos (*Macropus giganteus*), Red-rumped Parrot (*Psephotus haematonotus*), Eastern Rosella (*Platycercus eximius*) and less frequently species such as Superb Parrot. Species such as Spotted Harrier (*Circus assimilis*), and Little Eagle (*Hieraaetus morphnoides*) use grassland and open woodland habitats as foraging grounds for hawking small mammals, and reptiles.	**Occasional** - Hollow-bearing trees (scattered paddock trees) and ground nests.	**Occasional** - Seasonal or ephemeral wet areas within a site may occur, containing a range of wetland flora species, including rushes, sedges, and a variety of wetland specialist forbs. Farm dams are also commonly found in proximity to grassland habitats.	Reptiles such as Striped Legless Lizard and Pink-tailed Legless Lizard were found in grasslands with significant amounts of surface rocks, which are used for shelter, as they actively hunt for spiders, crickets, moth larvae and cockroaches. Grasslands dominated by Wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for Golden Sun Moth (DAWE, 2021a). The species occupies this microhabitat for all stages of its lifecycle. Grassland habitats provide refugia, and runways for terrestrial mammals,

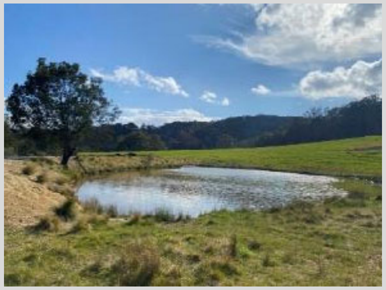
Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
							and nesting and foraging resources for small grassland bird species.
Wet sclerophyll forest  *Plate 3 Wet sclerophyll forest (PCT 1107)*	PCTs 295, 300, 638, 1097 and 1107.	Wet sclerophyll forest habitat supports a diverse range of birds (for nesting and foraging [nectar, blossom, and insectivorous feeders]), mammals (arboreal, terrestrial, and flying), amphibians, reptiles, and invertebrates.	**Common –** Dense to patchy distribution of leaf litter and a high abundance of fallen woody debris and rock habitats. Detritus, clubmosses, and ferns occur in many areas.	**Common -** Generally good levels of food resources such as insects, nectar, pollen, and sap.	**Common -** There is a moderate to high diversity of hollows (small to extra-large hollows) in limbs and trunks of live trees, dead trees (stags) and ground logs. **Occasional –** medium to large canopy sticknests.	**Common –** This habitat type has a mesic understorey, which contains creeks, fens, and ephemeral soaks, suitable for many fauna groups.	Generally, contains eucalypt species such as Alpine Ash, Snow Gum, Mountain Gum, and Brown Barrel. These species as they mature, provide many different types of nest or home sites for fauna (eg large forest owls, cockatoos, gliders, and other arboreal mammals). Rock outcrops and riparian habitats also occur in this habitat type.
Open dry sclerophyll woodland	PCTs 285, 287, 290, 294, 297, 299, 306, 314, 322, 343, 349, 351, 352, 727, 870, 953, 1093, 1150 and 1151.	This habitat type provides a wide range of food and shelter for vertebrate fauna. Trees from the family Myrtaceae generally dominate	**Common -** Dense to patchy distribution of leaf litter and a high abundance of fallen woody debris.	**Common -** Many myrtaceous and proteaceous shrubs and canopy species that would be suitable for nectivorous birds, insects, and mammals.	**Common -** Many hollow-bearing trees (all size classes) within open woodland habitat.	**Common -** Ephemeral drainage lines, second and third-order streams. The creeklines (ephemeral and permanent)	Natural grassland habitats also occur in pockets of open woodland and are generally associated with this habitat type. As such, there are areas of surface

Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
 *Plate 4 Open woodland habitat (PCT 349)* 		the upper canopy in these areas and supply direct (foliage, nectar, exudates) and indirect food (arthropods) for a range of vertebrates, particularly birds and arboreal mammals. Tree hollows (formed in dead trees [stags] and mature trees) provide nesting and roosting habitat for hollow-dwelling fauna. The connectivity of open woodland habitats within the amended project footprint varies in scale from scattered, isolated patches to highly connected landscapes facilitating fauna dispersal.			A variety of tree hollows were seen throughout the amended project footprint. These are likely to provide suitable den and nesting habitat for a range of birds, arboreal mammals, and microbats.	within the amended project footprint support pooling habitat suitable for breeding, foraging (aquatic macroinvertebrates, amphibians, larval fish, gudgeons and attracts terrestrial invertebrates), refuge and basking.	rock, cobbles, and boulders. This provides additional foraging, nesting, and ground refugia for small mammals, birds, and reptiles.

Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
Plate 5 Scattered trees and fallen woody debris							
Alpine Fens  *Plate 6 Alpine wetland/ fen habitat*	PCTs 637, 939	Alpine wetland habitat is found within the Snowy Mountain IBRA subregion portion of the amended project footprint, comprising either dense to open patches of or more open and shorter communities of herbs and sedges (fens). The habitat type is interspersed with woodland habitat within a small portion of the amended project footprint.	**Occasional -** Some fallen woody debris from the surrounding Snow Gum dominated woodland.	**Common -** Herbs, forbs, sedges, and myrtaceous shrubs that would be suitable for nectivorous birds, insects, and mammals.	**Occasional -** Tree cover is open to sparse or absent. It can include typical cool riparian species such as *Eucalyptus pauciflora, E.viminalis* or *E.dalrymplean a.*	**Common –** GDE habitat, however, also influenced by surface water. *Carex spp.* dominated fen/ wetland habitat which provides habitat for a range of aquatic and terrestrial fauna.	Dense sedge layer, ground cover, which also provides refuge and nesting/ breeding opportunities for fauna such as small mammals and amphibians.

Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
Aquatic and riparian habitats  *Plate 7 First order stream in Bungonia*  *Plate 8 Riparian habitat*	PCTs 5, 278, 299, 335, 356 and 1256.	There are many floodplains, freshwater wetlands and at least 135 streams (of various types and condition) that intersect the amended project footprint. Major waterbodies such as the Goobarragandra River, Gocup Creek, Tumut River, Murrumbidgee River, Adjungbilly Creek, and Lachlan River are important to their bioregions for several species.	**Common –** Snags and undercut banks, often have a build-up of woody debris on creek bends, which are used by many aquatic and terrestrial species.	**Common –** Bat species such as Southern Myotis rely on suitable-sized waterbodies within the amended project footprint for gleaning prey (insects and/or larval fish). Avifauna rely on aquatic and riparian habitats within the amended project footprint as a source of food (eg aquatic insects, amphibians, seeds, molluscs, fish, turtles, eels, crayfish prey) and water. Aquatic habitats also attract significant prey for raptors.	**Common –** Along fertile riparian corridors and gullies, hollow-bearing trees are common within the amended project footprint.	**Common –** There is a variety of aquatic habitat within the amended project footprint. These habitats include ephemeral drainage lines, sub-surface flows, freshwater wetlands, floodplain, soaks, fens, dams, first, second and third order streams with pooling habitat, and riffles.	Threatened bats use these features for drinking, foraging, and thermoregulation. Frogs relies on pooling habitat, and permanent water sources for all stages of their lifecycle (development, sheltering, breeding, foraging). Avifauna use aquatic habitats for nesting, sheltering, and foraging. Riparian shrub layers, creek embankments, rocks and fallen timber all provide shelter and foraging habitat for invertebrates, frogs, lizards, snakes, small mammals and monotremes. Aquatic habitats also provide a permanent drinking water resource for all terrestrial fauna.

Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
Rocky habitats (outcrops, karst, and overhangs)  *Granitic outcrops*  *Plate 9 Granite boulders, which could be karstic*	All PCTs within the amended project footprint supported rocky habitats to varying degrees	Rocky habitats are important in providing habitat for a variety of fauna. Steep cliffs, and overhangs are likely to support microhabitats for several fauna species (especially microchiropteran bats and reptiles). The amended project footprint also supports rocky landscape features in the form of sandstone and/or granite and outcrops, granite boulders and cobbles.	**Occasional –** Woody debris can be found amongst rocky outcrops on hillslopes.	**Common –** rocky habitats typically support a sparse scattering of vegetation for herbivores, and insects (including stygofauna), reptile, and amphibian prey for mammalian (bats) and avian (owls) predators.	**Occasional –** Nests in overhangs and caves eg Fairy Martins (*Petrochelidon ariel*), Superb Lyrebird (*Menura novaehollandiae*) and sometimes, avian predators such as Masked Owl and Sooty Owl.	**Occasional -** Artesian/sub-surface water flows and adjacent waterbodies.	Rocky outcrops provide critical habitat for threatened native reptiles, such as the Striped Legless Lizard and the Pink-tailed Worm Lizard. Karsts and overhangs provide critical sheltering, nesting, and roosting sites for reptiles, as well as many top order mammalian and avian predators. Suitable cave habitat can be used for breeding by threatened bat species such as Large-eared Pied Bat, Large Bent-winged Bat and Little Bent-winged Bat. No breeding habitat has been identified within areas surveyed in the amended project footprint.

Habitat type and photos	Associated PCTs	General description	Fallen logs and other woody debris	Foraging resources	Hollow-bearing trees and/or nests	Aquatic habitat	Other foraging/ sheltering/ nesting resources
Artificial habitats  *Plate 10 Farm dam potentially used by a variety of fauna species*	**N/A**	Culverts, bridges, dilapidated buildings identified within the amended project footprint are considered potential habitat for roosting bats at different times of the year.	**N/A**	**Common -** Threatened bats use the waterbodies that are adjacent to these structures for drinking, foraging and sometimes thermoregulation.	**N/A**	**Common -** Ephemeral drainage lines, second and third-order streams typically intersect culvert and bridge structures within the amended project footprint. Farm dams are another form of artificial habitat and are commonly found across the amended project footprint and considered ecologically important (foraging, breeding, and sheltering habitat for many fauna species).	Within the amended project footprint, there appears to be one 'definite' culvert, six 'definite' road bridges and 22 possible man-made structures which intersect suitable waterbodies and may support roosting habitat for threatened microbats. Additionally, lumber plantations (Radiata Pine) have been identified within sections of the amended project footprint. These plantations provide additional landscape connectivity and refuge for fauna dispersal.

7.3.2 Candidate threatened fauna species

A total of 47 candidate threatened fauna species (including dual credit species) were identified by the BAM-C as having a potential to occur within the amended project footprint (across all amended project IBRA subregions) (refer to Table 7-4). Two endangered populations were also predicted (refer to Table 7-4).

The habitat suitability assessment for each species is provided in Table 7-4, including justification for species inclusion/exclusion from further assessment. Additional supporting assessments are provided in Attachment 1. Of the 47 potential candidate species, 15 species were excluded from further assessment based on lack of suitable habitat/habitat constraints/geographic limitations or vagrancy as described in Table 7-4.

A total of 31 threatened species and two endangered populations were identified as requiring further assessment. The two endangered populations associated with the amended project are:

- Squirrel Glider in the Wagga Wagga City LGA, situated within the Inland Slopes IBRA subregion
- Yellow-bellied Glider population on the Bago Plateau, situated within the Snowy Mountains IBRA subregion.

Several of these candidate species and/ or populations occur across multiple IBRA subregions, as follows:

- 16 in Bungonia
- 18 in Bondo
- 16 in Crookwell
- 16 in Murrumbateman
- 23 in Inland Slopes
- 19 in Snowy Mountains.

The justification for inclusion/exclusion from further assessment for each species and/ or population is provided in Table 7-4. Attachment 1 documents the outcome of more detailed habitat suitability assessments undertaken. Species-specific information presented in Table 7-4 below was obtained from information sources as outlined in Section 4.6.1.

A summary of methods applied for supplementary constraint mapping to inform habitat mapping for candidate species, and the methodologies applied for assessing habitat suitability within in accessible lands is provided in Section 4.10 and detailed further in Attachment 1.

Table 7-4: Candidate threatened fauna species credit species

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
Birds													
Anthochaera phrygia	Regent Honeyeater	CE	CE	Dual	Yes-Important area mapping	As per mapped areas	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM (DPIE, 2020a), Step 4) Amended project footprint is outside of BAM Important Areas mapping for the species and does not support breeding habitat for the species. Foraging habitats only.
Burhinus grallarius	Bush Stone-curlew	E	-	Species	-	Fallen/standing dead timber including logs	-	-	-	-	Included	-	**Included** Associated PCTs and habitat occurs within the amended project footprint. Generally low levels of woody debris within associated PCTs.
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	Dual	-	Hollow bearing trees; Eucalypt tree species	Included	Included	Included	Included	Included	Included	**Included**

[12] Bondo IBRA subregion
[13] Bungonia IBRA subregion
[14] Crookwell IBRA subregion
[15] Murrumbateman IBRA subregion
[16] Inland Slopes IBRA subregion
[17] Snowy Mountain IBRA subregion

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
						with hollows greater than 9 cm diameter							Associated PCTs and habitat occurs within the amended project footprint. Hollows of suitable size for breeding occur throughout at varying densities subject to land use.
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Dual	-	Hollow bearing trees; Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground.	Excluded	Included	Included	Excluded	Included	-	**Included- Bungonia, Crookwell and Inland Slopes Only -** Associated PCTs and habitat occur within these IBRA subregions. Hollows of suitable size for breeding occur throughout at varying densities subject to land use. Habitats occurring elsewhere within the amended project footprint are degraded or do not occur within 20km of a known breeding record for the species.
Haliaeetus leucogaster	White-bellied Sea-eagle	V	-	Dual (breeding)	-	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Included	Excluded	Included	Included	Included	Excluded	**Included- Crookwell, Murrumbateman, and Inland Slopes only** Associated PCTs and habitat including larger waterways

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													and waterbodies with potential to support foraging activity occur within a number of IBRA subregions within the amended project footprint. No large waterways required for foraging and supporting associated PCTs were situated within 1 km of the amended project footprint within the Bondo, Bungonia and Snowy Mountains IBRA subregions (excluded from these IBRA subregions as per section 5.2 of the BAM, Step 2).
Hieraaetus morphnoides	Little Eagle	V	-	Dual (breeding)	-	Nest trees - live (occasionally dead) large old trees within vegetation.	Included	Included	Included	Included	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint. Mapping of nest trees limited due to land access constraints. Presence of nests assumed within associated PCTs.

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
Lathamus discolor	Swift Parrot	E	CE	Dual	Yes- Important areas mapping	As per mapped areas	-	Excluded	-	Excluded	Excluded	-	**Excluded: Vagrant (**as per section 5.2 of the BAM (DPIE, 2020a), Step 4) Amended project footprint outside of BAM Important Areas mapping for the species and does not support breeding habitat for the species. Foraging habitats only.
Lophoictinia isura	Square-tailed Kite	V	-	Dual (Breeding)	-	Nest Trees	Included	-	-	Included	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint. Mapping of nest trees limited due to land access constraints. Presence of nests assumed within associated PCTs. The species was added as a candidate for the Snowy Mountains IBRA subregion based on the BioNet power query and an apparent inconsistency with the BAMC.

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
Ninox connivens	Barking Owl	V	-	Dual (Breeding)	-	Hollow bearing trees; Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	Included	Included	-	-	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint. Hollows of suitable size for breeding occur throughout at varying densities subject to land use.
Ninox strenua	Powerful Owl	V	-	Dual (Breeding)	-	Hollow bearing trees; Living or dead trees with hollow greater than 20 cm diameter	Included	Included	Included	Included	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint. Hollows of suitable size for breeding occur throughout at varying densities subject to land use.
Petroica rodinogaster	Pink Robin	V	-	Species	-	N/A	Included	Included	-	-	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint.
Polytelis swainsonii	Superb Parrot	V	V	Dual	-	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;	-	-	Included	Included	Included	-	**Included** Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
						greater than 4 m above ground or trees with a DBH of greater than 30 cm.							breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. Associated PCTs and habitat occur within the amended project footprint. Hollows of suitable size for breeding occur throughout at varying densities subject to land use. Many hollow-bearing trees are situated within a matrix of non-native vegetation.
Tyto novaehollandiae	Masked Owl	V	-	Dual (Breeding)	-	Hollow bearing trees; Living or dead trees with hollows greater than 20 cm diameter.	Included	Included	-	-	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint. Hollows of suitable size for breeding occur throughout at varying densities subject to land use.
Tyto tenebricosa	Sooty Owl	V	-	Dual (Breeding)	Yes (Breeding)	Caves; Caves or cliffines/ledges| Hollow bearing trees; Living or dead trees with hollows greater	-	Excluded	-	-	-	Included	**Included- Snowy Mountains only** Associated PCTs and habitat occurs within the Snowy Mountains IBRA

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
						than 20 cm diameter.							subregion only (excluded from Bungonia IBRA subregion as per section 5.2 of the BAM, Step 1). Hollows of suitable size for breeding occur throughout at varying densities subject to land use.
Mammals													
Cercartetus nanus	Eastern Pygmy-possum	V	-	Species	-	N/A	Included	Included	Included	Included	Included	Included	**Included** Associated TECs and habitat occurs within the amended project footprint. Two individuals identified within the amended project footprint in Murrumbateman IBRA subregion, and another individual was identified within the Snowy Mountains.
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Species	Yes (Breeding)	Cliffs; Within two km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two km of old mines or tunnels.	-	Included	-	-	Included	-	**Included** Associated PCTs and habitat occurs within the amended project footprint. Species found mainly in areas with extensive cliffs and caves. Roosts in caves (near their

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													entrances), crevices in cliffs, frequenting low to mid-elevation dry open forest and woodland close to these features. Potential Karst and/ or cliffline habitats were mapped in proximity (ie <500m) to the amended project footprint within the Bungonia and Inland Slopes subregions. No individuals have been detected during acoustic or trapping surveys carried out within potential habitats.
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	Species	-	Requires dense ground cover in a variety of habitats.	-	Excluded	-	-	-	-	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) The species is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges.
Mastacomys fuscus	Broad-toothed Rat	V	V	Species	-	N/A	-	-	-	-	-	Included	**Included**

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													One record from 2004 approximately 100m west of the Snowy Mountains amended project footprint. Associated PCTs and habitat occurs within the amended project footprint.
Miniopterus australis	Little Bent-winged Bat	V	-	Dual	Yes (Breeding)	Caves; Cave, tunnel, mine, culvert or other structure 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.	-	Excluded	-	-	-	-	**Excluded- no known roosts and potential habitats degraded** (as per section 5.2 of the BAM, Step 2 and 3) The species forages in moist eucalypt forest, and dry sclerophyll forests. Generally found in well-timbered areas. Often share roosting sites with the Large Bent-winged Bat. Associated PCTs within 100 m of potential roosts are degraded due to historic clearing (ie degraded grasslands).
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Dual	Yes (Breeding)	Caves: Cave, tunnel, mine, culvert, or other structure known or suspected to be used for	Excluded	Included	Excluded	Included	Included	Excluded	**Excluded – Potential breeding discounted via targeted surveys.** Seasonal migration

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
						breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500							patterns and maternity roosts for this species are well documented and suggest maternity roosts are unlikely to be found within the amended project footprint. A supplementary habitat modelling process was implemented to identify potential roosting/ staging sites. One area of potential breeding habitat was identified within the amended project footprint, based on the supplementary desktop mapping. The area of potential breeding habitat identified using supplementary habitat modelling was subsequently targeted via harp trapping surveys (Summer 2024), and was discounted as potential Large Bent- wingedBat breeding habitat.
Myotis macropus	Southern Myotis	V	-	Species	-	Hollow bearing trees; Within 200 m of	Included	Included	-	Included	Included	-	**Included**

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
						riparian zone| Bridges, caves, or artificial structures within 200 m of riparian zone| Waterbodies; rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200 m of the site							Potential habitat includes associated PCTs within 200 m of any medium to large permanent creeks, rivers, lakes, or other waterways (ie with pools/ stretches 3 m or wider). Associated PCTs and habitat occurs within the amended project footprint.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Dual	-	Breeding camps	-	Excluded	Excluded	Excluded	Excluded	-	**Excluded** (as per section 5.2 of the BAM, Step 2) Grey-headed flying fox is a generalist, nomadic species that occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Associated PCTs and foraging habitat occurs within the amended project footprint. No breeding camps were recorded or are known to occur

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													within the amended project footprint.
Pseudomys fumeus	Smoky Mouse	CE	E	Species	Yes	N/A	Included	-	-	-	-	Included	**Included** In NSW there are 3 records from Kosciuszko National Park and 2 records adjacent to the park in Bondo and Ingebyra State forests. Associated PCTs and habitats are situated within the amended project footprint.
Petauroides volans	Greater Glider	E	E	Species	-	Hollow bearing trees	Included	Included	Included	Included	Included	Included	**Included** Utilise large trees with hollows (<50 m spaced) in patches of tall forest >5 ha in size for refuge, nesting and foraging. Associated PCTs and habitat occurs within the amended project footprint. Hollows of suitable size for breeding occur throughout at varying densities subject to land use.
Petaurus norfolcensis	Squirrel Glider	V	-	Species	-	N/A	Included	Included	Included	Included	Included	Included	**Included** Utilises large trees with hollows (<50 m spaced) for refuge, nesting and

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													foraging. May occur within mature Box-Ironbark woodlands, with abundant hollows and moderate to high connectivity within the amended project footprint.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Species	Yes	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	-	Excluded	-	-	Excluded	-	**Excluded** (as per section 5.2 of the BAM, Step 2) Patchily distributed along the Great Dividing Range, predominantly on the eastern scarp with known outlying populations at Warrumbungle Ranges and Mt Kaputar. One record from 1997 about 8km north of the amended project near Wombeyan Caves. Field survey confirmed an absence of suitable rocky habitats within the amended project footprint in proximity to the Tarlo River National Park. The species is considered vagrant within the Inland

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													Slopes due to a lack of records and poor connectivity to potential source populations (excluded as per section 5.2 of the BAM, Step 2).
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	Species	-	N/A	Included	Included	-	-	Excluded	Included	**Included** The Brush-tailed Phascogale has a patchy distribution, and in NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs, or leaf litter, however, can also be found in a range of habitats. Associated PCTs and habitat occurs within the amended project footprint. The species has been excluded from the Inland Slopes IBRA subregion due to the following geographic

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													constraint: "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".
Phascolarctos cinereus	Koala	E	E	Species	-	N/A	Included	Included	Included	Included	Included	Included	**Included** Associated PCTs and habitat occurs within the amended project footprint in all studied IBRA bioregions.
Potorous tridactylus	Long-nosed Potoroo	V	V	Species	-	Dense shrub layer or alternatively high canopy cover exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest)	-	Excluded	-	-	-	-	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Outside of known species range (vagrant).
Sminthopsis leucopus	White-footed Dunnart	V	-	Species	-	N/A	-	Excluded	-	-	-	-	**Excluded – Vagrant (**as per section 5.2 of the BAM, Step 2) No suitable habitat is present, and

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													known populations are isolated, to the east of the amended project footprint.
Reptiles													
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	Species	-	Rocky areas; Or within 50 m of rocky areas / South of Grabben Gullen (Cro); West of Dalton (Mur)	-	Included	Included	Included	Included	-	**Included** Associated PCTs and habitat occurs within the amended project footprint. These support varying amounts of surface rock.
Cyclodomorphus praealtus	Alpine She-oak Skink	E	E	Species	-	N/A	-	-	-	-	-	Included	**Included** In NSW, the Alpine She-oak Skink has only been observed within Kosciuszko National Park between Smiggin Holes and Kiandra. However, the amended project footprint supports potential habitat within native grassland /heath greater than 1200 m in elevation.
Delma impar	Striped Legless Lizard	V	V	Species	-	N/A	-	Excluded	Included	Included	Included	-	**Included** Populations of this species are known in the Goulburn, Yass, Queanbeyan, Cooma,

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													Muswellbrook and Tumut areas. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Associated PCTs and habitat occurs within the amended project footprint. Excluded from Bungonia – species expert
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Dual	Yes	Rocky areas; Including escarpments, outcrops and pogodas within the Sydney Sandstone geologies	-	Excluded	-	-	-	-	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Species excluded based on previous advice received from NSW DCCEEW, and no Sydney

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													sandstone geologies occur within the amended project footprint.
Liopholis guthega	Guthega Skink	E	E	Species	-	Granite substrate and decomposing granite soils. Rocky areas; Including sub-surface boulders	-	-	-	-	-	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) The Guthega Skink is highly restricted to locations above 1,600 m in the Australian Alps, in the vicinity of Mt Kosciuszko, NSW. Outside of known species range (vagrant).
Invertebrates													
Keyacris scurra	Key's Matchstick Grasshopper	E	E	Species	-		-	Included	Included	Included	Included	-	**Included** Key's Matchstick Grasshopper was originally distributed from Victoria to Orange (NSW) across the wheat/sheep belt. The species is typically recorded in native grasslands and grassy woodland. The species was recorded in the Murrumbateman IBRA subregion within moderate

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													condition PCT 280 (derived grassland).
Synemon plana	Golden Sun Moth	V	V	Species	-	Wallaby grass (*Rytidosperma* sp), Chilean Needle Grass (*Nassella nessiana*) or Serrated Tussock (*Nassella trichotoma*)	-	-	-	Included	Included	-	**Included** Suitable habitat occurs in the amended project footprint. Numerous BioNet records indicate the presence of a population within the Murrumbateman IBRA subregion region roughly centred on Yass and overlapping the amended project footprint at this locality. There is a single older record (2000) located north-east of Tumut and potential habitat is known to exist there.
Amphibians													
Crinia sloanei	Sloane's Froglet	V	E	Species	-	Semi-permanent/ephemeral wet areas; Containing relatively shallow sections with submergent and emergent vegetation, or within 500 m of wet area;Swamps; Within	-	-	-	-	Included	-	**Included** The species is typically associated with ephemeral, periodically inundated areas in grassland, woodland habitats. Associated PCTs and habitat occurs

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
						500 m of swamps; Waterbodies; Within 500 m of waterbody							within the amended project footprint.
Heleioporus australiacus	Giant Burrowing Frog	V	V	Species	-	N/A	-	Excluded	Excluded	-	-	-	**Excluded- Vagrant** (as per section 5.2 of the BAM, Step 2) The species is predominant restricted to coastal areas. The species is coastal, and reliant on Sydney sandstone geologies. No Sydney sandstone geologies occur within the amended project footprint and therefore the species has been excluded on that basis.
Litoria aurea	Green and Golden Bell Frog	E	V	Species	-	Semi-permanent/ephemeral wet areas; Within 1 km of wet areas; Swamps; Within 1 km of swamp; Waterbodies; Within 1 km of waterbody	-		Excluded	Excluded	-	-	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. The closest known population is within the Molonglo area. Whilst there are marginal habitats

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													within the amended project footprint, the species is considered vagrant due to poor connectivity with source populations and absence of confirmed records.
Litoria booroolongensis	Booroolong Frog	E	E	Species	-	N/A	Excluded	Excluded	Included	Excluded	Included	-	**Included** Suitable stream habitats intersect the amended project footprint within the Bondo, Crookwell and Inland IBRA subregions, as advised by NSW DCCEEW Booroolong Frog Habitat Mapping and supplementary advice (provided via email 15/11/2022). Habitats include rocky/cobble streams, with fringing vegetation cover such as ferns, sedges, or grasses within the amended project footprint. **Excluded – Vagrant** from Bondo, Bungonia and Murrumbateman IBRA subregions (as

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													per section 5.2 of the BAM, Step 2). NSW DCCEEW Booroolong Frog Habitat Mapping did not intersect these subregions.
Litoria castanea	Yellow-spotted Tree Frog	CE	CE	Species	Yes	N/A	-	-	Included	Included	-	Included	**Included** Suitable habitat in open dry sclerophyll forest with permanent streams, fringing vegetation, and rocky pooling habitats within the amended project footprint.
Litoria spenceri	Spotted Tree Frog	CE	CE	Species	Yes	Waterbodies; River environments with rocky habitat or with 500 m of rocky river	-	-	-	-	-	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) The Spotted Tree Frog is extremely rare and occurs in scattered, geographically isolated populations. No known populations are near the amended project footprint.
Litoria verreauxii alpina	Alpine Tree Frog	E	V	Species	-	Above 1000 m altitude	-	-	-	-	-	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) The species is restricted to elevations above

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													1000 m within Kosciuszko and adjacent State forest.
Mixophyes balbus	Stuttering Frog	E	V	Species	Yes	N/A	-	Included	-	-	-	-	**Included** Suitable wet sclerophyll forest habitat and permanent streams are situated within the Bungonia IBRA subregion portion of the amended project footprint. However, closest records are recorded near Ruby Creek in Blue Mountains.
Pseudophryne corroboree	Southern Corroboree Frog	CE	CE	Species	Yes	Swamps; Within 200 m of high montane and sub-alpine bog or ephemeral pool environments / Above 1000 m altitude	-	-	-	-	-	Included	**Included** The Southern Corroboree Frog is limited to sphagnum bogs of the northern Snowy Mountains, in a strip from the Maragle Range in the north-west, through Mt Jagungal to Smiggin Holes in the south. Its range is entirely within Kosciuszko National Park. Based on the species highly specific habitat

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status	SAII	Habitat/ Geographic constraints	IBRA subregion						Justification for inclusion/ exclusion
							BON [12]	BUN [13]	CRO [14]	MUR [15]	INL [16]	SNO [17]	
													requirements and endemic distribution (Kosciusko NP), the species is considered vagrant within the amended project footprint.
Pseudophryne pengilleyi	Northern Corroboree Frog	CE	CE	Species	Yes	Above 700 m altitude	-	-	-	-	-	Excluded	**Excluded – Vagrant** (as per section 5.2 of the BAM, Step 2) The species has been excluded as the amended project footprint does not intersect the species known distribution.
Endangered populations													
Petaurus norfolcensis- endangered population	Squirrel Glider in the Wagga Wagga LGA	E	-	Species	-	N/A	-	-	-	-	Included	-	**Included- Wagga Wagga LGA only** Suitable habitats are situated within the amended project footprint intersecting the Wagga Wagga LGA.
Petaurus australis- endangered population	Yellow-bellied Glider population on the Bago Plateau	E	-	Species	-	N/A	-	-	-	-	-	Included	**Included- Bago Plateau only** Suitable habitats occur within Bago State Forest and adjacent private lands.

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

7.3.3 Threatened fauna results

Targeted surveys were undertaken to inform the presence/ absence of candidate threatened fauna species within the amended project footprint. Details regarding field survey methods applied and a summary of survey effort are provided in Section 4.6. Two-hundred and seventy (270) native fauna species were recorded during the surveys across the six IBRA subregions comprising 15 frog, 158 bird, 49 mammal, 42 reptile, four invertebrate and two aquatic species. A list of fauna recorded within and/or adjacent to the amended project footprint is provided in Attachment 18, along with their relative abundance.

Of the 270 species recorded, 30 species are threatened species listed under the schedules of the BC Act and/or EPBC Act. The location of threatened fauna recorded during field surveys is shown in Figure 13-4 to Figure 13-7, Figure 13-9 to Figure 13-10, and Figure 13-12 (Attachment 5). Additional details regarding observations of threatened species throughout the amended project footprint are included in Attachment 18.

Of the 30 listed species recorded, 25 are ecosystem credit species (refer to Section 7.3.5), five are species credit species (candidate species) and three of the threatened species are identified as migratory species under the EPBC Act (refer to Table 11-5). Two species detected are also associated with endangered populations: Squirrel Glider and Yellow-bellied Glider.

No further assessment is required for ecosystem credit species as detailed further in Section 7.3.5. The presence and further assessment of migratory species under the EPBC Act is addressed in Section 11.6.

Table 7-6 presents the field survey results for candidate threatened fauna species, including the proportion of habitats excluded or confirmed through field survey and the remaining habitat extent for which species presence has been assumed or addressed through a species expert. Attachment 1 provides a detailed overview of the survey effort review and final species polygon development process undertaken to support the assessment outcomes. Six candidate fauna species were not subject to targeted surveys as detailed in Table 7-5. For most of the candidate species, surveying all areas of potential habitat/associated PCTs with sufficient effort to determine presence/absence from the whole amended project footprint was not possible.

Table 7-5: Candidate species not subject to targeted survey

Scientific name	Common name	SAII	Justification
Litoria booroolongensis	Booroolong Frog	-	Consultation with NSW DCCEEW indicated survey conditions were not favourable and species exclusion based on field survey was unlikely to be supported by NSW DCCEEW. Stream mapping for Booroolong Frog was provided by the DPE (DPE, 2023c) and the species was assumed present within these streams and adjacent riparian habitat.
Phascogale tapoatafa	Brush-tailed Phascogale	-	The species is very difficult to detect by means of field survey. Consultation with NSW DCCEEW suggested the most suitable survey method is baited arboreal Elliot traps. This survey method was not considered feasible on a large-scale, due to the exhaustive amount of survey effort required, and the likely low detection rates.
Cyclodomorphus praealtus	Alpine She-oak Skink	-	This species is highly cryptic and has a very limited geographic extent. Surveys require active searches of grass tussocks preferred by the species. This was not considered feasible to deploy, particularly given the variable survey conditions over the duration of the field campaign.

Scientific name	Common name	SAII	Justification
Keyacris scurra	Key's Matchstick Grasshopper	-	Species expert engaged. Species was not listed until later in the assessment process.
Synemon plana	Golden Sun Moth	-	BDAR surveys coincided with two poor flying seasons for Golden Sun Moth in 2021 and 2023. For this reason, species presence/ absence could not be confidently determined by means of targeted survey and a species expert was instead engaged.
Delma impar	Striped Legless Lizard	-	Species expert engaged.

A total of 4,795.50 hectares (24%) of potential habitat for threatened fauna and 435.17 hectares (57%) of potential habitat for endangered populations was sufficiently surveyed across the amended project footprint and excluded from the assessment. All potential habitats for Southern Corroboree Frog (*Pseudophryne corroboree*) were excluded. Habitat for several other candidate fauna was also adequately surveyed within some IBRA subregions and/ or vegetation formations and excluded completely from the species polygon. The candidate fauna species and populations documented above were confirmed to occupy approximately 2,759.47 hectares (19%) of potential habitat. 47% of the remaining 14,914.49 hectares of potential habitats within the amended project footprint is subject to an expert report. Species subject to an expert report are noted in Table 7-6 below. The 6,410.16hectares of habitat where candidate species have been assumed present includes:

- potential breeding habitat for hollow-dependent dual credit species (i.e. cockatoos, Superb Parrot) that was not surveyed to confirm the presence/ absence of breeding activities. As such, breeding habitats are assumed present for these dual credit species based on the presence of breeding habitat constraints.
- habitats where the total survey effort fell short of BAM survey guidelines requirements (ie insufficient survey replicates or unsuitable timing) but for which the species is considered unlikely to occur.
- habitats where survey access was not possible and fauna habitat constraints, such as surface rock and tree hollows, were assumed present but may not actually occur.
- severely burnt habitats where survey effort could not be considered for some candidate fauna species (Attachment 19).
- habitats for which some species are considered unlikely to occur, as detailed in Table 7-6.

A total of 603.43 hectares (72%) of potential habitat for candidate SAII fauna was adequately surveyed and excluded from the assessment. Approximately 230.49 hectares of potential habitat for five candidate SAII fauna species remains subject to the assessment including 89.64 hectares (39%) assumed present and 140.85 hectares (61%) addressed through an expert report (Table 7-6). Information required to assess SAII is detailed in Attachment 17 with a summary provided in Section 13.6.

Table 7-6: Threatened fauna species confirmed, assumed present or excluded through field survey

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded- field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Frogs													
Crinia sloanei	Sloane's Froglet	V	E	-	PCT 5, 9997 (waterbodies)	Inland Slopes	3.56	0.00[18]	0.00	0.00	3.56	3.56	Sloane's Froglet has not been recorded in the amended project footprint but is considered likely to occur based on indicative mapping and habitat assessments.
Litoria booroolongensis	Booroolong Frog	E	E	-	PCT 280, 290, 1330, 9997 (waterbodies)	Crookwell	1.82	0.00	0.00	0.00	1.82	1.82	Booroolong Frog has not been recorded in the amended project footprint but is considered likely to occur based on NSW DCCEEW stream mapping and agency consultation.
						Inland Slopes	2.09	0.00	0.00	0.00	2.09	2.09	
Litoria castanea	Yellow-spotted Tree Frog	CE	E	Yes	PCT 335, 939, 1256, 9997 (waterbodies)	Crookwell	5.42	0.00	0.00	0.00	5.42	5.42	Yellow-spotted Tree Frog was not recorded in the amended project footprint. Species has low likelihood of occurrence within Crookwell and Snowy Mountains IBRA subregions
						Murrumbateman	0.27	0.27	0.00	0.00	0.00	0.00	
						Snowy Mountains	1.63	0.00[18]	0.00	0.00	1.63	1.63	
Mixophyes balbus	Stuttering Frog	E	V	Yes	PCT 870, 1097, 1107, 1150	Bungonia	63.43	4.58	0.00	0.00	58.85	58.85	Stuttering Frog was not recorded in the amended project footprint. Suitable wet sclerophyll forest habitat and permanent streams occur within the Bungonia IBRA subregion however the closest historic records are within the Blue Mountains (about 40 km north).

[18] Where 0.00 ha is listed in the *Excluded field survey* column, this does not mean the species was not subject to survey. Rather it means that survey effort requirements were not met and a species polygon reduction could not be applied. Please refer to section 2.6 of Attachment 1 for further details regarding actual survey effort carried out in comparison to survey guideline requirements.

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded- field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Pseudophryne corroboree	Southern Corroboree Frog	CE	CE	Yes	PCT 679 and 1196	Snowy Mountains	30.57	30.57	0.00	0.00	0.00	0.00	Southern Corroboree Frog was not recorded in the amended project footprint and survey effort was sufficient to confirm species absence. The known range of the species is limited to Kosciuszko National Park (nearest known location is approximately 12 km from the amended project footprint).
Birds													
Burhinus grallarius	Bush Stone-curlew	E	-	-	PCT 5, 266, 277, 280, 287, 290, 343, 352 and 1330	Inland Slopes	394.42	39.24	0.00	0.00	355.18	355.18	The species is assumed present over a portion of the amended project footprint due to survey limitations. However, the species is considered to have a low likelihood of occurrence as there is generally low levels of woody debris within associated PCTs.
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	-	PCT 5, 266, 268, 277, 278, 280, 283, 287, 290, 294, 294, 299, 300, 314, 316, 322, 343, 349, 351, 352, 638, 679, 727, 731, 870, 52, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196 and 1330	Bondo	98.82	0.00[18]	98.82	0.00	0.00	98.82	The Gang-gang Cockatoo is known to occur within the amended project footprint in all IBRA subregions impacted, with multiple species sightings and suitable foraging and potential nesting habitat recorded. Breeding pairs were also identified in Bungonia, with breeding habitat likely nearby. Recorded- 18 individuals within PCT 295, 299, 638 and Non-native
						Bungonia	138.83	0.00[18]	138.83	0.00	0.00	138.83	Recorded- 44 individuals within PCT 1093, 1150, 1330 and Non-native

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
						Crookwell	199.08	0.00[18]	183.07	0.00	16.01	199.08	Recorded- 27 individuals within PCT 679, 727, 731, 1151, 1330 and Non-native
						Inland Slopes	744.22	0.00[18]	679.54	0.00	64.68	744.22	Recorded- 19 individuals within PCT 268, 277, 280 and 316
						Murrumbateman	283.91	0.00[18]	283.91	0.00	0.00	283.91	Recorded - 16 individuals within PCT 349, 1330 and Non-native
						Snowy Mountains	551.83	0.00[18]	551.83	0.00	0.00	551.83	Recorded- 80 individuals within PCT 300, 638, 679, 953, 1196 and Non-native
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	V	-	PCT 266, 290, 322, 343, 731, 870, 1093, 1097, 1107, 1150, 1151, 1191 and 1330	Bungonia	141.26	2.73	32.92	0.00	105.61	138.53	The Glossy Black-Cockatoo is known to occur in the amended project footprint in Bungonia and has a high likelihood of occurrence in Inland Slopes. The species has been assumed present within Crookwell, and Murrumbateman IBRA subregions due to survey limitations. Recorded- 6 individuals within PCT 1150
						Crookwell	67.03	0.00[18]	0.00	0.00	67.03	67.03	
						Inland Slopes	8.44	0.00	0.00	0.00	8.44	8.44	
Haliaeetus leucogaster	White-bellied Sea-eagle	V	-	-	PCT 5, 85, 266 277, 280, 283, 278, 287, 290, 299, 314, 316, 352, 679, 953, 1191 and 1330	Bondo	2.07	0.00	0.00	0.00	2.07	2.07	There is a moderate likelihood that the species may occur within the Bondo IBRA subregion portion of the amended project footprint. There are 8 BioNet records within the broader IBRA subregion.
						Crookwell	0.04	0.00	0.00	0.00	0.04	0.04	The species has been recorded in Murrumbateman and Inland Slopes IBRA subregions and is assumed present within portions of the amended project footprint due to survey limitations. The species is considered likely to occur.
						Inland Slopes	8.57	0.00	0.72	0.00	7.85	8.57	One individual recorded in Inland Slopes IBRA region within PCT 266

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
						Murrumbateman	0.32	0.17	0.02	0.00	0.14	0.15	One individual was recorded in Murrumbateman within PCT 1330
Hieraaetus morphnoides	Little Eagle	V	-	-	PCT 5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 296, 297, 299, 300, 301, 306, 314, 316, 322, 335, 343, 349, 351, 352, 638, 679, 727, 731, 870, 939, 952, 953, 1093, 1097, 1107, 1150, 1191, 1196 and 1330	Bondo	16.14	0.00	0.00	16.14	0.00	16.14	The species is known to occur within Inland Slopes and Murrumbateman IBRA subregions. The species has been assumed present across a portion of the amended project footprint due to survey limitations. Breeding habitat for the species is considered likely to occur due to its broad nesting preferences. Recorded Inland Slopes- 2 individuals within Non-native Recorded Murrumbateman- 4 individuals within PCT 287, 352 and 1330
						Bungonia	5.49	0.00	0.00	5.49	0.00	5.49	
						Crookwell	2.10	0.00	0.00	2.10	0.00	2.10	
						Inland Slopes	17.09	0.00	0.00	17.09	0.00	17.09	
						Murrumbateman	0.88	0.00	0.25	0.63	0.00	0.88	
						Snowy Mountains	214.31	0.00	0.00	214.31	0.00	214.31	
Lophoictinia isura	Square-tailed Kite	V	-	-	PCT 5, 266, 268, 277, 278, 280, 283, 287, 290, 294, 322, 352, 731, 953 and 1093	Bondo	4.00	0.00	0.00	4.00	0.00	4.00	The species is known to occur within Inland Slopes and Murrumbateman IBRA subregions. The species has been assumed present across a portion of the amended project footprint due to survey limitations. Breeding habitat for the species is considered likely to occur due to its broad nesting preferences.
						Inland Slopes	11.54	0.00	0.00	11.54	0.00	11.54	
						Murrumbateman	0.03	0.00	0.00	0.03	0.00	0.03	
						Snowy Mountains	84.18	0.00	0.00	84.18	0.00	84.18	
Ninox connivens	Barking Owl	V	-	-	PCT 5, 266, 268, 277, 278, 280, 283, 290, 295, 314, 343, 638, 870, 953,	Bondo	23.11	0.00	0.00	23.11	0.00	23.11	The species was recorded in Snowy Mountains IBRA subregion and is assumed present over a portion of the amended project footprint due to survey limitations. Potential breeding
						Bungonia	134.36	0.00	0.00	134.36	0.00	134.36	
						Inland Slopes	481.18	0.00	0.00	481.18	0.00	481.18	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
					1093, 1097, 1107, 1150, 1191 and 1330	Snowy Mountains	398.88	0.00	26.79	372.09	0.00	398.88	habitat is considered likely to occur where suitable nest trees are present or likely to be present. Recorded Snowy Mountains- 1 individual within Non-native
Ninox strenua	Powerful Owl	V	-	-	PCT 5, 283, 287, 290, 295, 300, 314, 351, 352, 638, 727, 731, 870, 953, 1093, 1097, 1107, 1150, 1151, 1191 and 1330	Bondo	21.35	0.00	0.00	21.35	0.00	21.35	The species was recorded in Bungonia and Inland Slopes IBRA subregions and is assumed present over a portion of the amended project footprint due to survey limitations. Potential breeding habitat is considered likely to occur where suitable nest trees are present or likely to be present. Recorded Bungonia- 1 individual within PCT 1330 Recorded Inland Slopes- 1 individual within derived PCT 268
						Bungonia	124.24	0.00	20.07	104.17	0.00	124.24	
						Crookwell	98.77	98.77	0.00	0.00	0.00	0.00	
						Inland Slopes	107.48	0.07	0.00	107.41	0.00	107.41	
						Murrumbateman	156.35	0.00	0.00	156.35	0.00	156.35	
						Snowy Mountains	442.36	0.00	0.00	442.36	0.00	442.36	
Petroica rodinogaster	Pink Robin	V	-	-	PCT 299, 300, 638, 679, 953, 1097, 1107, 1150, 1191 and 1196	Bondo	36.06	0.00[18]	0.00	0.00	36.06	36.06	The Pink Robin is assumed present over a portion of the amended project footprint due to survey limitations and is considered likely to be present.
						Bungonia	25.58	22.85	0.00	0.00	2.73	2.73	
						Inland Slopes	0.69	0.00	0.00	0.00	0.69	0.69	
						Snowy Mountains	131.96	50.22	0.00	0.00	81.74	81.74	
Polytelis swainsonii	Superb Parrot	V	V	-	PCT 5, 266, 277, 278, 280, 283, 322, 343, 349, 352, 1330 and Non-native	Bondo	0.41	0.00	0.00	0.00	0.41	0.41	The Superb Parrot is known to occur within the amended project footprint in the Murrumbateman and Inland Slopes IBRA subregions, with suitable foraging and potential nesting habitat occurring in grassy box woodland. It also has a moderate likelihood of occurrence in
						Crookwell	92.95	0.00[18]	0.00	0.00	92.95	92.95	
						Inland Slopes	458.39	0.00[18]	40.94	0.00	417.44	458.39	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
						Murrumbateman	207.11	0.00[18]	20.71	0.00	186.40	207.11	Bondo and Crookwell as a forager, with suitable open woodland habitats occurring. Recorded Inland Slopes- 11 individuals within PCT 277 and 343. Recorded Murrumbateman- 5 individuals within PCT 1330 and Non-native
Tyto novaehollandiae	Masked Owl	V	-	-	PCT 266, 277, 280, 290, 294, 638, 870, 953, 1093, 1097, 1107, 1150, 1191 and 1330	Bondo	16.74	0.00	0.00	16.74	0.00	16.74	Recorded- 5 individuals within PCT 1330 and Non-native
						Bungonia	31.33	0.00	0.00	31.33	0.00	31.33	
						Inland Slopes	213.58	0.00	0.00	213.58	0.00	213.58	
						Snowy Mountains	399.55	0.00	0.00	399.55	0.00	399.55	
Tyto tenebricosa	Sooty Owl	V	-	Yes	PCT 638		13.17	0.00	0.00	13.17	0.00	13.17	The species is assumed present over a portion of the amended project footprint due to survey limitations. Potential breeding habitat is considered likely to occur where suitable nest trees are present or likely to be present.
						Snowy Mountains	127.68	0.00	0.00	127.68	0.00	127.68	
Insects													
Keyacris scurra	Key's Matchstick Grasshopper	E	E	-	PCT 266, 277, 278, 283 and 1330	Crookwell	329.96	0.00	0.00	329.96	0.00	329.96	Key's Matchstick Grasshopper was opportunistically detected in the Murrumbateman IBRA subregion. 8 individuals were recorded within PCT 280. Species presence is likely within
						Inland Slopes	696.83	0.00	0.00	696.83	0.00	696.83	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
						Murrumbateman	577.22	0.00	10.59	566.64	0.00	577.22	mapped habitats as determined by a species expert.
Synemon plana	Golden Sun Moth	V	V	-	PCT 266, 277, 352 and 1330	Inland Slopes	92.28	0.00	0.00	92.28	0.00	92.28	Likely within mapped habitats as determined by a species expert.
						Murrumbateman	164.04	0.00	0.00	164.04	0.00	164.04	
Mammals													
Cercartetus nanus	Eastern Pygmy-possum	V	-	-	PCT 268, 277, 280, 283, 285, 287, 290, 294, 295, 97, 299, 300, 314, 349, 352, 638, 727, 731, 952, 1093, 1097, 1107, 1150, 1151, 1191, 1196 and 1330	Bondo	101.51	29.04	0.00	0.00	72.46	72.46	Recorded Murrumbateman- 2 individuals within PCT 280 and 1093. Recorded Snowy Mountains- 17 individuals within PCT 638, 953 and 1196
						Bungonia	125.38	0.00	0.00	0.00	125.38	125.38	
						Crookwell	220.11	0.00	0.00	0.00	220.11	220.11	
						Inland Slopes	478.97	478.97	0.00	0.00	0.00	0.00	
						Murrumbateman	217.61	0.00	4.12	0.00	213.49	217.61	
						Snowy Mountains	535.39	249.78	57.97	0.00	227.64	285.61	
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Yes	PCT 1093 and 1330	Bungonia	67.96	67.96	0.00	0.00	0.00	0.00	No individuals or roosting sites were recorded within the amended project footprint during targeted surveys. The Large-eared Pied Bat has a medium likelihood of occurrence in the Bungonia IBRA subregion due to the presence of suitable foraging habitats and multiple species records. Foraging habitats have

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
						Inland Slopes	20.18	9.61	0.00	0.00	10.57	10.57	been assumed within 2 km of mapped potential karst and cliff lines, due to survey limitations. No breeding habitats occur within the amended project footprint.
Mastacomys fuscus	Broad-toothed Rat	V	V	-	PCT 679	Snowy Mountains	23.45	18.32	0.00	0.00	5.13	5.13	The Broad-toothed Rat has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence. The species has been assumed present over a portion of the amended project footprint due to survey limitations.
Myotis macropus	Southern Myotis	V	-	-	PCT5, 299, 349, 352, 870, 1107, 191 and 1330	Bondo	45.08	0.00[18]	0.00	0.00	45.08	45.08	The species has been recorded within Bungonia, Crookwell Inland Slopes and Murrumbateman IBRA subregions and is assumed present across a portion of the amended project footprint due to survey limitations. The species was not a candidate for the Crookwell region but has been added as it was confirmed to occur through field survey. The species is considered likely to occur across the extent of habitats for which presence is assumed. Recorded Bungonia- 21 passes within PCT 1150 and 1330 Recorded Crookwell- 6 passes within Non-native Recorded Inland Slopes- 127 passes within PCT 266, 268, 277 and 278
						Bungonia	137.70	0.00[18]	54.10	0.00	83.60	137.70	
						Crookwell	0.25	0.00	0.25	0.00	0.00	0.25	
						Inland Slopes	48.93	6.44	18.52	0.00	23.97	42.49	
						Murrumbateman	276.06	0.00[18]	25.42	0.00	250.64	276.06	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
													Recorded Murrumbateman- 14 passes within PCT 280, 352 and 731
Petauroides volans	Southern Greater Glider	E	E	-	PCT 299, 300, 316, 351, 638, 727, 870, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196 and 1330	Bondo	27.54	6.54	0.87	0.00	20.12	20.99	The Greater Glider is known to occur within the amended project footprint in the Bondo, Bungonia and Snowy Mountains IBRA subregions in high condition, mature remnants. It also has a moderate likelihood of occurrence in the Crookwell, Inland Slopes and Murrumbateman IBRA subregions in intact remnants, with moderate to high connectivity. Recorded Bondo- 18 individuals within PCT 300 and Non-native Recorded Bungonia - 2 individuals within PCT 1107 and 1150 Recorded Snowy Mountains- 14 individuals within PCT 300, 638, 953 and Non-native
						Bungonia	127.51	78.92	47.5	0.00	1.1	48.59	
						Crookwell	98.47	98.47	0.00	0.00	0.00	0.00	
						Inland Slopes	49.39	0.00	0.00	0.00	49.39	49.39	
						Murrumbateman	117.19	117.19	0.00	0.00	0.00	0.00	
						Snowy Mountains	531.02	213.22	148.06	0	169.74	317.80	
Petaurus australis	Yellow-bellied Glider population on the Bago Plateau	E	-	-	PCT 638	Bondo	26.24	0.00	0.64	0.00	25.59	26.24	Recorded- 10 individuals within PCT 638, 679, 953 and Non-native The population was recorded within the amended project footprint in Bago State Forest.
						Snowy Mountains	531.03	204.22	170.22	0.00	156.59	326.81	
Petaurus norfolcensis	Squirrel Glider	V	-	-	PCT 5, 266, 268, 277, 278, 280, 283, 287, 290, 294, 314, 316, 322, 343, 349, 351, 352,	Bondo	25.11	9.54	0.00	0.00	15.56	15.56	The species has been recorded in the amended project footprint. Recorded Crookwell- 3 individuals within PCT 1151 Recorded Inland Slopes- 2 individuals within PCT 268 and 277
						Bungonia	137.41	137.41	0.00	0.00	0.00	0.00	
						Crookwell	218.43	174.40	44.03	0.00	0.00	44.03	
						Inland Slopes	751.82	608.24	27.56	0.00	116.02	143.58	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
					731, 870, 953, 1093, 1150, 1151 and 1330	Murrumbateman	328.39	297.98	30.41	0.00	0.00	30.41	Recorded Murrumbateman- 3 individuals within PCT 283 and Non-native Recorded Snowy Mountains- 1 individual within PCT 1196
						Snowy Mountains	273.96	205.61	4.66	0.00	63.69	68.35	
Petaurus norfolcensis	Squirrel Glider in the Wagga Wagga Local Government Area	E	-	-	PCT 5, 266, 277, 278, 280, 319, and 343	Inland Slopes	208.22	116.72	27.56	0.00	63.94	91.50	The species has been assumed present in portions of the amended project footprint due to survey limitations. The species is considered likely to be present in areas of assumed presence.
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	-	PCT 638 and 953	Bondo	13.17	0.00	0.00	0.00	13.17	13.17	The species is considered likely to be present in Snowy Mountains IBRA subregion, but considered unlikely to occur in the Bungonia or Bondo IBRA subregions.
						Bungonia	91.40	0.00	0.00	0.00	91.40	91.40	
						Snowy Mountains	398.17	0.00	0.00	0.00	398.17	398.17	
Phascolarctos cinereus	Koala	E	E	-	PCT 5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 296, 297, 299, 300, 301, 306, 314, 316, 322, 335, 343, 349, 351, 352, 638, 679, 727, 731, 870, 939, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196 and 1330	Bondo	101.66	0.00[18]	0.00	0.00	101.66	101.66	The species was not recorded during field surveys but is considered likely to occur based on the high number of local records and the occurrence of Koala feed tree species.
						Bungonia	144.13	95.98	0.00	0.00	48.15	48.15	
						Crookwell	259.84	0.00[18]	0.00	0.00	259.84	259.84	
						Inland Slopes	821.73	0.00[18]	0.00	0.00	821.73	821.73	
						Murrumbateman	338.54	0.00[18]	0.00	0.00	338.54	338.54	
						Snowy Mountains	555.37	0.00[18]	0.00	0.00	555.37	555.37	
		CE	E	Yes		Bondo	13.17	0.00	0.00	0.00	13.17	13.17	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Pseudomys fumeus	Smoky Mouse				PCT 638, 953 and 1196	Snowy Mountains	490.44	490.44	0.00	0.00	0.00	0.00	Smoky Mouse was not recorded in the amended project footprint, however the species has been assumed present over a portion of the amended project footprint due to survey limitations. The species is considered to have a moderate likelihood of occurrence.
Reptiles													
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	-	PCT 266, 277, 278, 280, 283, 290, 294, 319, 322, 351, 731, 1191 and 1330	Bungonia	69.63	0.00[18]	0.00	0.00	69.63	69.63	Pink-tailed Legless Lizard was recorded in the Murrumbateman IBRA subregion (7 individuals within PCT 1330). The species has been assumed present in Bungonia, Crookwell and Inland Slopes IBRA subregions due to survey limitations and is considered likely to occur.
						Crookwell	107.37	0.00[18]	0.00	0.00	107.37	107.37	
						Inland Slopes	763.84	683.92	0.00	0.00	79.92	79.92	
						Murrumbateman	466.50	430.35	36.15	0.00	0.00	36.15	
Cyclodomorphus praealtus	Alpine She-oak Skink	E	E	-	PCT 679 and 1196	Snowy Mountains	107.42	0.00[18]	0.00	0.00	107.42	107.42	The species has not been recorded in the amended project footprint. The species has been assumed present in Snowy Mountains IBRA subregion due to survey limitations, but is considered to have a low likelihood of occurrence. Based on consultation with NSW DCCEEW, the species is unlikely to occur west of Maragle at elevations less than 1200 m elevation. Given this, the amended project footprint is considered outside of the known range of the species.
		V	V	-		Crookwell	179.09	0.00	0.00	179.09	0.00	179.09	

Scientific name	Common name	BC Act Status *	EPBC Act Status*	SAII	Associated PCTs	IBRA subregion	Potential habitat (ha)	Excluded-field survey (ha)[18]	Recorded field survey (ha)	Species expert report (ha)	Assumed present (ha)	Final habitat extent (ha)	Notes
Delma impar	Striped Legless Lizard				PCT 277, 1330 and Non-native	Inland Slopes	339.86	0.00	0.00	339.86	0.00	339.86	The species has not been recorded in the amended project footprint. The species has been assumed present in Bungonia, Crookwell, Inland Slopes and Murrumbateman IBRA subregions due to assumed presence of suitable habitat.
						Murrumbateman	366.13	0.00	0.00	366.13	0.00	366.13	

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

7.3.4 Expert reports

An expert report has been prepared to inform the assessment and delineation of species polygons for the Golden Sun Moth, Striped Legless Lizard, Key's Matchstick Grasshopper and owls and raptors. A summary of the proposed approach to the expert reports are presented below. Expert reports were used for these species as they are considered likely to occur in the amended project footprint, however are species that are onerous to survey as per the guidelines over a large survey area, such as the amended project footprint. Additionally, poor flying seasons for Golden Sun Moth resulted in low detection rates across multiple seasons. A species polygon mapped from available records would have underestimated the extent of the species within the amended project footprint.

Golden Sun Moth

Alison Rowell (NSW DCCEEW approved expert on Golden Sun Moth (*Synemon plana*)) was commissioned to prepare an expert report on Golden Sun Moth for the HumeLink project (Attachment 14).

The expert report reviewed floristic and condition score data from relevant BAM plots within potentially suitable Golden Sun Moth habitat within the amended project footprint to identify species polygon requirements for the species. The plot data was reviewed against data obtained from the point intercept 100 metre Golden Sun Moth habitat assessment transects that have been conducted in a sample of areas of the amended project footprint that were identified as suitable or unsuitable habitat. A spatial representation of a sub-set of the existing Golden Sun Moth habitat data was field validated with the aim of visiting enough replicates to substantiate the dataset. The field validation site selection was conducted based on several geographical justifications. Such justifications included:

- sites within closest proximity to BioNet Atlas records of Golden Sun Moth sightings
- private properties where land access could be facilitated
- areas containing relevant PCTs in suitable condition
- low lying but well-drained grasslands in association with waterways (e.g. potential primary grasslands)
- sites which could be easily accessed
- sites supporting a mix of suitable and unsuitable grasslands, based on the Golden Sun Moth habitat assessment results.

Incorporating these factors, a range of sites were chosen across the amended project footprint to better understand the distribution of suitable habitat and substantiate the existing Golden Sun Moth transect data.

A set of parameters indicating the potential for habitat to support Golden Sun Moth populations were developed based on Alison Rowell's knowledge (Table 7-7). These parameters were cross-referenced with BAM floristics and survey data within likely areas of habitat to generate species polygons for the Golden Sun Moth. Areas of potential Golden Sun Moth habitat were identified by means of the following mapping process and incorporating the criteria outlined in Table 7-7:

- associated PCTs occurring within the Murrumbateman and Inland Slopes IBRA subregions
- excluding lands supporting unsuitable land uses (ie cropping, horticulture, pasture improvement)
- excluding grassy ground layer of forest or dense woodland communities (ie subject to shading)
- excluding grasslands with unsuitable floristics based on the review of field-based plot and habitat transect data (Table 7-7)

- excluding grasslands with no bare ground, high litter or exotic broadleaf cover.

Table 7-7: Parameters for identifying potential Golden Sun Moth habitats

Criteria	Potential Golden Sun Moth habitat
Land use	• Habitat excludes unsuitable land uses based on cross reference with NSW Land use 2017 (NSW DCCEEW, 2019b) layer and aerial photo interpretation. This includes lands subject to ploughing, cropping, recent/ frequent superphosphate application or pasture improvement resulting in continuous cover of pasture species such as Phalaris, Lolium, and Subterranean Clover.
Shading	• Grasslands and woodlands supporting less than 10 percent canopy or midstorey cover.
Floristics	• Patch does not support dense cover of negative indicator species such as *Microlaena stipoides* or *Themeda triandra*, or species associated with forest or dense woodland communities such as *Rytidosperma pallidum, Austrostipa densiflora, Wahlenbergia stricta, Lomandra multiflora, L. longifolia, Hardenbergia violacea, Dianella revoluta, Cheiranthera* and *Patersonia sp*. • Patch supports more than 10% cover suitable larval food plants such as *Rytidosperma carphoides, R. auriculatum, R. laeve, Austrostipa bigeniculata* and *A. scabra. R. caespitosum, R. setaceum, R. erianthum, R. racemosum* and *Bothriochloa macra.* • Patch contains native forbs associated with Natural Temperate Grasslands.
Bare ground/ litter cover/ exotic broadleaf	• Greater than 3% bare ground • Less than 25% litter cover • Less than 10% exotic broadleaf cover

See Attachment 14 for the Golden Sun Moth Expert Report, including detailed methods, results, discussion of impacts and recommendations.

Striped Legless Lizard

Robert Spiers of Capital Ecology (NSW DCCEEW approved expert on Striped Legless Lizard *Delma Impar*) was commissioned to prepare an expert report on Striped Legless Lizard for the HumeLink project (Attachment 20, Capital Ecology 2024).

The primary habitat of *D. impar* has been broadly described as naturally treeless lowland grassland dominated by native, perennial, tussock-forming grass, particularly Kangaroo Grass *Themeda triandra*, Wallaby Grasses *Rytidosperma* spp., and Speargrasses *Austrostipa* spp. Although *D. impar* is largely restricted to areas that are (or were) lowland natural temperate grassland, the species has also been recorded in derived/secondary grassland (that derived from clearing of woodland or dry forest). However, all records of *D. impar* in derived/secondary grasslands in the ACT and east of the Murrumbidgee River in NSW are within one kilometre of the estimated 1750 natural grassland extent (ACT Wildlife Atlas). Thus, while *D. impar* may occupy open grassy woodland PCTs, and in particular derived grasslands of such PCTs, the substantial available evidence strongly suggests that in the eastern portion of the species' Extent of Occupation (EOO) (i.e. east of the Murrumbidgee River), the occurrence beyond the 1750 grassland-woodland ecotone is limited to a conservative maximum of two kilometres.

Confirmed records in the Adelong to Tumut region, together with the recent record at Cavan, occur in locations that at least 10 kilometres from any area that supports, or is likely to have once supported, a broad treeless grassland plain. Such a distance is beyond that which any current or historical connection to this habitat type can be deemed to be determinate for the occurrence of the species in those localities. Accordingly, it is reasonable to consider the open grassy woodlands in the localities where *D. impar* has been recorded west of the Murrumbidgee River to be the primary habitat for the species in these localities.

This potential for occurrence in woodland PCTs in the west of species' geographical distribution and in woodland PCTs where they adjoin grasslands in the east is the basis for *D. impar* being identified as a 'candidate species' under the BAM for many of the woodland PCTs that occur in this area.

Whilst lowland natural temperate grasslands and open grassy woodlands are considered the primary habitat of *D. impar*, the species has also been recorded in many former grassland sites that are now dominated by exotic grasses, notably the tussock forming species Phalaris, Cocksfoot, and Serrated Tussock *Nassella trichotoma*. The presence of a defined tussock structure with sufficient herbage mass may be more important to the species' persistence at a site than floristic composition and diversity. This is reflected in the fact that *D. impar* has not been recorded where the tussock structure (of native and/or exotic grasses) has been lost, such as in sites that have undergone past cultivation/ploughing, and those where the tussock structure has been lost due to prolonged high stocking rates. In addition to extinguishing the *D. impar* population at the time, cultivation destroys the natural structure of the topsoil which appears to render the land unsuitable for *D. impar* for extended periods (ie the species has generally not been found to re-occupy previously cultivated land).

The key elements that define the likelihood that a given patch of grassland/pasture supports an extant population of *D. impar* are as follows:

- site location within the geographical distribution of the species (set as the EOO + 30 km)
- presence of natural temperate grassland and/or grassy woodland the PCT 1750 vegetation formation for the subject patch of grassland / derived grassland / pasture
- grassland/pasture with absence of cultivation/ploughing in the last approximately 20 years, either for cropping or pasture improvement. Note: many sites have been pasture improved via the spreading of superphosphate and/or exotic pasture species seed without cultivation (it is the soil profile modification from cultivation that appears to be the important deleterious element)
- presence of a defined tussock structure and moderate to high herbage mass of native and/or exotic grass species.

In accordance with the above, the *D. impar* species polygon has been prepared for the amended project footprint, as per Subsection 5.2.5 of the BAM. This layer has a total area of 1,194.68 hectares. It can be assumed with certainty that the *D. impar* species polygon layer provided represents a vast over exaggeration of the area of actual, extant habitat for the species in the subject land. The key reasons for this are detailed in Attachment 20.

Further steps that could be taken in order to reduce the layer include site inspections/habitat assessments to identify additional polygons for removal; or targeted tile roof surveys. However, the logistical difficulties and costs of these steps warrant careful consideration as part of any decision regarding whether to proceed with either step (.

Refer to Attachment 20 for the Striped Legless Lizard Expert Report, including detailed methods, results discussion of impacts and mitigation measures.

Key’s Matchstick Grasshopper

Prof Michael Kearney (NSW DCCEEW approved expert on Key’s Matchstick Grasshopper *Keyacris scurra*), and Hiromi Yagui (PhD candidate in School of BioSciences at The University of Melbourne, researching conservation success of matchstick grasshoppers including *Keyacris scurra*), were commissioned to provide an expert report on Key’s Matchstick Grasshopper for the HumeLink project (Yagui and Kearney 2024, Attachment 21).

Suitable habitat for *K. scurra* typically encompasses grassland and grassy woodland, characterized by Kangaroo Grass (*Themeda triandra*), that is not considered a food plant, alongside areas with everlasting daisies (*Chrysocephalum apiculatum*), Clustered Everlasting (*C. semipapposum*), and yellow buttons of the genus *Leptorhynchos* that provide food. Understanding the habitat preferences of the species is crucial for targeted survey efforts. Observing the presence of certain food plants or specific habitat features can serve as strong indicators of the species' presence in an area. Other known food plants are species of the genus Plantago (natives and introduced) and Acaena. Unfavourable habitat conditions encompass high levels of disturbance (e.g. mowed areas), absence of necessary resources (e.g. only Kangaroo grass but not food plants), or shadowy areas.

Key’s Matchstick Grasshopper had not historically been collected or observed within the amended project footprint until the incidental record of four individuals in Murrumbateman during Golden Sun Moth targeted surveys in October 2022. The species was recorded in good condition derived PCT 280. Targeted surveys were undertaken in November 2023 at 16 locations within the amended project footprint and did not detect any additional individuals of the Key’s Matchstick Grasshopper. Nevertheless, it is crucial to note that the absence of sightings should not be definitively interpreted as evidence of their absence.

Historically, Key’s Matchstick Grasshopper has been observed 40 kilometres from the amended project footprint, suggesting the species might once have occurred, or might still exist in the amended project footprint as unrecorded populations. Furthermore, records of plant groups known to be food and habitat for the grasshopper species have been identified around the amended project footprint, suggesting the possibility of an extant population.

The findings from the incidental fauna record, literature review, existing data analysis, and field surveys conducted in 2023 have confirmed the presence of potential habitat for Key's Matchstick Grasshopper within the amended project footprint.

The Key’s Matchstick Grasshopper species polygon from the EIS BDAR was formulated under the assumption of its presence within the associated PCTs in Bungonia, Crookwell, Murrumbateman, and the Inland Slopes IBRA subregions. This species polygon was provided to the species expert for review. The initial polygon (from the EIS BDAR) was approximately 2,187 hectares. To refine this species polygon from the EIS BDAR, a comprehensive analysis was conducted by considering both historical and current records of the Key’s Matchstick Grasshopper, along with suitable habitat records, which was utilised to construct a species distribution model, the outcome being the species polygon reduced to approximately 1,654 hectares. The majority of this habitat was classified as low-quality, characterized by small, discrete patches susceptible to degradation and fragmentation due grazing and pasture expansion.

See Attachment 21 for the Key’s Matchstick Grasshopper Expert Report, including detailed methods, results, discussion of impacts and mitigation measures.

Owls and Raptors

Dr Stephen Debus (NSW DCCEEW approved expert on Barking Owl, Little Eagle, Masked Owl, Square-tailed Kite, White-bellied Sea-Eagle; expert approval pending for Sooty Owl and Powerful Owl) was commissioned to prepare an expert report on the following candidate species (Attachment 22):

- Barking Owl *Ninox connivens*
- Little Eagle *Hieraaetus morphnoides*
- Masked Owl *Tyto novaehollandiae*
- Powerful Owl *Ninox strenua*
- Sooty Owl *Tyto tenebricosa*
- Square-tailed Kite *Lophoictinia isura*
- White-bellied Sea-Eagle *Haliaeetus leucogaster.*

Literature on the ecology of the seven target species, species distribution (including BioNet and Niche survey records of these species), habitat requirements, resource availability, interspecific tolerance and competition, home ranges and patch size considerations were reviewed in relation to the amended project footprint, to determine whether these species occur or are likely to occur in or near the amended project footprint and to further inform the species polygon development. Preliminary habitat mapping for target species was developed by Niche in accordance with the process and criteria outlined in Attachment 1. The preliminary mapping was supplied for review and to support the identification of further opportunities for species polygon mapping refinements based on expert knowledge.

A review of preliminary mapping indicated that the polygons for the target species were overly generous in the sparsely wooded sections of the central and eastern sections of the amended project footprint (east of Burrinjuck Dam), away from the large patches identified above, and in the western section from Maragle to Wagga Wagga. Given target species home ranges are unlikely to incorporate the use of small discontinuous habitat fragments throughout the amended project footprint, the following more realistic patch size thresholds were recommended by Stephen Debus to reduce the extent of mapped habitats for target species:

- The Square-tailed Kite on the Northern Tablelands and North-west Slopes is unlikely to nest in patches <100 ha where the matrix is heavily cleared, as in many parts of the amended project footprint. Therefore, a realistic breeding-habitat polygon would discount patches <100 ha and/or smaller patches (>5 ha) less than 1.5 km from a patch >100 ha.
- For the Little Eagle in such a cleared landscape as the amended project footprint, the average (not minimum) patch size for nest sites is most suitable, i.e. 76 ha not 5 ha, and for the landscape associated with the amended project footprint use a threshold of 100 ha and/or smaller patches (>5 ha) less than 1 km from patches >100 ha. A realistic breeding-habitat polygon would discount patches <100 ha and/or smaller patches (>5 ha) less than 1 km from a patch >100 ha.
- The Sooty Owl already has a threshold for breeding-habitat polygon of forest patches >100 ha in the amended project footprint. The same is recommended for the Masked, Powerful and Barking Owls, as these species are averse to habitat fragmentation and are not typically found in fragments <200 ha. Because Barking Owls are also associated with riparian habitats and wetlands in inland southern Australia, a realistic breeding-habitat polygon in the amended project footprint should include a buffer of <1 km to a permanent watercourse.

Final species polygon review

Niche applied the following updates to the preliminary habitat mapping for target species to obtain a final set of species polygons:

- Barking Owl: In line with species expert advice, a 1 km buffer of perennial streams and the patch size layer (>100 ha) layers, along with the distribution of Niche and BioNet Squirrel Glider and Sugar Glider records (prey species) were used to inform the review of final species polygons. Habitat polygons were deemed “Unsuitable” if they were in fragmented areas, outside the 1 km buffer of permanent streams, and had no nearby or connected vegetated areas with prey species records.
- Powerful Owl and Masked Owl: In line with species expert advice, Powerful Owl, and Masked Owl on the western slopes of the Great Dividing Range are likely occur in extensive forested areas along the amended project footprint. There are numerous Greater Glider and Yellow-bellied Glider records (major Powerful Owl prey) in extensive forests at both ends of the amended project footprint (Maragle to Burrinjuck Nature Reserve, and Tarlo River National Park). Masked Owl is likely to occur in Bago and Maragle State Forests, Kosciuszko National Park, Mundoonen Nature Reserve, and Tarlo River National Park. As such, the species expert recommendation for these species was to increase the patch size threshold for the habitat polygons from >5 ha to >100 ha, and native vegetation cover threshold to 31-<70 %, to capture these distributions. Habitat polygons were deemed “Unsuitable” if they were below 100 ha patch size and had no nearby or connected vegetated areas with prey species records.
- Sooty Owl: There are no records of this species in BioNet or the Niche fauna survey, in or within 20 km of the amended project footprint, nor any relevant atlas records sufficiently close to the amended project footprint. However, there is a literature record for a single owl roosting in a cave at Yarrangobilly Caves east of Maragle, anomalously on the western slopes of the Great Dividing Range where the owl does not usually occur (Bilney 2020). It is unlikely that the owl occurs within the amended project footprint, except possibly in Bago or Maragle State Forest where the forest is sufficiently tall and moist. The habitat polygon for Sooty Owl is situated within the Bago portion of the amended project footprint (consistent with recommendations of the species expert). As such, no refinements were made to Sooty Owl habitat polygons. Latest information is that a Sooty Owl has been recorded in the Maragle area (per NSW DCCEEW), consistent with the foregoing interpretation and assumptions.

Overall, the revised iteration of the species polygons is a more realistic assessment of where, and in which remnant forest or woodland patches, the various raptors and owls are likely to occur and, consequently, the revised areas to be used for calculating species and ecosystem credits.

See Attachment 22 for the Owls and Raptors Expert Report, including detailed methods, results discussion of impacts and mitigation measures.

7.3.5 Predicted 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. Targeted surveys are not required to identify or confirm the presence of ecosystem credit species.

In accordance with the BAM, assessing habitat suitability for an ecosystem credit species involves the following steps:

- Step 1: All PCTs, associated vegetation zones and plot data are loaded into the BAM-C and a list of predicted ecosystem credit species is generated (Table 7-8)
- Step 2: Habitat constraints and vagrant species are assessed to exclude/ include ecosystem credit species from the assessment.

For the purpose of this assessment, it is assumed that all predicted species may have potential habitat in the amended project footprint and therefore no predicted species have been excluded from the assessment. The only exception being the owl species (Barking Owl, Masked Owl, Powerful Owl and Sooty Owl), as these species were changed from a dual credit species to a species credit species by NSW DCCEEW on 14 March 2024 (for some IBRAs the Owls species were still occurring in the BAM-C as ecosystem credit species post the 14 March BAM-C update, therefore these were manually removed).

A total of 46 ecosystem credit species were identified by the BAM-C. Table 7-8 presents a summary of the status, survey results, associated PCTs and presence within each IBRA subregion for each of the ecosystem credit species predicted by the BAM-C. All ecosystem credit species were assumed present on inaccessible lands where suitable habitat occurred. A total of 23 ecosystem credit species were directly recorded during field surveys.

Table 7-8: Predicted ecosystem credit species (BAM-C 2024)

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
Birds												
Anthochaera phrygia	Regent Honeyeater	CE	CE	Dual	5, 266, 268, 277, 280, 283, 287, 294, 319, 343, 352, 731, 870, 1093, 1097, 1107, 1191, 1330	Assumed present (foraging only)	Assumed Present	Assumed present	Assumed present	Assumed present	Assumed present	-
Artamus cyanopterus	Dusky Woodswallow	V	-	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 316, 319, 322, 335, 343, 349, 351, 352, 637, 638, 679, 727, 731, 870, 939, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196, 1224, 1256, 1330	Recorded	Assumed present	Assumed present	Assumed present	Recorded	Recorded	Assumed present
Botaurus poiciloptilus	Australasian Bittern	E	E	Ecosystem	1256	Assumed present	-	-	Assumed present	Assumed present	-	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	Dual	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 306, 314, 316, 322, 343, 349, 351,	Recorded (BUN: breeding pairs identified, and heard at dusk during stagwatching surveys (likely	Recorded	Recorded	Recorded	Recorded	Recorded	Recorded

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
					352, 638, 679, 727, 731, 870, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196, 1330, 99997	nearby breeding habitat)						
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Dual	266, 290, 343, 870, 1093, 1097, 1107, 1150, 1191, 1330	Recorded within BUN (no nest/breeding sites identified within the amended project footprint). Assumed present in other IBRA subregions.	Assumed present	Recorded	Assumed present	-	Assumed present	-
Chthonicola sagittata	Speckled Warbler	V	-	Ecosystem	266, 268, 277, 278, 280, 283, 287, 290, 294, 297, 319, 322, 343, 349, 351, 352, 731, 870, 1093, 1097, 1151, 1191, 1330	Recorded	Assumed present	Assumed present	Assumed present	Assumed present	Recorded	-
Circus assimilis	Spotted Harrier	V	-	Ecosystem	5, 266, 277, 278, 322, 939, 1191, 1224, 1256, 99997	Recorded	-	-	Assumed present	Recorded	Assumed present	Assumed present

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Ecosystem	266, 268, 277, 278, 280, 283, 287, 290, 294, 306, 314, 316, 322, 335, 343, 349, 351, 352, 731, 870, 1093, 1191, 1256, 1330	Recorded	Assumed present	Assumed present	Assumed present	Recorded	Recorded	Recorded
Daphoenositta chrysoptera	Varied Sittella	V	-	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 316, 319, 322, 343, 349, 351, 352, 638, 679, 727, 731, 870, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196, 1330	Recorded	Assumed present	Assumed present	Assumed present	Recorded	Recorded	Assumed present
Epthianura albifrons	White-fronted Chat	V	-	Ecosystem	1256	Assumed present	-	-	Assumed present	Assumed present	-	-
Falco subniger	Black Falcon	V	-	Ecosystem	5, 266, 277, 283, 287, 335, 352, 1330	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	-
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	V	-	Ecosystem	5, 266	Assumed present	-	-	-	-	Assumed present	-
Glossopsitta pusilla	Little Lorikeet			Ecosystem	5, 266, 268, 277, 280, 283, 287,	Assumed present	-	Assumed present	Assumed present	Assumed present	Assumed present	-

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
					290, 294, 319, 343, 349, 352, 731, 870, 1093, 1097, 1107, 1150, 1191, 1330							
Grantiella picta	Painted Honeyeater	V	V	Ecosystem	5, 266, 268, 277, 278, 280, 287, 290, 294, 319, 322, 343, 349, 351, 352, 727, 731, 1093, 1097, 1330	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	-
Haliaeetus leucogaster	White-bellied Sea-eagle	V	-	Dual (breeding)	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 316, 319, 322, 335, 343, 349, 352, 679, 939, 953, 1191, 1196, 1224, 1256, 1330	Recorded	Assumed present	Assumed present	Assumed present	Recorded	Recorded	Assumed present
Hieraaetus morphnoides	Little Eagle	V	-	Dual (breeding)	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 316, 319, 322, 335, 343, 349, 351, 352, 637, 638, 679, 727, 731,	Recorded	Assumed present	Assumed present	Assumed present	Recorded	Recorded	Assumed present

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
					870, 939, 952, 953, 1093, 1097, 1107, 1150, 1191, 1196, 1224, 1256, 1330, 99997							
Hirundapus caudacutus	White-throated Needletail		VM	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 316, 319, 322, 335, 343, 349, 351, 352, 637, 638, 679, 727, 731, 870, 939, 952, 953, 1093, 1097, 1150, 1151, 1191, 1196, 1224, 1256, 1330	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present
Lathamus discolor	Swift Parrot	E	CE	Dual	5, 266, 268, 277, 278, 280, 283, 287, 290, 294, 295, 297, 299, 301, 306, 314, 316, 319, 322, 343, 349, 352, 731, 870, 1093, 1097, 1107, 1150, 1330, 99997	Assumed present	-	Assumed present	-	Assumed present	Assumed present	-
Leipoa ocellata	Malleefowl	E	V	Ecosystem	343	Assumed present	-	-	-	-	Assumed present	-

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
Lophoictinia isura	Square-tailed Kite	V	-	Dual (Breeding)	5, 266, 268, 277, 280, 283, 287, 290, 322, 352, 638, 731, 953, 1093,	Assumed present	Assumed present	-	-	Assumed present	Assumed present	-
Melanodryas cucullata cucullata	Hooded Robin	V	-	Ecosystem	5, 266, 268, 277, 278, 280, 283, 287, 290, 294, 297, 306, 314, 316, 319, 322, 349, 352, 731, 1093, 1191, 1330	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	-
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)			Ecosystem	5, 266, 268, 277, 278, 280, 283, 287, 290, 319, 343, 352, 731, 870, 1330	Assumed present	-	Assumed present	Assumed present	Assumed present	Assumed present	-
Neophema pulchella	Turquoise Parrot	V	-	Ecosystem	5, 266, 268, 277, 278, 280, 283, 287, 290, 294, 319, 322, 343, 349, 351, 352, 731, 870, 1093, 1097, 1107, 1150, 1191, 1256, 1330	Assumed present	Assumed present	Assumed present	-	Assumed present	Assumed present	-
Pachycephala inornata	Gilbert's Whistler	V	-	Ecosystem	5	Assumed present	-	-	-	-	Assumed present	-
Pachycephala olivacea	Olive Whistler	V	-	Ecosystem	299, 300, 637, 638, 939, 1097	Recorded	Assumed present	Assumed present	-	-	-	Recorded

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
Petroica boodang	Scarlet Robin	V	-	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 316, 319, 322, 343, 349, 351, 352, 638, 679, 727, 731, 870, 939, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196, 1256, 1330	Recorded	Recorded	Recorded	Recorded	Recorded	Recorded	Assumed present
Petroica phoenicea	Flame Robin	V	-	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 301, 306, 314, 322, 343, 349, 351, 352, 638, 679, 727, 731, 870, 939, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191, 1196, 1224, 1256, 1330	Recorded	Assumed present	Recorded	Assumed present	Assumed present	Recorded	Recorded
Polytelis swainsonii	Superb Parrot	V	V	Dual (SAII breeding)	5, 266, 277, 278, 280, 283, 322, 343, 349, 352, 1330, 99997	Recorded	Assumed present	-	Assumed present	Recorded	Recorded	-

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
Pomatostomus temporalis temporalis	Grey-crowned Babbler			Ecosystem	266, 277, 278, 287, 319	Recorded	-	-	-	-	Recorded	-
Rostratula australis	Australian Painted Snipe	E	E	Ecosystem	5, 1256	Assumed present	-	-	Assumed present	Assumed present	Assumed present	-
Stagonopleura guttata	Diamond Firetail	V	V	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 301, 306, 314, 319, 322, 343, 349, 351, 352, 727, 731, 870, 1093, 1097, 1191, 1330, 99997	Recorded	Assumed present	Assumed present	Assumed present	Recorded	Recorded	Recorded
Stictonetta naevosa	Freckled Duck	V	-	Ecosystem	5	Assumed present	-	-	-	-	Assumed present	-
Mammals												
Chalinolobus picatus	Little Pied Bat	V	-	Ecosystem	5, 278	Assumed present	-	-	-	-	Assumed present	-
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Ecosystem	5, 266, 268, 277, 278, 280, 283, 285, 287, 290, 294, 295, 297, 299, 300, 306, 314, 316, 322, 343, 349, 351, 352, 638, 679, 727, 731, 870, 939, 952, 953,	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present	Assumed present

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
					1093, 1097, 1107, 1150, 1191, 1196, 1256, 1330							
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Ecosystem	266, 268, 277, 278, 280, 285, 287, 290, 294, 295, 297, 299, 300, 306, 316, 343, 352, 638, 679, 731, 870, 939, 952, 953, 1093, 1097, 1107, 1150, 1191, 1196, 1256, 1330	Recorded	Assumed present	Recorded	Recorded	Recorded	Recorded	Recorded
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	-	Ecosystem	870, 1107, 1150	Assumed present	-	Assumed present	-	-	-	-
Miniopterus australis	Little Bent-winged Bat	V	-	Dual	870, 1097, 1107, 1150	Assumed present (no breeding habitat identified)	-	Assumed present	-	-	-	-
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Dual	266, 277, 278, 280, 283, 285, 290, 295, 297, 299, 300, 306, 322, 349, 351, 352, 638, 679, 727, 731, 870, 939, 952, 953, 1093, 1097, 1107, 1150, 1151, 1191,	Assumed present (no breeding habitat identified)	Assumed present	Recorded	Recorded	Recorded	Recorded	Recorded

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
					1196, 1256, 1330, 99997							
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Ecosystem	266	Assumed present	-	-	-	-	Assumed present	-
Petaurus australis	Yellow-bellied Glider	V	-	Ecosystem	299, 300, 351, 638, 731, 870, 952, 953, 1093, 1097, 1107, 1150, 1191, 1196, 1330	Recorded	Recorded	Assumed present	Assumed present	Assumed present	Assumed present	Recorded
Pseudomys novaehollandiae	New Holland Mouse	-	V	Ecosystem	290	Assumed present	-	-	-	-	Assumed present	-
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Ecosystem	5, 266, 277, 280, 283, 287, 290, 352, 731, 870, 1093, 1097, 1107, 1150, 1330	Recorded	-	Recorded	-	-	Assumed present	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Ecosystem	731, 870, 1093, 1097, 1107, 1150, 1151, 1191, 1256, 1330	Recorded	-	Recorded	Recorded	Recorded	Recorded	Recorded
Reptiles												
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Dual	870, 1107, 1150,	Assumed present	-	Assumed present	-	-	-	-
Suta flagellum	Little Whip Snake	V	-	Ecosystem	1191, 1330	Assumed present	-	Assumed present	Assumed present	Assumed present	-	-

Scientific name	Common name	BC Act status*	EPBC Act status*	Credit status (SAII)	Associated PCTs within amended project footprint	Status	IBRA subregion					
							BON	BUN	CRO	MUR	INL	SNO
Varanus rosenbergi	Rosenberg's Goanna	V	-	Ecosystem	268, 278, 280, 285, 290, 295, 297, 299, 306, 314, 349, 352, 727, 731, 870, 952, 1093, 1150, 1191, 1196, 1256, 1330	Recorded	Assumed present	Assumed present	Assumed present	Assumed present	Recorded	Assumed present

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

7.4 Candidate species polygon development

Species polygons were developed for all candidate threatened flora and fauna species (species credit species area and count species) where recorded or assumed present within the disturbance area. This process followed the BAM section 5.2.5 to 5.2.6 and relevant polygon requirements as documented in the TBDC, BioNet species profiles or approval survey guidelines (Table 1-5 and Table 4-15).

Details regarding the development of the species polygon for each relevant candidate species is provided in Attachment 1. The condition of habitats, biodiversity risk weighting and sensitivity to gain associated with species polygons is presented in the BAM credit summary report provided in Attachment 23.

7.5 Pest animals

Pest animals directly sighted within the amended project footprint during field surveys are detailed in Table 7-9. Note: an 'X' denotes where a pest species was recorded within an IBRA subregion.

Table 7-9: Pest animals recorded within the amended project footprint

Scientific name	Common name	IBRA subregion					
		BUN	CRO	MUR	INL	BON	SNO
Anas platyrhynchos	Mallard			x			
Axis axis	Chital	x	x		x		x
Capra hircus	Goat			x	x		
Cervus sp.	Unidentified Deer			x			
Cyprinus carpio	Carp			x	x		
Dama dama	Fallow Deer						x
Equus caballus	Horse					x	x
Felis catus	Cat			x			
Gambusia holbrooki	Mosquito Fish			x			
Lepus capensis	Brown Hare		x	x		x	
Mus musculus	House Mouse			x	x		
Oryctolagus cuniculus	Rabbit		x	x	x		
Ovis aries	Sheep (feral)			X			
Rattus rattus	Black Rat	x		x	x		
Spilopelia chinensis	Spotted Turtle-Dove				x		
Sturnus vulgaris	Common Starling		x	x	x		
Sus scrofa	Pig	x	x		x		
Turdus merula	Eurasian Blackbird	x		x	x		
Vulpes vulpes	Fox	x	x	x	x	x	

7.6 Threatened aquatic biota

A total of nine threatened aquatic fauna species and TECs listed under the FM Act and EPBC Act (Table 7-10) have been identified through the aquatic desktop assessment and field investigation as having the potential to occur within the amended project footprint (Figure 10-1 Attachment 5). This includes eight fish species and one endangered ecological community. These species and communities are considered in detail in Section 10.2. See Chapter 11 of the BDAR for further assessment of threatened aquatic biota under the EPBC Act.

Table 7-10: Threatened aquatic species likely to occur within the amended project footprint

Scientific name	Common name	FM Act status*	EPBC Act status*
Aquatic Ecological Community In The Natural Drainage System Of The Lower Murray River Catchment	Lowland Murray River EEC	EEC	-
Bidyanus bidyanus	Silver Perch	V	CE
Euastacus armatus	Murray Crayfish	V	-
Galaxias rostratus	Flatheaded Galaxias	CE	CE
Nannoperca australis	Southern Pygmy Perch	E	V
Maccullochella macquariensis	Trout Cod	E	E
Maccullochella peelii	Murray Cod	-	V
Macquaria australasica	Macquarie Perch	E	E
Euastacus rieki	Riek's Crayfish	-	E

* FM Act and EPBC Act conservation status: EEC- Endangered Ecological Community; CE: Critically Endangered; E- Endangered; V- Vulnerable.

8 Identifying indirect and prescribed impacts

8.1 Indirect impacts

Indirect impacts are defined under the BAM as (DPIE 2020a):

> *impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts.*

Indirect impacts are defined under the EPBC Act as including (DSEWPC 2013):

- off-site impacts including, but not limited to:
  - downstream impacts (such as impacts on wetlands from chemicals discharged into upstream river systems); or
  - upstream impacts (such as the extraction of raw materials which are used to undertake the action), and
- actions taken by third parties, where the third party action is facilitated to a major extent by the primary action and the impacts of the third party action were reasonably foreseeable (as set out in sub-section 527E(2) of the EPBC Act).

The BAM requires an assessment of the indirect impacts of the proposal (amended project) on native vegetation, threatened entities and their habitat, including description of (DPIE 2020a):

- the nature, extent, frequency, duration and timing of indirect impacts of the proposal during construction, during operation and arising from a change in land-use patterns
- the consequences of indirect impacts on biodiversity values
- any limitations to data, assumptions and predictions about impacts on biodiversity.

The BAM requires a description and assessment of the indirect impacts of the proposal on TECs/PCTs and/or threatened species and their habitat, beyond the development footprint, including but not limited to (DPIE 2020a):

- inadvertent impacts on adjacent habitat or vegetation
- reduced viability of adjacent habitat due to edge effects
- reduced viability of adjacent habitat due to noise, dust, or light spill
- transport of weeds and pathogens from the site to adjacent vegetation
- increased risk of starvation or exposure, and loss of shade or shelter
- loss of breeding habitat
- trampling of threatened flora species
- fertiliser drift
- inhibition of nitrogen fixation and increased soil salinity
- rubbish dumping
- wood collection

- removal and disturbance of rocks, including bush rock
- increase in predators
- increase in pest animal populations
- changed fire regimes
- disturbance to specialist breeding and foraging habitat (e.g. beach nesting for shorebirds).

Section 13.4 provides a summary of potential indirect impacts on native vegetation, threatened entities and their habitat as a result of the amended project.

8.2 Prescribed impacts

Prescribed biodiversity impacts are impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. Prescribed biodiversity impacts (prescribed impacts) that must be assessed under the BOS and addressed as a part of the BDAR are outlined in Clause 6.1 of the BC Regulation. These are:

- the impacts of development on the following habitat of threatened species or ecological communities:
  - karst, caves, crevices, cliffs and other geological features of significance
  - rocks
  - human made structures
  - non-native vegetation and Category 1 exempt lands.
- the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
- the impacts of development on movement of threatened species that maintains their lifecycle
- the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)
- the impacts of wind turbine strike on protected animals
- the impact of vehicle strikes on threatened species or animals that are part of a threatened ecological community.

Prescribed impacts relevant to the amended project and potentially affected threatened entities are identified and described in Table 8-1. They include all prescribed impacts listed above except impacts relating to movement of threatened species that maintains their lifecycle (addressed in relation to impacts to habitat connectivity) and impacts relating to wind turbine strike (not relevant to the amended project). Supporting assessments and analysis are provided in Attachment 24. The assessment of prescribed impacts has been carried out for all prescribed impact entities identified and is presented in Section 13.3.

For the purpose of the assessment:

- Threatened and/ or migratory species with a potential risk of collision were identified within a 10 km buffer to the amended project footprint.
- A 1 km buffer was then applied to identify areas subject to highest risk of transmission line collision.
- Specific criteria used to delineate potential impacts to habitat connectivity are detailed in Attachment 24.

Table 8-1: Prescribed biodiversity impacts relevant to the amended project

Prescribed impact	Present	Description	Relevant threatened entities
Karst, caves, crevices, cliffs, rocks, and other geological features of significance	Yes – crevices, cliffs, and rocky habitats	Across the amended project footprint, there are a couple of limestone deposits displaying features that are generally expected in karst environments. Some of those limestone deposits are of the same formation group and epoch as karst environments in the broader region (e.g. Bungonia Caves and Careys Cave). There are no confirmed 'maternity' microbat roosts within karsts, crevices, or cliffs within the amended project footprint. However, there is important cave roosting habitat beyond the amended project footprint, including Large Bent-winged Bat roosts located at: • Black Andrew Mine (within 14 km) • Dip Cave, Wee Jasper (within 28 km) • Punchbowl Cave (within 27 km, known roosting site and staging site for gravid females enroute to Church Cave maternity site) • Pylon 58 Cave (within 20 km) • Church Cave (within 27 km) (maternity roost site) • Drum Cave (within 37 km) (maternity roost site). Areas of typical rocky hillslope and rock overhangs occur throughout the amended project footprint, in areas with moderate to high topographic relief. This provides a different type of terrestrial habitat to other parts of the amended project footprint. Some of the potential karst locations (identified in the karst mapping), were subsequently ground-truthed and targeted for breeding bats (via harping trapping) during the Summer 2023 survey period. From the ground-truthing exercise, all potential karsts/caves areas were ground-truthed and discounted as being suitable habitat. Masked Owl and Sooty Owl roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes in caves for nesting. These species were not detected during spotlighting surveys or call playback surveys undertaken as a part of the amended project. However, known and assumed habitats occur within the amended project footprint. Direct impacts would be negligible; the rocky environment described would be minimally impacted, and these habitats would remain post-construction. No potential karst, caves or cliffline habitats will be directly impacted by proposed subsurface work (blasting, rock crushing or excavation work).	Potential impacts to rocky habitats, cliffs, or overhangs within the amended project footprint, may result in impacts to the following species: • Large-eared Pied Bat, and Large Bent-winged bat (non-breeding individuals) • Masked Owl • Sooty Owl.

Prescribed impact	Present	Description	Relevant threatened entities
		However, blasting may occur within a couple hundred metres of rocky habitats and cliffline areas (*EIS Technical Report 9 - Noise and Vibration Impact Assessment* [SLR, 2023]). The consequence of the impacts would be minor and non-significant following further design refinement (avoidance), and the residual impact would be appropriately offset. Further detailed discussion of impacts on habitat associated with karsts, rocky areas cliffs and gorges are provided in Section 13.5.	
Human-made structures (culverts and bridges)	Yes	Culverts and bridges identified within the amended project footprint are considered potential habitat for roosting bats at different times of the year. Performing an intersection analysis in ArcGIS of the NSW Road Segment and Hydrology (Strahler order greater than or equal to 3) layers within the amended project footprint, there appears to be one 'definite' culvert, six 'definite' road bridges and 22 possible structures (i.e. bridges/ culverts) which intersect suitable waterbodies and may support roosting habitat for threatened microbats within the amended project footprint: **Bondo IBRA-subregion**: 5 possible structures **Crookwell IBRA-subregion**: 1 possible structure, 1 definite road bridge and 1 definite culvert **Inland Slopes IBRA-subregion**: 1 definite road bridge and 2 possible structures **Murrumbateman IBRA-subregion**: 2 possible structures and one definite road bridge **Snowy Mountains IBRA-subregion**: 7 possible structures and one definite road bridge. No upgrade or replacement works are proposed for these structures as part of the amended project. No removal or upgrades of human-made structures is proposed at this stage. No direct impact or removal of existing culverts or bridges is proposed. No impacts to human-made structures are to occur as a result of the amended project. Therefore, impacts to human-made structures are not relevant to the amended project and have not been discussed further.	Culverts, bridges, and dilapidated structures may be used by roosting bats such as, Large Bent-winged Bat, Little Bent-winged Bat, Greater Broad-nosed Bat and Southern Myotis. Niche surveys identified the following microbat species within proximity of human-made structures: **<u>Crookwell IBRA subregion:</u>** Large Bent-winged Bat was acoustically recorded 2 km from road bridge at Middle Creek. Southern Myotis recorded less than 2 km from road culvert at Cowper's Creek. **<u>Murrumbateman IBRA subregion:</u>** Southern Myotis recorded 9 km from Jerrawa Creek road bridge. Large Bent-winged Bat was recorded 5 km from unknown structure at Dowling's Creek. **<u>Snowy Mountains IBRA subregion:</u>** Two Large Bent-winged Bat records within 1 km of unknown structure at Logbridge Creek. Greater Broad-nosed Bat recorded acoustically in the immediate vicinity of Honey Suckle Creek Road bridge. **<u>Inland Slopes IBRA subregion:</u>** Greater Broad-nosed Bat within 4 km of unknown structure at Tywong Creek. Southern Myotis within 1 km of an unknown structure on an unnamed Strahler order 2 creek, within the Murrumbidgee Catchment area.

Prescribed impact	Present	Description	Relevant threatened entities
Non-native vegetation offering habitat for threatened species	Yes	Exotic vegetation within the amended project footprint may provide supplementary foraging, dispersal and/or shelter habitat for some candidate fauna species. For species such as Golden Sun Moth, primary habitat is native grasslands (including derived grasslands) or grassy woodlands within the species geographic distribution. However, the species is also known to colonise exotic grasslands dominated by the exotic weed Chilean Needle Grass (*Nassella neesiana*) (DEWHA, 2009a). Chilean Needle Grass dominated grasslands have not been identified within accessible areas of the amended project footprint. Striped Legless Lizard has also been previously identified in sites dominated by exotic grasses such as *Phalaris aquatica, Nasella trichotoma and Hypochaeris radicata* (Robertson & Smith, 2010). Occasionally, Pink-tailed Legless Lizard has been found in disturbed areas dominated by exotic species such as Oats (*Avena barbata*), Squirrel Tail Grass (*Vulpia bromoides*), Flatweed (*Hypocheirus radicata*), Soft Brome (*Bromus hordaceous*), Delicate Hairgrass (*Aira elegantissima*), Haresfoot Clover (*Trifolium arvense*) (Jones, 1999). Resident populations of Grey-headed Flying-fox in human-modified landscapes (urban, peri-urban, and agricultural), have been documented utilising exotic vegetation, as an alternate food source throughout the year, as well as vegetation suitable for roosting (Parry-Jones and Augee, 2001; Timmiss *et al*., 2020; Yabsley *et al*., 2021). A large portion of the Green Hills corridor amendment consists of commercial pine forests, used for timber harvesting. These plantations occur adjacent to native forest and may provide supplementary connectivity for arboreal mammal species and woodland bird species (Taylor *et al*., 2007). A review of BioNet records identified recent records of Southern Greater Glider on the eastern edge of the Green Hills State Forest.	Threatened fauna species that may be impacted by the removal of non-native vegetation, include: • Grey-headed Flying-fox • Golden Sun Moth • Striped Legless Lizard • Pink-tailed Legless Lizard • Southern Greater Glider.
Habitat connectivity	Yes	**Threatened fauna** Areas of vegetation identified for removal for the transmission line easement and the installation of the transmission line structures may potentially impact habitat connectivity for threatened fauna. The barrier created from vegetation removal may result in reduced ability for terrestrial fauna (including threatened fauna) to move safely across the landscape to	Threatened microbat species that require cluttered or edge environments for foraging and may be affected by reduced connectivity: • Large-eared Pied Bat • Southern Myotis • Eastern False Pipistrelle.

Prescribed impact	Present	Description	Relevant threatened entities
		access nearby habitats. However, the extent of such impacts is likely to be limited given historic clearing and existing land use intensity within the amended project footprint. The ability of arboreal and gliding fauna to safely traverse across remaining patches of vegetation would become constrained with the increase in distance between patches, and it may represent a barrier for gliding species. During the field campaigns, Southern Greater Glider (Snowy Mountain IBRA region), Squirrel Glider (Inland Slopes IBRA subregion), and Yellow-bellied Glider (Snowy Mountain IBRA region), were recorded in several locations throughout the amended project footprint (Table 7-5). For woodland bird species like the Varied Sitella, reduced landscape connectivity may create movement barriers (the sedentary nature of the species makes cleared land a potential barrier). Species such as Flame Robin and Scarlet Robin require connected corridors of vegetation for movement. Isolation of patches of habitat, particularly where these patches are smaller than 10 ha, may result in isolated individuals. For other fauna species with limited dispersal ability/mobility (highly restricted home ranges), such as Golden Sun Moth, Rosenberg's Goanna, and Pink-tailed Legless Lizard; the reduction in habitat connectivity may, depending on the location, effectively isolate individuals, or populations, leading to a decline in the species population. The increased distance between vegetation patches intersecting the amended project footprint is unlikely to impact the lifecycle of highly mobile species (such as some microbats species, megabats and birds). However, the amended project may result in fauna injury and/ or mortality from transmission line collision, entanglement, or electrocution. For amphibian species like Stuttering Frog, Sloane's Froglet, Booroolong Frog and Yellow-spotted Tree Frog, the installation of maintenance access tracks across waterways (formal or informal) may reduce stream connectivity, and breeding success of individuals. **<u>Threatened flora</u>** For threatened flora species such as Small Snake Orchid, clearing, or reduced connectivity of habitat may reduce pollination and dispersal success of the species.	Terrestrial and arboreal mammals potentially affected by reduced landscape connectivity: • Broad-toothed Rat • Koala • Eastern Pygmy-possum • Smoky Mouse • Southern Greater Glider • Yellow-bellied Glider • Squirrel Glider. Small, sedentary (short dispersal distances) woodland birds which may be affected by reduced connectivity: • Flame Robin • Scarlet Robin • Varied Sitella. Reptiles which may be affected by reduced connectivity: • Pink-tailed Legless Lizard Amphibians which may be affected by reduced riparian connectivity: • Stuttering Frog • Sloane's Froglet • Booroolong Frog • Yellow-spotted Tree Frog. TECs potentially affected by reduced connectivity: *Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-western Slopes and South-eastern Highlands Bioregions* *Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion* *Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions.*

<table>
<tr><th>Prescribed impact</th><th>Present</th><th>Description</th><th>Relevant threatened entities</th></tr>
<tr><td></td><td></td><td><u>TECs</u>
For TECs, increased fragmentation may result in loss of community composition, structure and function.</td><td></td></tr>
<tr><td>Waterbodies, water quality and hydrological processes</td><td>Yes</td><td><u>Threatened fauna</u>
There are at least 135 streams (of various types and condition) that intersect the amended project footprint. Major waterways such as the Goobarragandra River, Gocup Creek, Tumut River, Murrumbidgee River, Adjungbilly Creek and Lachlan River are important to their bioregions for a number of species.
Threatened bats use these features for drinking, foraging, and thermoregulation. Southern Myotis require waterways for foraging with proximity to and condition of suitable aquatic habitats being the primary force driving roost selection by this species (Campbell, 2009; Gonsalves & Law, 2017a). Given the species' affinity with waterways, the species can, directly and indirectly, be exposed to pollutants associated with run-off and sedimentation.
Threatened frog species with potential to occur that are sensitive to hydrological changes, include:
• Stuttering Frog
• Sloane's Froglet
• Booroolong Frog
• Yellow-spotted Tree Frog
• Spotted Tree Frog.

<u>TECs</u>
Altered hydrological regimes have the potential to change the floristic and faunal composition of the following TECs:
• Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion
• White Box Yellow Box Blakely's Red Gum Woodland
• Tableland Basalt Forest
• Montane Peatlands and Swamps.</td><td>Fauna groups which would be sensitive to impacts to waterbodies, reductions in water quality and altered hydrological processes include threatened microbats that use waterbodies as part of their foraging strategy or a primary source of food:
• Southern Myotis (confirmed present)
• Greater Broad-nosed Bat (confirmed present)
• threatened frogs:
• Stuttering Frog
• Sloane's Froglet
• Booroolong Frog
• Yellow-spotted Tree Frog.
TECs affected by altered hydrological regimes:
• Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion
• White Box Yellow Box Blakely's Red Gum Woodland
• Tableland Basalt Forest
• Montane Peatlands and Swamps.</td></tr>
</table>

Prescribed impact	Present	Description	Relevant threatened entities
		The amended project has the potential to impact waterways, water quality and/or hydrological processes such that threatened species and TECs may be impacted. As such, this prescribed impact is relevant.	
Vehicle strikes	Yes	Vehicle strike risk is likely to increase during construction of the amended project. The risk of mortality or injury from vehicle strike is likely to be higher at certain times of the year for terrestrial/ arboreal mammals when their mobility and home range sizes increases, particularly during the breeding season. Further, vehicle strike risk is likely to be higher in connected landscapes (eg large patches of vegetation) versus highly fragmented landscapes (such as heavily cleared farmlands) within the amended project footprint. The clearing of vegetation in some areas within the amended project footprint may increase the risk of harm/death to local fauna through increased exposure to vehicle strike as they attempt to move to nearby habitats. Some bird species feed on carrion or seeds along road corridors/easements, which may result in them being struck by or trampled by vehicles/machinery.	The following candidate fauna species with vehicle strike listed as a Key Threatened Process (KTP) to their conservation (under the BC Act), include: • Koala • Eastern Pygmy-possum • Squirrel Glider • Superb Parrot • Powerful Owl • Masked Owl.

9 Bushfire impacts and assessment considerations

This chapter addresses the impacts of bushfire within the amended project footprint and important considerations for the assessment.

9.1 Overview of the 2019-20 bushfires

The Dunns Road bushfire impacted the amended project footprint in the 2019/2020 fire season. The bushfire started on 27 December 2019 from a lightning strike in a private pine plantation near Adelong. A total of 333,980 hectares of land was impacted (NSW NPWS, pers comm 2020). Within the amended project footprint, approximately 2,038 hectares of land was impacted across three IBRA subregions: Bondo, Inland Slopes and Snowy Mountains.

Areas within the amended project footprint affected by the 2019-20 fire were assessed in accordance with the DPIE (2020c) Guideline, with reference to the extent of severity as detailed in NSW DCCEEW (2020) FESM. FESM burn severity classes are defined in Table 9-1, with severely burnt vegetation classified as those aligning with burn classes of High and Extreme. The results of the burnt land assessments are documented in Attachment 9 and summarised in Section 9.2. The extent of severely burnt vegetation in the 2019-20 bushfire across the amended project footprint is detailed in Table 9-2.

Table 9-1: FESM burn severity classes (NSW DCCEEW, 2020)

Burn severity	Definition
Low	Burnt surface with unburnt canopy
Moderate	Partial canopy scorch
High	Full canopy scorch (± partial canopy consumption)
Extreme	Full canopy consumption

9.2 Severely burnt vegetation within the amended project footprint

Initial site assessments were completed by ELA about one year post-fire and indicated that most of the assessed vegetation within burnt lands was severely impacted. Subsequent site assessments completed by Niche noted substantial vegetation recovery including:

- assessments completed during preparation of the EIS, two to three years post-fire (ie, March to October 2022).
- assessments completed post-EIS public exhibition, about four years post-fire (ie, September to November 2023).

Evidence of severe bushfire was observed throughout the amended project footprint. However, this was largely limited to lands mapped as a high or extreme burn severity class (according to the NSW DCCEEW (2020) FESM). Within these sites, observed impacts to floristic structure as a result of the fire included a dominance of pioneer species, reduction in species diversity and increase in the vegetative cover. Given the length of time since fire, much of the understorey and groundcover vegetation within fire affected areas had regenerated, and it is no longer evident the extent to which these strata were consumed. Similarly, white ash and charred organic matter was not recorded. Whilst burnt logs were observed, impacts to log and leaf litter cover were not notable given the time since fire and ongoing accumulation of debris.

Vegetation within land mapped as subject to moderate and low severity burns showed little evidence of bushfire impacts. This was typically limited to scorch marks on tree trunks with some epicormic growth and occasional burnt logs also observed. The canopy appeared to be mostly intact with no apparent impacts to species diversity observed across strata.

A number of burnt land site assessments were undertaken, in accordance with the DPIE (2020c) Guideline, to assist in delineating severely burnt vegetation within the amended project footprint (Figure 9-1 Attachment 5). The results of the assessment are presented in Attachment 9.

Given the coarse nature of the FESM mapping and some noted variation in the positioning of vegetation zones within the landscape, a conservative approach was adopted in assigning burn severity to woody vegetation zones. All woody vegetation zones intersecting lands with a high or extreme burnt severity according to the FESM (NSW DCCEEW, 2020) have been assessed as severely burnt. This includes a total of 316.43 hectares of native vegetation situated within the following IBRA subregions (Figure 9-1 Attachment 5):

- **Inland Slopes**: 82.85 hectares
- **Bondo:** 58.03 hectares
- **Snowy Mountains:** 175.55 hectares.

Severely burnt vegetation within the amended project footprint comprises 16 PCTs in varying condition states. 0.53 hectares of severely burnt vegetation within the amended project footprint intersects with the approved Snowy 2.0 Transmission Connection footprint. As the Snowy 2.0 footprint was excluded from this impact assessment, this area of severely burnt vegetation was not included in the calculations provided below (Table 9.2).

Table 9-2: Severely burnt vegetation within the amended project footprint

PCT ID	Condition	BC Act TEC	EPBC Act TEC	Extent within amended project footprint (hectares)		% Vegetation Zone severely burnt
				Severely burnt vegetation (by IBRA)	Total (ha) of Vegetation Zone (by IBRA)	
Snowy Mountains						
300	Very high	Non-TEC	Non-TEC	11.98	42.83	28%
638	High	Non TEC	Non TEC	26.21	95.25	28%
	Moderate	Non TEC	Non TEC	22.08	33.32	66%
679	High	Non-TEC	Non-TEC	8.97	18.47	32%
939	High	Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregion	Alpine Sphagnum Bogs and Associated Fens	0.88	2.54	35%
953	Moderate	Non-TEC	Non-TEC	13.46	30.96	43%
	High	Non-TEC	Non-TEC	43.08	132.82	32$
	Very high	Non-TEC	Non-TEC	5.11	110.26	5%
1196	High	Non-TEC	Non-TEC	46.77	88.92	53%
Inland Slopes						
268	High	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	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0.82	4.40	19%

PCT ID	Condition	BC Act TEC	EPBC Act TEC	Extent within amended project footprint (hectares)		% Vegetation Zone severely burnt
				Severely burnt vegetation (by IBRA)	Total (ha) of Vegetation Zone (by IBRA)	
		Slopes, South East Corner and Riverina Bioregion				
	Very high	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 Bioregion	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	29.45	83.71	35%
280	High	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 Bioregion	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0.06	84.15	0.001%
287	Moderate	Non-TEC	Non-TEC	4.29	18.96	23%
	High	Non-TEC	Non-TEC	0.19	0.36	52%
	Very high	Non-TEC	Non-TEC	16.57	16.58	100%
290	Moderate	Non-TEC	Non-TEC	4.81	10.38	46%
	High	Non-TEC	Non-TEC	5.33	42.58	13%

PCT ID	Condition	BC Act TEC	EPBC Act TEC	Extent within amended project footprint (hectares)		% Vegetation Zone severely burnt
				Severely burnt vegetation (by IBRA)	Total (ha) of Vegetation Zone (by IBRA)	
295	Moderate	Non-TEC	Non-TEC	0.12	1.53	8%
297	Moderate	Non-TEC	Non-TEC	12.54	19.32	65%
299	Moderate	Non-TEC	Non-TEC	0.70	0.72	97%
306	Very high	Non-TEC	Non-TEC	1.13	1.13	100%
314	Very high	Non-TEC	Non-TEC	6.85	11.84	58%
Bondo						
285	High	Non-TEC	Non-TEC	10.63	15.49	69%
	Very high	Non-TEC	Non-TEC	1.37	2.89	47%
299	Moderate	Non-TEC	Non-TEC	31.63	48.62	65%
300	High	Non-TEC	Non-TEC	2.21	6.20	36%
638	High	Non-TEC	Non-TEC	10.99	15.46	71%
953	Moderate	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Non-TEC	1.21	3.16	38%

9.3 Application of the BAM in severely burnt sites

9.3.1 Observed burn characteristics

Whilst large portions of the amended project footprint were impacted across the Bondo, Inland Slopes and Snowy Mountains IBRA subregions, the severity of bushfire impacts observed across these lands varied considerably. Ongoing evidence of severe fire was most frequently noted on steeper slopes and/ or at higher elevations resulting in relatively discontiguous patches of burnt vegetation interspersed through a matrix recovered or unburnt habitats (Figure 9-1 Attachment 5). Three larger contiguous patches of severely burnt vegetation were observed within the amended project footprint as follows:

- Approximately 40 ha patch of severely burnt grassy woodland was identified within Bago State Forest adjacent to Powerline Road. The patch intersects approximately 3 km of amended project footprint within the Snowy Mountains IBRA subregion.
- Approximately 30 ha patch of severely burnt dry sclerophyll forest situated within private lands located between Green Hills Road and Batlow Road. The patch intersects approximately 1.4 km of amended project footprint overlapping the Bondo and Inland Slopes IBRA subregions.
- Approximately 25 ha patch of severely burnt grassy woodland within private lands north-east of Stewarts Road. The patch intersects approximately 1.3 km of amended project footprint within the Inland Slopes IBRA subregion.

Larger severely burnt patches were generally situated within one kilometre of adjacent unburnt habitats.

9.3.2 Native vegetation and threatened ecological communities

PCTs were effectively delineated within burnt areas where the dominant species within the various strata could be readily identified. Where the crowns of canopy trees were fully consumed at the time of field survey, juvenile/epicormic growth was used to support plant species identification (refer to Attachment 9). Given a substantial amount of regeneration was noted within the understorey and ground layers, regenerating plant material was generally available during the field survey and provided a suitable means for identifying dominant species within these strata. PCTs were stratified into condition classes based on the observed floristic structure and land use patterns of adjacent unburnt areas. Condition classes in burnt areas were assigned conservatively, with consideration of canopy and understorey condition (refer to Attachment 9). Where a PCT within the burnt areas met all requirements for a moderate, high or very high condition class, the relevant EPBC Act TEC was assigned. All PCTs in a condition class other than “Non-native” that aligned with a BC Act TEC were assigned the relevant BC Act TEC (refer to Table 9-2).

Vegetation integrity was assessed for each severely burnt vegetation zone using the following approach:

- Use of plot data gathered from unburnt sections of each vegetation zone situated within the amended project footprint and adjacent landscape buffer (ie within 500 metres).
- Plot shortfalls associated with severely burnt PCTs and methods adopted to address these within the BAM Calculator are outlined in Attachment 12.

9.3.3 Threatened flora and fauna species

Ecosystem credit species predicted to occur within severely burnt habitats were assumed present.

For candidate species credit threatened species, the following approach was adopted to assess habitat suitability:

- Where land access was possible, surveys were carried out within severely burnt habitats to confirm the presence/ absence of habitat features unlikely to be affected or consumed by fire (ie surface rock, caves, streams etc).
- The presence/ absence of other relevant habitat constraints susceptible to bushfire impact was informed by field observations and plot data gathered from adjacent unburnt lands and surrogate sites.
- Supplementary constraint mapping methods, as detailed in Section 4.10, were employed to supplement available field data particularly within inaccessible lands.

A literature review investigating candidate species associated with the Bondo, Inland Slopes and Snowy Mountains IBRA subregions and their response to fire was undertaken to inform:

- the suitability of undertaking targeted surveys for species credit threatened species (ie known fire respondent species) within severely burnt habitats
- determining species credit threatened species to be assumed present where fire response is found to be poor
- requirement for supporting expert report.

Some important considerations were made during this review:

- Habitat constraints that are components of vegetation were not determined as being absent from severely burnt lands unless it was apparent that the constraint was not present prior to the bushfire.
- Surveys for threatened plant species were considered suitable where evidence indicated the species, if present, would be identifiable above ground (i.e., reference to studies noting species presence within three years post-fire).
- Observed burn characteristics including connectivity of unburnt and recovered habitats, resource availability (i.e., forage and prey) and roost / refuge suitability formed key considerations in relation to threatened fauna species and their likely utilisation of severely burnt habitats.

The complete literature review is provided in Attachment 19. The key findings regarding responses to fire for flora and fauna were as follows:

- Where literature was available, the response of flora was found to be highly variable, with some species responding very positively to fire, while others responded neutrally or poorly.
- The response of microbats and other mammals was found to be highly variable, depending on the species and their differing ecology and biology.
- The response of birds was also found to be highly variable, with small insectivorous birds generally responding well, while large hollow nesters appeared to respond poorly.
- Reptiles and amphibians were found to generally respond well or at least neutrally to fire, therefore surveys targeting these species were considered to be sufficient for determining the species presence/absence.

- There is a current lack of literature on the impacts of bushfires on invertebrates, thus it is uncertain how species credit threatened invertebrates respond to fire. These species have been assumed present in associated PCTs that were severely burned within the amended project footprint.

In summary, with respect to survey effort undertaken within severely burned sites, the following was determined:

- Habitats for 15 threatened flora and six threatened fauna species were not severely burnt as a result of the bushfire (see Attachment 19). No changes to the standard BAM were applied for these locations.
- Habitats for 22 threatened flora and 23 threatened fauna and one endangered population were severely burnt as a result of the bushfire:
  - 20 threatened flora were observed to respond positively or neutrally to fire, therefore surveys targeting these species were considered sufficient for determining the species presence/absence. These species included: *Ammobium craspedioides, Bossiaea fragrans, Caesia parviflora var. minor, Caladenia concolor, Caladenia montana, Calotis glandulosa, Diuris tricolor, Eucalyptus* robertsonii *subsp. hemisphaerica, Leucochrysum albicans* var*. tricolor, Persoonia marginata, Pimelea bracteata, Prasophyllum bagoense, Prasophyllum keltonii, Prasophyllum petilum, Pultenaea humilis, Senecio garlandii, Swainsona recta, Swainsona sericea, Thelymitra alpicola, Xerochrysum palustre.*
  - 12 threatened fauna species are known to recolonise post-fire, therefore surveys targeting these species were considered sufficient for determining the species presence/absence. These species included: *Burhinus grallarius* Bush Stone-curlew, *Haliaeetus leucogaster* White-bellied Sea Eagle, *Hieraaetus morphnoides* Little Eagle, *Lophoictinia isura* Square-tailed Kite, *Petroica rodinogaster* Pink Robin, *Cercartetus nanus* Eastern Pygmy-possum, *Mastacomys fuscus* Broad-toothed Rat, *Myotis macropus* Southern Myotis, *Pseudomys fumeus* Smoky Mouse, *Aprasia parapulchella* Pink-tailed Legless Lizard, *Litoria castanea* Yellow-spotted Tree Frog, *Pseudophryne corroboree* Southern Corroboree Frog.
  - There was a lack of available literature to inform survey suitability for the four remaining flora species: *Pterostylis alpina, Pterostylis foliata, Pterostylis oreophila* and *Thesium australe*. However, given timeframes since fire, observed recovery within understorey habitats and recent positive species detections within proximity to burnt habitats (i.e. orchids in McPhersons Plain), it was concluded that survey for these species was appropriate.
  - Available literature and data suggested that the remaining 11 threatened fauna species may respond negatively to fire. Therefore, surveys targeting these species were considered insufficient for determining the species presence/absence. These species have been assumed present in associated PCTs that were severely burned within the amended project footprint. These species include: *Callocephalon fimbriatum* Gang-gang Cockatoo, *Ninox connivens* Barking Owl, *Ninox strenua* Powerful Owl, *Tyto novaehollandiae* Masked Owl, *Tyto tenebricosa* Sooty Owl, *Petauroides volans* Greater Glider, *Petaurus norfolcensis* Squirrel Glider, *Petaurus australis* Yellow-bellied Glider, *Phascogale tapoatafa* Brush-tailed Phascogale, *Phascolarctos cinereus* Koala and *Cyclodomorphus praealtus* Alpine She-oak Skink.

9.4 Resource flows and sinks

In accordance with the DPIE (2020c) guideline, locations of likely resource flows and sinks include locations where moisture and nutrients are likely to accumulate and support more rapid regeneration of vegetation post-fire. These sites are considered important for the recovery of bushfire affected lands within the locality and would be retained where practicable. Likely resource flows and sinks within the amended project footprint are shown in Figure 9-1 (Attachment 5) and include:

- low lying areas containing swampy and riparian vegetation
- mapped waterways, as these are likely to transport and accumulate nutrients and sediments.

10 Aquatic species and habitats

This section addresses threatened aquatic species and matters relating to the FM Act and EPBC Act.

A total of 1,548 stream sections (i.e. including tributaries and separate sections of stream that are intersected at multiple locations) are located within the amended project footprint (refer to Figure 10-1 Attachment 5) which traverses the Hawkesbury-Nepean, Lachlan and Murrumbidgee catchments. Seventy-eight per cent of these waterways are first and second order streams, reflecting the dominance of smaller streams within the amended project footprint. Major rivers that occur within the amended project footprint include the Lachlan River, Murrumbidgee River and Tumut River as well as several major creeks that are tributaries of these major rivers.

The assessment of aquatic species and habitats addresses the two most relevant aims of the FM Act. First, the conservation of threatened species, populations or ecological communities. Second, an assessment of potential impacts to mapped Key Fish Habitat (KFH). An assessment of the likelihood of threatened species, populations and ecological communities occurring within the alignment is undertaken in Section 10.1. Key Fish Habitat and potential habitats for threatened aquatic species that are likely to be subject to direct impacts are described in Section 10.2.

10.1 Threatened aquatic species and communities

Seven threatened aquatic species and one threatened aquatic ecological community have been identified as having the potential to occur within the amended project footprint, as detailed in Table 7-9 and Section 7.6. An assessment of the likely occurrence of threatened aquatic biota following the assessment of habitats as documented in Section 10.1 is detailed in the following section.

10.1.1 Threatened aquatic species

Southern Pygmy Perch (*Nannoperca australis*)

The available information on the known distribution of Southern Pygmy Perch (*Nannoperca australis*) is somewhat at odds with the indicative distribution mapping published by DPI, given that the species may be close to extinction (Morris et al., 2001) and the poor dispersal capabilities of this species (Hammer, 2002; Cook et al., 2007). The indicative distribution mapping includes a significant amount of stream length in the Upper Lachlan and Murray River catchments, presumably reflecting the inclusion of the MaxEnt predicted maximum extent of the species using environmental variables from known locations (DPI, 2015a) in the dataset rather than recent records.

The Southern Pygmy Perch was once widely distributed throughout the Lachlan, Murrumbidgee and Murray River system. In NSW, the species is now restricted to sections of three waterways in New South Wales, which include a tributary of the Lachlan River (Blakney Creek near Yass) and two tributaries of the Murray River, aside from five additional conservation stocking sites (DPI, 2013; TSSC, 2021a; Commonwealth DCCEEW, 2022b) the location of which do not appear to be published. The species is considered locally extinct in the Murrumbidgee River catchment. Lintermans (2007) notes that the Southern Pygmy Perch has now disappeared from most locations in NSW, with previously recorded populations from the Normans Lagoon and Millewa Forest sites now considered extinct (DPI, 2015b). The Blakney Creek population of Southern Pygmy Perch was discovered in 2002, although subsequent surveys have failed to detect Southern Pygmy Perch outside Blakney Creek and its tributaries. In fact, recent surveys within Blakney Creek show a marked decline in both the abundance and distribution of this population over the survey period (DPI, 2015b). A stocked population of Southern Pygmy Perch within Pudman Creek is surviving and recruiting, however there is no evidence of their colonisation away from the initial stocking locations (DPI, 2015b). None of these known distributions occur within the amended project footprint. One remnant population of the Murray-Darling Basin lineage exists in Blakney Creek, a tributary draining northward into the upper Lachlan River catchment, near Yass (TSSC, 2021a). Both Yellow Creek and Bango Creeks occur in proximity to the Blakney Creek sub-catchment and intersect with the amended project footprint, however the catchments of these streams are separate from that of Blakney Creek, instead draining south into the Yass River. Information from DPI Fisheries (DPI, 2023b) identifies that there is a population extant in Oolong Creek within the amended project footprint, although no access tracks are proposed at this creek. A population of Southern Pygmy Perch within the amended project footprint was recently described at Oolong Creek (Lintermans et al., 2022). Although the pest species Redfin Perch (*Perca fluviatilis*) and European Carp (*Cyprinus carpio*) have not been recorded in Oolong Creek, they are present downstream at its confluence with Jerrawa Creek and pose a threat to the Southern Pygmy Perch population (Lintermans et al., 2022).

None of the known remaining populations of Southern Pygmy Perch would be impacted by the amended project. Potential impacts to the species are considered in Section 13.7.

The Southern Pygmy Perch prefers slow flowing or still waters in small streams, billabongs, vegetated lakes and irrigation channels with dense aquatic vegetation and habitat cover (Lintermans, 2007). These habitats are generally absent from the desktop assessment of aquatic habitats. Where these habitats do occur in some form, they are typically limited and have been subject to degradation from deleterious processes such as grazing and riparian clearing.

Macquarie Perch (*Macquaria australasica*)

Macquarie Perch (*Macquaria australasica*) from the Murray-Darling Basin strain of the species may occur in the upstream reaches of the Lachlan, Murrumbidgee and Murray rivers. Indicative distribution mapping by DPI for the species includes the Lachlan River and Adjungbilly Creek within amended project footprint, although a number of streams may be within the historic distribution of the species (DPI, 2015c; DPI, 2016a). The species is unlikely to occur within the Murrumbidgee River in the amended project footprint, with the population of this river occurring upstream, south of Canberra (DEE, 2018).

The Macquarie Perch may occur in stream or lake habitats, with a preference for upper river reaches or tributaries, and lake dwelling individuals of the species would migrate into these habitats to spawn (DPI, 2016b). Typical habitat for the species is described as being a large and moderately deep pool immediately upstream of fast-flowing broken water with aquatic vegetation and additional cover in the form of large boulders, debris and overhanging banks, with stream shading provided by steep rock faces, riparian trees or over hanging bank vegetation (DEE, 2018).

Within the amended project footprint, the species has the potential to occur within the Lachlan River and Adjungbilly Creek. Potential impacts to the species are considered in Section 13.7.3.

Murray Crayfish (*Euastacus armatus*)

The majority of the Murray Crayfish (*Euastacus armatus*) population occurs in NSW, but the species is also found in the ACT, Victoria and South Australia. The species occurs in lotic waters in the southern Murray Darling Basin, including the Murray and Murrumbidgee catchments below approximately 700 metres above sea level, although the natural range may also include the headwaters of the Macquarie and Lachlan catchments (Fisheries Scientific Committee (FSC), 2013). The Murray Crayfish may occur within the Murrumbidgee catchment, with indicative distribution mapping including 10 streams within the amended project footprint, as identified in Table 101. The species may occupy a range of habitats from pasturelands to sclerophyll forest with cool, well oxygenated flowing water (DPI, 2019) and could occur within the amended project footprint. Potential impacts to the species are considered in Section 13.7.3.

Flatheaded Galaxias (*Galaxias rostratus*)

The Flatheaded Galaxias (*Galaxias rostratus*) is restricted to the southern Murray-Darling Basin (Lintermans, 2007), although the species once occurred in the middle reaches of the Lachlan, Murrumbidgee and Murray River catchments in New South Wales (TSSC, 2016a; Commonwealth DCCEEW, 2022c). The last Flatheaded Galaxias record in the Murrumbidgee River was in 1971 and the Fisheries Scientific Committee (2008a) suggest the species may be locally extinct from Murrumbidgee and Lachlan rivers. This is contrary to the indicative habitat mapping (DPI, 2023a) which includes large sections of these major waterways and associated stream networks.

The species occurs in still and gently flowing small streams, lakes, lagoons, billabongs and backwaters with coarse sand or muddy substrate and aquatic vegetation (DPI, 2014). On the basis of these factors, it is considered unlikely to occur within the amended project footprint, however a precautionary approach has been adopted and potential impacts to the species are considered in Section 13.7.3.

Trout Cod (*Maccullochella macquariensis*)

The only known naturally reproducing (non-translocated) population of Trout Cod (*Maccullochella macquariensis*) occurs in the Murray River below Yarrawonga Weir (DPI, 2006a). Stocking has occurred at various locations within the Murrumbidgee River with some success. Stocking attempts however within the Tumut River have been unsuccessful or at least undetermined (Lintermans, 2007; Trout Cod Recovery Team, 2008).

The species occurs in a variety of flowing habitats, typically in the mid to upper reaches of rivers and streams with cover in the form of woody debris or boulders (Trout Cod Recovery Team, 2008). Habitats for the species require substantial amounts of large in-stream woody debris, which provides complex habitats supporting each life-cycle stage of the species (DPI, 2017). Potential impacts to the species are considered in Section 13.7.3.

Silver Perch (*Bidyanus bidyanus*)

Silver perch (*Bidyanus bidyanus*) are endemic to the Murray-Darling system (including all states and sub-basins) and previously occurred in a range of habitats. Silver Perch are generally found in lowland areas outside of cooler upstream waters, although the species may undertake large scale migrations into upstream reaches. Indicative distribution mapping for the species within the amended project footprint includes the Murrumbidgee River (DPI, 2016c; DPI, 2016a), although currently there is only one known strong viable natural population in the middle Murray region (TSSC, 2013). Silver Perch are generally found in faster flowing streams, including rapid habitats, and in more open water habitats. However, the species has also been stocked into impoundments. The species has the potential to occur in major streams within amended project footprint. Potential impacts to the species are considered in Section 13.7.3.

Riek's Crayfish (*Euastacus rieki*)

Riek's Crayfish is a small and spiny crayfish with dark brown dorsal colouration becoming lighter and redder along its sides. Riek's Crayfish have dark blue-green claws with a singular dactylar spine that distinguishes it from similar species (Commonwealth DCCEEW, 2023a). Riek's Crayfish was listed as Endangered under the EPBC Act in September 2023.

In terms of distribution, Riek's crayfish is endemic to the highlands of Southern NSW and ACT, typically at greater than 1,000 metres above sea level. Their habitat range encompasses the upper catchment areas of the Snowy, Murray and Murrumbidgee rivers. Broadscale predicted habitat mapping for the species (Commonwealth DCCEEW, 2023a) includes a large portion of the southern arm of the amended project footprint around the Bago State Forest and Maragle State Forest.

In terms of habitat, the Riek's Crayfish is restricted to small-moderate highland streams, bogs and other wetland zones. Riek's Crayfish requires accessible surface water whether it be within undisturbed woodland and grassland or modified grazing areas (Commonwealth DCCEEW, 2023a). Potential impacts to the species are considered in Section 13.7.3.

10.1.2 Threatened aquatic communities

Aquatic ecological community in the natural drainage system of the Lower Murray River Catchment

The lower Murray River aquatic ecological community (Aquatic ecological community in the natural drainage system of the Lower Murray River Catchment) includes the Murrumbidgee River below Burrinjuck Dam and the Tumut River below Blowering Dam (Figure 10-1 Attachment 5), while the Lachlan River and its tributaries are excluded from the aquatic ecological community. The lower Murray aquatic ecological community includes all native fish and aquatic invertebrates within all natural creeks, rivers and associated lagoons, billabongs and lakes of the regulated portions of the Murray, Murrumbidgee and Tumut rivers, as well as all their tributaries and branches (DPI, 2007). Potential impacts to the TEC are considered in Section 13.7.3.

10.1.3 Threatened aquatic species and communities not considered

Murray Cod (*Maccullochella peelii*)

Murray Cod (*Maccullochella peelii*) has the potential to occur within the amended project footprint in larger streams, particularly the Murrumbidgee River. However, any population present within these streams intersecting with the amended project footprint would not constitute part of any important population identified in the recovery plan for the species (National Murray Cod Recovery Team, 2010). The closest important population occurs in the Murrumbidgee River between Wagga Wagga and Hay. The upstream extent of this important population (Wagga Wagga) is over 200 kilometres downstream of the amended project footprint. Furthermore, the waterways intersecting with the amended project footprint are not located at the limit of the species range and it is considered unlikely that any population that may occur within the amended project footprint would represent a key source population for breeding or necessary for maintaining the genetic diversity of the species. As such, no important populations would be impacted by the amended project and as the species is not listed under the FM Act, the species is not considered further. Despite this, it is noted that the avoidance and mitigation measures presented within this BDAR would apply to any individuals not part of the important population that may occur within the amended project footprint Eel-Tailed Catfish (*Tandanus tandanus*).

SEARs advice provided by DPI (2022b) identified the Eel-Tailed Catfish (*Tandanus tandanus*) as potentially occurring within the amended project footprint. The Eel-Tailed Catfish is not listed under the EPBC Act but is part of an Endangered Population within the Murray-Darling Basin listed under the FM Act. It is considered that there is an overall low likelihood of individuals from the Endangered Population of this species occurring within amended project footprint, as the amended project footprint does not intersect with any indicative distribution mapping for the Endangered Population published by DPI (2016a) and the species is now virtually absent from the Murrumbidgee catchment (DPI, N.D.b). In addition to this, there are a lack of identified post-1980 records by Lintermans (2007) in proximity to the amended project footprint and it seems the species was always relatively uncommon upstream of Wagga Wagga on the Murrumbidgee River, even prior to the significant decline of local populations post-1970s (FSC, 2008b). In consideration of these factors, the species is considered unlikely to occur within the amended project footprint and is not considered further within this BDAR.

Bald Carp Gudgeon (*Hypseleotris gymnocephala*)

The Bald Carp Gudgeon has a highly restricted distribution within the Upper Lachlan Catchment, known from only two small streams in separate localities outside the amended project footprint. These are Meadow Creek, near Gunning and Urumwalla Creek northwest of Dalton (Commonwealth DCCEEW, 2023b). The Urumwalla Creek north-west of Dalton is not connected to any streams that flow downstream from the amended project footprint and therefore impacts are unlikely. The Meadow Creek Population near Gunning is located upstream of the amended project footprint and therefore would not be impacted by the amended project.

Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River

SEARs advice provided by DPI (2022) identified Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River (Lachlan River EEC) as requiring consideration. However, an inspection of coarse distribution mapping published by DPI (2006b) does not indicate any areas of this community that fall within the amended project footprint.

Furthermore, the amended project footprint does not intersect with any natural rivers, creeks, streams and associated lagoons, billabongs, lakes, wetlands, paleochannels, flood runners, effluent streams and the floodplains of the Lachlan River within the State of New South Wales that are considered part of the Endangered Ecological Community according to the Final Recommendation (FSC, N.D.). In consideration of these factors, the Lachlan River EEC is not considered further within this BDAR.

10.2 Access track and Key Fish Habitat (KFH) assessment

The objective of this section is to address the existing condition and potential for impacts to mapped KFHs or indicative threatened species distributions (DPI, 2023a) within the updated indicative disturbance area as a result of waterway crossings associated with access tracks.

An initial review of threatened aquatic species indicative habitat mapping within the updated indicative disturbance area (DPI, 2023a) identified that the majority of these streams are classed as having a "Very Poor" condition, with one classed as "Poor" condition or have no rating. These prevailing poor conditions align with the condition assessment informed by the desktop assessment points and field inspection across the updated indicative disturbance area, particularly in rural settings. While sensitive aquatic habitat features such as aquatic macrophytes, deep pools and large woody debris (LWD) may be present along these stream sections, where present these features were typically limited in extent. The streams are typically subject to some form of degradation including clearing, grazing or cropping within the riparian zone, channel incision, bank erosion or weed ingress (the most prevalent among these). These factors contribute to an overall picture of existing modified landscapes supporting generally low condition stream habitats within the updated indicative disturbance area.

The indicative construction methodology for the transmission line structures themselves avoid direct impacts to streams and waterways, discussed further in Section 13.5.5. Importantly, this includes the major waterways and majority of streams included in KFH mapping within the amended project footprint. The maximum impact to aquatic environments likely to occur at any of the waterways relevant to transmission lines would be the removal or trimming of tree canopy on waterway banks to facilitate the construction and operation of the transmission lines spanning riparian areas, as necessary. Tree trunk bases and understorey species would be retained in-situ adjoining the waterway banks, with riparian areas retaining their current function. The construction of waterway crossings to support access for the amended project has been identified as the primary pathway of potential impact to aquatic habitats as this would result in the direct disturbance to aquatic ecosystems.

A total of 1,548 stream sections (i.e. including tributaries and separate sections of stream that are intersected at multiple locations) occur within the amended project footprint, with 809 of these streams intersected by indicative waterway crossings. Of these, 662 are first order or second order streams, contributing to 82 per cent of all streams intersecting with the indicative waterway crossing locations. This reflects the dominance of smaller streams within the updated indicative disturbance area. First and second order streams on gaining stream networks, as well as farm dams on first and second order streams or unmapped gullies are not considered KFH unless they support habitat of a threatened aquatic species (Fairfull, 2013).

These streams that are intersected by the indicative waterway crossing locations are reflective of the findings described above, with the majority of these streams being in poor condition as a result of land clearing, online dam construction, clearing, grazing and cropping, as well as existing informal access track and waterway crossing construction. The existing impacts have resulted in deleterious processes such as bank erosion and channel incision and contribute to an overall picture of degraded aquatic habitats within the updated indicative disturbance area. Only indicative access tracks that occur within areas of mapped KFH, or indicative distribution mapping for threatened aquatic species (DPI, 2023a), are considered further in detail in this section.

A total of 192 indicative waterway crossings intersect with mapped KFH or indicative distribution mapping for threatened aquatic species (DPI, 2023a), or predicted habitat for Riek's Crayfish (DCEEW 2023x). These streams are most likely to present higher ecological values, higher stream orders and more permanent waters (as described in Section 4.8.2). This represents 24 per cent of all indicative access track locations that may require waterway crossings. A further 59 points intersect with the KFH habitat mapping buffer, but do not represent actual indicative crossings (eg access track runs parallel to a KFH stream). A detailed desktop assessment of aquatic ecological conditions at these 251 access track locations is detailed in Table 10-2. Also included in Table 10-2 are additional desktop aquatic assessment sites considered as part of previous indicative access track alignments now associated with previous iterations of the BDAR, but aid in the comprehensiveness of the assessment and support the overall coverage of the aquatic assessment across the amended project footprint.

The majority of these 192 indicative waterway crossings intersect with CLASS 1 (major KFH), with the remainder crossing CLASS 2 or 3 (moderate or minimal KFH). The following CLASS descriptions have been applied, following Fairfull (2013):

- CLASS 1: Major Key Fish Habitat - Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (eg river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.
- CLASS 2: Moderate Key Fish Habitat - Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present.
- CLASS 3: Minimal Key Fish Habitat - Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (eg fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other CLASS 1-3 fish habitats.
- CLASS 4: Unlikely Key Fish Habitat - Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free standing water or pools post rain events (eg dry gullies or shallow floodplain depressions with no aquatic flora present).

The streams subject to indicative waterway crossings are typically degraded and in a relatively poor condition. Where available, streams that have received freshwater fish community grades are described as "Very Poor".

The desktop assessment of these indicative crossing points (Figure 10-1 Attachment 5) was augmented by information gathered opportunistically during field investigation at 53 of these sites. Where relevant, field inspections that have taken place in proximity to indicative waterway crossing locations (eg a stream immediately downstream) have also been used to inform habitat assessments and provide context in terms of downstream receiving waters that may be impacted, identified in the photo captions Table 10-2.

Table 10-1: KFH and indicative waterway crossing points

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
Desktop aquatic assessment sites								
V13. 2-1	-	-	-	-	Murray Darling South	Not a crossing. KFH mapped is no longer extant, having been reclaimed to establish the substation. Track grade: N/A	-35.2015 147.3949	No field inspection.
V13. 2-2	Heffernan 's Creek	1	-	-	Hawkesbury -Nepean	Location has been heavily cleared and sits beneath the existing easement, with existing crossing present. Online dams are present upstream. Macrophytes may occur in the channel zone. The stream is assessed as a **CLASS 3** - minimal KFH stream. Track grade: New tracks	-34.6261 149.4165	No field inspection.
V13. 2-3	Kialla Creek	2	-	Very Poor	Hawkesbury -Nepean	Kialla Creek is cleared with an existing at the site of indicative access track. Bank erosion and channel incision is evident along the reach with very limited riparian vegetation or shading present. Although, sections of stream are likely to support instream macrophytes and permanent or semi-permanent pooling. The stream is assessed as a **CLASS 2** - moderate KFH stream. Track grade: New tracks	-34.5911 149.5162	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-4	Back Creek	3	-	-	Hawkesbury -Nepean	At the indicative point of crossing the Back Creek is completely cleared with exposed and incised banks. Back Creek is highly modified with an online dam just upstream of indicative crossing, one of multiple dams along the creek. The stream features limited fringing macrophytes with evidence of pugging as a result of stock access. Semi-permanent pools are present but are unlikely to be permanent. The stream is assessed as a **CLASS 3** - Minor KFH stream. Track grade: New tracks	-34.5825 149.5278	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-5	Middle Creek	5	-	Very Poor	Hawkesbury -Nepean	Middle Creek is largely cleared with some remnant riparian vegetation. There is an existing crossing (ford) at the indicative access track site. There is some fringing macrophyte cover with permanent pools. The stream is assessed as a **CLASS 1** - Major KFH stream. Track grade: New tracks	-34.5825 149.5359	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-6	First Creek	3	-	-	Hawkesbury -Nepean	First Creek is predominantly cleared flowing through modified pasture with isolated patches of remnant riparian vegetation. An existing crossing is also present. Fringing macrophytes occur along the channel zone. Semi-permanent to permanent pools occur along this reach. Wetland vegetation occurs downstream where the channel opens out. The stream is assessed as a **CLASS 2** - moderate KFH stream. Track grade: Upgraded tracks	-34.5764 149.5608	

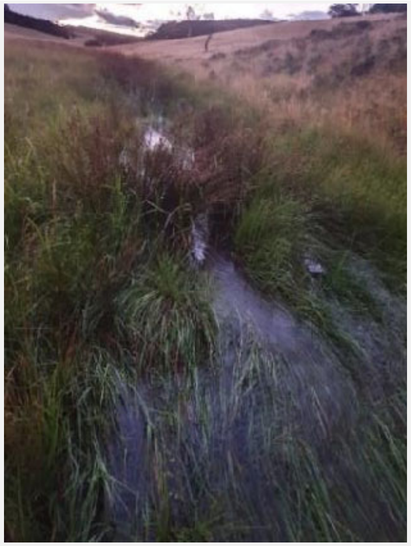
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-7	-	2	-	-	Hawkesbury -Nepean	This unnamed creek runs through cleared land with, In some parts, heavily eroded banks with bare topsoil. There is an existing crossing at the indicative access track site below an online dam. The creek likely has intermittent flow. Potential macrophyte beds and some in-stream rock habitat are present downstream of the dam below existing crossing. Pools appear to be semi-permanent to permanent with some fringing macrophytes present. The stream is assessed as a **CLASS 2** - moderate KFH stream. Track grade: Upgraded tracks	-34.566 149.5992	
V13. 2-8	-	-	-	-	Hawkesbury -Nepean	This access track runs adjacent to Pejar Dam, the intersection occurs with the KFH buffer associated with the waterbody and does not represent an actual crossing across KFH. Track grade: Upgraded tracks	-34.5654 149.59	No field inspection
V13. 2-9	-	3	-	-	Hawkesbury -Nepean	This unnamed creek runs through cleared pastural land with an existing track crossing below an online dam. Both offline and online dams are located throughout the stream network. The stream at the location of the crossing does not appear to support permanent pools, although wetland vegetation may be present. The stream is assessed as a **CLASS 3** – minimal KFH (desktop assessment). Track grade: Existing tracks/roads	-34.5552 149.6591	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-10	-	3	-	-	Hawkesbury -Nepean	This unnamed creek runs through completely cleared land with considerable areas of bank erosion evident. An existing crossing is present at the indicative access track site. Several online and offline dams are present along this section of stream network. The stream is assessed as a **CLASS 3** – minimal KFH (desktop assessment). Track grade: Existing tracks/roads	-34.552 149.6539	No field inspection
V13. 2-11	Pejar Creek	4	-	-	Hawkesbury -Nepean	At the site of the indicative access track Pejar Creek is highly modified with a major dam immediately upstream of the crossing site. An existing track is also present here. The land is mostly cleared, with signs of bank erosion. The stream is assessed as a **CLASS 3** – minimal KFH (desktop assessment). Track grade: New tracks	-34.5516 149.63	No field inspection
V13. 2-12	Steeves Creek	3	-	-	Hawkesbury -Nepean	Steeves Creek is predominantly cleared with patches of remnant vegetation, running through pasture. A series of elongated pools occur along the stream, with macrophytes likely to occur within these pools. The stream is assessed as a **CLASS 2** - moderate KFH stream. Track grade: Upgraded tracks	-34.5494 149.6515	No field inspection

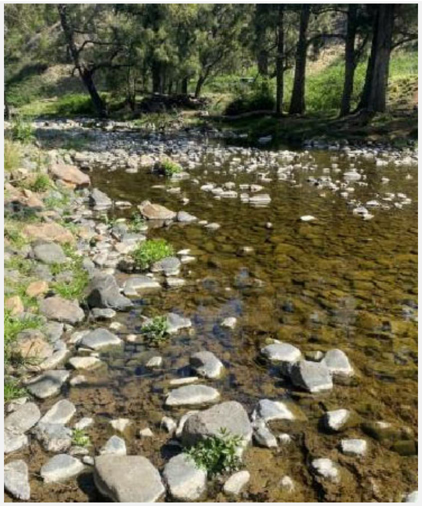
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-13, 14, 15 (V9-11)	Melamalong Creek	4	-	-	Hawkesbury-Nepean	The unnamed stream flows through cleared pasture. Upstream sections show a broad and densely vegetated channel zone fed by a network of tributaries that are subject to significant channel erosion. Riparian vegetation is restricted to occasional remnant stands but is largely absent. The water is discoloured in sections, but the presence of cobbles and overhanging bank vegetation present some habitat features, along with organic debris. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks A crossing is only indicative at V13.2-15.	-34.5419 149.6803	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-16	-	3	-	-	Hawkesbury -Nepean	This unnamed stream is heavily eroded with incised and runs through cleared pasture. The creek has multiple online dams, the main dam being the location of an existing crossing and the indicative access track site. The creek is a series of disconnected and mostly dry dams with minimal signs of permanent habitat. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Upgraded tracks	-34.5397 149.6831	
V13. 2-17, 18	-	-	-	-	Hawkesbury -Nepean	This Unnamed creek runs through a mix of cleared pasture as well as forested areas. It maintains a reasonably intact riparian strip throughout. The access track runs alongside mapped KFH but does not represent an actual crossing. Track grade: New tracks	-34.5239 149.7442	No field inspection
V13. 2-19 (V9-10)	-	4	N/A	N/A	Hawkesbury -Nepean	The stream appears to be perennial with sections of deeper pools separated by shallower reaches. An existing crossing is located at this stream section. Bank erosion is evident throughout the channel zone and associated tributaries and the riparian zone is highly diminished. The unnamed stream at the	-34.5176 149.7567	No field inspection.

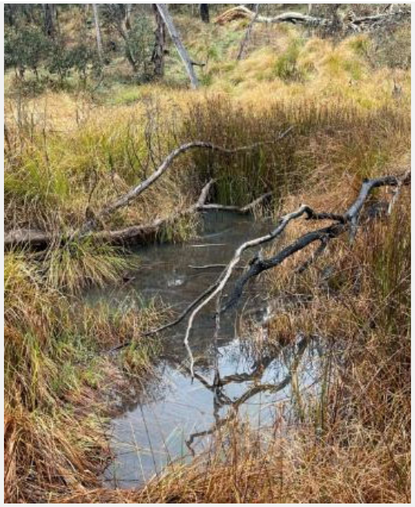
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks		
V13.2-20, 21	-	-	-	-	Hawkesbury-Nepean	The unnamed stream flows through cleared pasture. The stream is perennial with deeper pool sections separated by shallower sections characterised by macrophytes occurring within the low flow channel and banks. Downstream field assessment recorded emergent macrophytes, with the channel dominated by fine sediment and evidence of grazing. Bank erosion is evident throughout the channel zone and stream extent. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH stream**. Track grade: New tracks The access track runs alongside mapped KFH but does not represent an actual crossing of this stream.	-34.5044 149.7993	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-22, 23 (V9-9)	-	3	-	-	Hawkesbury-Nepean	The unnamed stream flows through cleared pasture. The stream is perennial with deeper pool sections separated by shallower section characterised by macrophytes occurring within the low flow channel and banks. Field assessment recorded emergent macrophytes, with the channel dominated by fine sediment and evidence of grazing. Bank erosion is evident throughout the channel zone and stream extent. Tributaries of the stream are variable in condition, with some entering from relatively intact areas of bushland to those characterised by entirely modified landscapes and major channel erosion evident. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks Point V13.2-23 does not represent a crossing, rather running alongside mapped KFH.	-34.5038 149.7955	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-24	-	3	-	-	Hawkesbury -Nepean	Unnamed stream flowing through mixed pasture with some overstorey vegetation within the riparian zone. An existing crossing occurs along this section of stream, with a major road bridge downstream of confluence below this point. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-34.501 149.813	

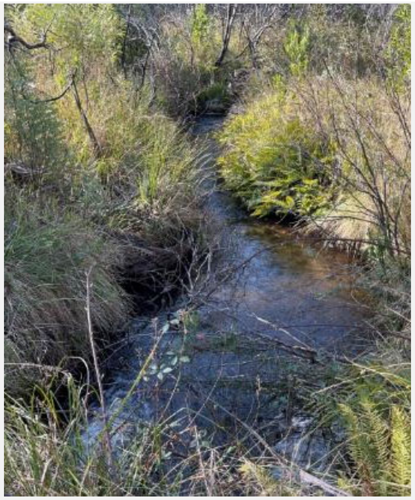
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-25, 26	Kerraway Creek	4	-	Very Poor	Hawkesbury -Nepean	Kerraway Creek runs through mostly well vegetated land. There are elongated pools likely flowing intermittently. The stream is relatively wide and cobble dominated. Limited snags are present. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream. Track grade: New tracks Point V13.2-26 does not represent a crossing, rather running alongside mapped KFH.	-34.446 149.9084	
V13. 2-27	Bannaby Creek	3	-	-	Hawkesbury -Nepean	Bannaby Creek runs through mostly well vegetated land, with an existing established crossing at this stream section. Elongated pools are present and are likely to flow intermittently. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-34.436 149.9541	No field inspection.
V13. 2-28	-	4	-	-	Hawkesbury -Nepean	This waterway flows through cleared land with some canopy vegetation in patches in the broader landscape. An existing crossing is present at this stream section. Bank erosion is evident with elongate pools occurring within the channel zone. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream.	-34.4351 149.9163	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: New tracks		
V13. 2-29	Bannaby Creek	4	-	-	Hawkesbury -Nepean	This waterway flows through cleared land with some canopy vegetation in patches in the broader landscape. An existing crossing is present at this stream section. Bank erosion is evident with elongate pools occurring within the channel zone. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	149.9163 149.9978	No field inspection.
V13. 2-30	-	4	-	-	Hawkesbury -Nepean	This waterway flows through cleared land, with online dams present upstream. An existing crossing is present at this stream section. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-34.4213 150.0182	No field inspection.
V13. 2-31	Logbridge Creek	3	Riek's Crayfish (DoE 2024)	-	Murray Darling South	Logbridge Creek runs through well vegetated land but crosses at a cleared patch of the existing easement, where an existing crossing is located. Semi-permanent to permanent pools are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.7847 148.3057	No field inspection.
V13. 2-32	Plain Creek	3	Riek's Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Plain Creek flows through cleared land into well vegetated forest downstream of the existing waterway crossing. Permanent pools are apparent, in particular upstream of the existing track where several tributaries meet. Aquatic macrophyte beds are likely.	-35.7634 148.2879	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads		
V13.2-33		3	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	An established track crossing is located at this point, with semi-permanent to permanent pools located upstream and downstream of the crossing. Aquatic macrophytes are present, with well forested areas surrounding the stream outside of the access track and existing easement. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.7433 148.2629	
V13.2-34	Tomney's Plain Creek	3	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	An established track crossing is located at this point, with semi-permanent to permanent pools located along the reach, with well forested areas surrounding the stream outside of the access track and existing easement. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.7348 148.2567	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-35	Long Creek	3	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	An established track crossing is located at this point, with semi-permanent to permanent pools located upstream and downstream of the crossing. Aquatic macrophytes are present, with well forested areas surrounding the stream outside of the access track and existing easement. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.7265 148.2448	No field inspection.
V13.2-36	Long Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	An established track crossing is located at this point, with semi-permanent to permanent pools located upstream and downstream of the crossing. Aquatic macrophytes are present, with well forested areas surrounding the stream outside of the access track and existing easement. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Upgraded tracks	-35.7255 148.247	No field inspection.
V13.2-37	McGregor's Gully	3	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	McGregor's Gully runs through well vegetated forest and is crossed by an existing waterway crossing. Semi-permanent to permanent waters are likely to be present with intermittent flow. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Upgraded tracks	-35.7213 148.2473	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-38	Long Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Long Creek at this location occurs within the existing easement. The access track runs adjacent to mapped KFH but does not represent a crossing.	-35.7233 148.2482	No field inspection.
V13. 2-39	Long Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Long Creek at this location occurs within the existing cleared easement and is crossed by an existing waterway crossing. Semi-permanent to permanent waters are likely to be present with intermittent flow. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.7209 148.2501	No field inspection.
V13. 2-40	-	3	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	At this location the unnamed stream flows within the existing cleared easement and is crossed by an existing waterway crossing. Semi-permanent to permanent waters are likely to be present with intermittent flow. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6908 148.2454	
V13. 2-41	Honeysuckle Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Honeysuckle Creek flows within the existing cleared easement and is crossed by an existing waterway crossing. Semi-permanent to permanent waters are likely to be present with intermittent flow. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping.	-35.6796 148.2435	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: Existing tracks/roads		
V13. 2-42	Stockman 's Creek	3	-	Very Poor	Murray Darling South	Long creek runs through mostly well vegetated land. Semi-permanent to permanent waters are likely to be present with intermittent flow. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6603 148.2342	
V13. 2-43	Buddong Creek	5	Riek's Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Buddong Creek flows predominantly through well vegetated land. Permanent waters are likely to be present with intermittent flow. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6553 148.2146	No field inspection.
V13. 2-44	Buddong Creek	5	Riek's Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	The unnamed waterway at this location occurs within well vegetated land. The access track runs adjacent to mapped KFH but does not represent a crossing.	-35.6461 148.2183	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 45, 46	Sheepyar d Creek	4	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murray Darling South	Sheepyard creek runs through well vegetated land with an existing access track running alongside it. The access track runs adjacent to mapped KFH but does not represent a crossing.	-35.6445 148.2121	
V13. 2-47	Sheepyar d Creek	4	Riek's Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	At this point Sheepyard Creek runs through well vegetated land with an existing track running through it with an established crossing present. Permanent or semipermanent pools are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6433 148.2083	No field inspection.
V13. 2-48	Weir Gully	2	Riek's Crayfish (Common wealth	-	Murray Darling South	Weir Gully runs through vegetated land. Vegetation obscures much of the waterway, although semipermanent pools are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1**	-35.6385 148.2095	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
			DCCEEW, 2023a)			**Major KFH** stream based on threatened species habitat mapping. Track grade: New tracks		
V13. 2-49	-	-	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murray Darling South	Yellowin Creek runs through a mix of well vegetated as well as cleared land. The access track buffer intersects with the KFH buffer, however this does not represent a crossing of mapped KFH.	-35.6292 148.1982	No field inspection.
V13. 2-50	Yellow Gully	3	Riek's Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	At this point Yellowin Creek runs through a mix of well vegetated as well as cleared land. A large bare soil zone associated with access tracks is located nearby as well as an established existing crossing. Ponding around the access tracks with macrophytes, as well as small streams on slopes are present in the vicinity. Both up and downstream of this point Yellowin Creek shows a mix of potentially semi-permanent to permanent pools as well as elongated shallower pooling. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6239 148.2018	
V13. 2-51	-	2	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murray Darling South	This Unnamed creek runs through well vegetated land and eventually joins Yellowin Creek. An existing track crossing runs through the waterway. Semipermanent pools and intermittent flows are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping.	-35.6211 148.1999	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: Existing tracks/roads		
V13. 2-52	Mandy Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	Mandys Creek runs through vegetated land, with an existing track and established crossing present. Ponding as well as intermittent flows are observed, along with emergent macrophytes. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Upgraded tracks	-35.6187 148.1666	
V13. 2-54	Gilmore Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	Gilmore Creek runs through vegetated land, with an existing track and established crossing present. Permanent pools and intermittent flows are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Upgraded tracks	-35.612 148.1556	No field inspection.
V13. 2-55	Snubba Creek	3	Riek's Crayfish (Commonwealth	-	Murray Darling South	Snubba Creek runs through mostly uncleared land except for clearing for a network of well-established tracks which cross the creek multiple times. The indicative access track buffer runs alongside the KFH	-35.5946, 148.1916	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
			DCCEEW, 2023a)			buffer, however this does not represent a crossing of mapped KFH at this point.		
V13. 2-56	Snubba Creek	4	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	Very Poor	Murray Darling South	This section of Snubba Creek is crossed by a network of established tracks, including at this location. Vegetation obscures much of the creek, however semipermanent pools are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6091 148.1954	No field inspection.
V13. 2-57	Gilmore Creek	5	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Gilmore Creek is a large stream that runs through predominantly pastured land with a reasonably intact riparian strip. An existing established crossing occurs along the access track. The creek shows a mix of pool and rocky / riffle habitat and likely macrophyte beds. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream based on threatened species habitat mapping. Track grade: Existing tracks/roads	-35.6024 148.171	No field inspection.
V13. 2-58	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murray Darling South	The stream runs through mostly uncleared land except for a network of well-established tracks. The indicative access track buffer runs alongside the KFH buffer, however this does not represent a crossing of mapped KFH at this point.	-35.6034 148.1936	No field inspection.
V13. 2-59	Snubba Creek	4	Riek's Crayfish (Commonwealth	Very Poor	Murray Darling South	The stream runs through mostly uncleared land except for a network of well-established tracks. The indicative access track buffer runs alongside the KFH buffer, however this does not represent a crossing of mapped KFH at this point.	-35.5945 148.1916	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
			DCCEEW, 2023a)					
V13. 2-60	Snubba Creek	4	Riek's Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Snubba Creek has been subject to a degree of clearing at this point, with Snubba Road crossing the stream and a network of established tracks in the vicinity. Rocky habitats occur along this reach, with permanent pools and macrophytes likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.5899 148.1921	No field inspection.
V13. 2-61	Bago Creek	3	-	Very Poor	Murray Darling South	Bago Creek runs through a mix of cleared and vegetated land but maintains a strong riparian corridor throughout. Semipermanent to permanent pools are likely, along with coarse woody debris. The existing Bago Creek Road crosses the creek at this location. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.5706 148.0602	No field inspection.
V13. 2-62	-	-	-	-	Murray Darling South	This unnamed tributary of Gilmore Creek flows through cleared land and alongside a well-established track. The indicative access track buffer runs alongside the KFH buffer, however this does not represent a crossing of mapped KFH at this point.	-35.5675 148.1847	No field inspection.
V13. 2-63	Gilmore Creek	5	-	Very Poor	Murray Darling South	Gilmore Creek is a large stream flowing through predominantly cleared land interspersed by some well vegetated sections. A well-established track runs through the creek at this point. There are remnants of riparian vegetation throughout, although at low densities. The creek is comprised of	-35.5664 148.1771	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						mostly elongate pools, with macrophytes likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads		
V13. 2-64	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murray Darling South	This unnamed tributary of Gilmore Creek flows through cleared land and alongside a well-established track. The indicative access track buffer runs alongside the KFH buffer, however this does not represent a crossing of mapped KFH at this point.	-35.5661 148.1813	No field inspection.
V13. 2-65	-	-	-	-	Murray Darling South	The indicative access track buffer runs alongside the KFH buffer around Gilmore Creek, however this does not represent a crossing of mapped KFH at this point.	-35.5652 148.1769	No field inspection.
V13. 2-66	Bago Creek	4	-	Very Poor	Murray Darling South	Bago Creek runs from forested land into cleared land with a strip of riparian vegetation (distinct from the forest area) along the stream. The stream is crossed by an established dirt road, before the crossing is a wetland zone with good macrophyte presence and large pools. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.5597 148.0528	No field inspection.
V13. 2-67	-	-	-	-	Murray Darling South	Yaven Yaven Creek runs through agricultural and forested areas but maintains a good riparian corridor. The indicative access track buffer intersects with the KFH buffer of Yaven Yaven Creek but no additional crossing is proposed.	-35.5247 148.0493	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-68	German Creek	3	-	-	Murray Darling South	Germans Creek runs through forested land with a distinct riparian zone. It is dammed at an existing crossing and there are multiple dams on small tributaries nearby, although Germans Creek still supports intermittently flowing pools. Bank erosion and channel incision occurs along this stream. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.4993 148.0642	
V13. 2-72, 73, 75	Adelong Creek	4	Murray Crayfish (Common wealth DCCEEW, 2023a)	Very Poor	Murray Darling South	Adelong Creek runs through agricultural and forested areas but maintains a riparian corridor. A network of existing established tracks occurs within the landscape. The indicative access track buffer intersects with the KFH buffer of Adelong Creek but no additional crossing is proposed.	-35.4826 148.0788	No field inspection.
V13. 2-74	Nacki Nacki Creek	3	-	Very Poor	Murray Darling South	Nacki Nacki Creek runs through a mix of cleared and forested land and is crossed multiple times by existing tracks, including at this location. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.4768 148.0392	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-76	Nacki Nacki Creek	4	-	Very Poor	Murray Darling South	Nacki Nacki Creek runs through a mix of cleared and forested land and is crossed multiple times by existing tracks, including at this location. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.4462 148.042	No field inspection.
V13. 2-77	Wilson's Creek	2	-	-	Murray Darling South	Wilsons Creek flows through cleared land with existing informal crossings. Wilsons Creek is a mix of incised meandering stretches interspersed by larger pools which likely flow intermittently. A large portion of these pools are likely to support macrophyte beds. Rocky habitats may also be present. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-35.4201 148.1336	No field inspection.
V13. 2-78	Wilson's Creek	3	-	-	Murray Darling South	Wilsons Creek runs through cleared land with bank erosion evident along this reach. An existing crossing is present. Semi-permanent to permanent pools are likely, as are macrophytes and rocky habitats. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-35.4182 148.1334	No field inspection.
V13. 2-79	Cockatoo Creek	4	-	-	Murray Darling South	Cockatoo Creek is a relatively large stream with many upstream tributaries running through mostly cleared land with portions of riparian vegetation on one bank. Cockatoo Creek has a relatively high density of deep pools connected by shallower sections and is likely to flow intermittently. Macrophytes and rocky habitats are likely to be present. The stream at the indicative waterway	-35.4179 148.1409	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks		
V13. 2-80	Sharp's Creek	3	-	Very Poor	Murray Darling South	Sharps Creek runs through a mix of cleared, cropped and forested land bet retains some riparian vegetation, which has been partly cleared. This creek is a series of mostly elongated pools. An existing track crosses Sharps Creek at this location. Macrophytes and rocky habitats are likely to be present. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-35.4157 148.065	No field inspection.
V13. 2-81	Uncle's Creek	3	-	-	Murray Darling South	Uncles Creek runs through a mix of forested and cleared land with multiple existing tracks running across it, including at this location. The stream is comprised predominantly of long narrow stretches with incised banks and limited riparian vegetation. The stream at the indicative waterway crossing is assessed as a **CLASS 3 Minor KFH** stream. Track grade: Existing tracks/roads	-35.4146 148.0567	No field inspection.
V13. 2-82	Uncle's Creek	-	-	-	Murray Darling South	The indicative access track buffer intersects with the KFH buffer of Uncles Creek but no additional crossing is proposed.	-35.4132 148.0576	No field inspection.
V13. 2-83	-	2	-	-	Murray Darling South	This Unnamed tributary of Nacki Nacki Creek runs through forested land but with a wide riparian zone distinct from the forestry areas. Semi-permanent pools and intermittent flow are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 3 Minor KFH** stream.	-35.4089 148.0326	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: Existing tracks/roads		
V13. 2-84	-	-	-	-	-	The indicative access track buffer intersects with the KFH buffer of Nacki Nacki Creek but no additional crossing is proposed.	-35.408 148.0323	No field inspection.
V13. 2-85	-	-	-	-	Murray Darling South	The indicative access track buffer intersects with the KFH buffer of Nacki Nacki Creek but no additional crossing is proposed.	-35.4075 148.0317	No field inspection.
V13. 2-86	Nacki Nacki Creek	4	-	Very Poor	Murray Darling South	At this point Nacki Nacki Creek runs through cleared land with stretches of bank erosion evident and isolated canopy riparian vegetation. Macrophytes and rocky habitats are likely. An existing informal crossing is present at this location. Permanent waters and flows are likely. The stream at the indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.4059 148.031	
V13. 2-87	-	-	-	-	Murray Darling South	The indicative access track buffer intersects with the KFH buffer of Nacki Nacki Creek but no additional crossing is proposed.	-35.4042 148.0299	No field inspection.
V13. 2-88	Windowie Creek	3	-	-	Murray Darling South	Windowie Creek runs through cleared pasture. Its comprised of elongated pools with incised banks. Permanent aquatic habitats are likely to be limited.	-35.4007 148.1353	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						The stream at the indicative waterway crossing is assessed as a **CLASS 3 Minor KFH** stream. Track grade: New tracks		
V13. 2-89	-	-	-	-	Murray Darling South	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.399 148.1346	No field inspection.
V13. 2-90	-	3	-	-	Murray Darling South	This tributary of Right Arm Creek runs through a mix of forested and cleared land with minimal riparian vegetation. Two existing crossings occur at this location along established tracks. Some pools are present but overall limited likelihood of permanent aquatic habitat. The stream at the indicative waterway crossing is assessed as a **CLASS 3 Minor KFH** stream. Track grade: New tracks	-35.3899 148.0048	No field inspection.
V13. 2-91	Right Arm Creek	4	-	Very Poor	Murray Darling South	Right Arm Creek runs through forested, cleared and highly disturbed pasture land and forestry areas. An existing crossing is present at this location, associated with the network of established tracks in the landscape. A thin strip of riparian vegetation exists along this reach, with channel incision and bank erosion evident downstream. Semi-permanent to permanent pools may be present. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.3867 148.0036	No field inspection.
V13. 2-92	-	3	-	-	Murray Darling South	This tributary of Red Arm Creek runs through highly disturbed and cleared pastureland with an existing crossing along Millers Road. Mostly incised pools with some rocky habitat, macrophytes are likely	-35.3848 147.9998	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						within the low flow channel. Semi-permanent pools are present with intermittent flow likely. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads		
V13. 2-93 (V9-26)	-	3	-	-	Murray Darling South	The unnamed stream is assessed as a **CLASS 2 Moderate KFH** stream, with defined banks. Its extent is largely cleared within the updated indicative disturbance area, although stands of riparian vegetation exist upstream and downstream. The landscape is highly modified with dams present within the landscape. There is an existing informal crossing at this location. Track grade: Upgraded tracks	-35.377 147.9846	No field inspection.
V13. 2-97	Galvin's Creek	4	-	-	Murray Darling South	Galvin's Creek flows through cleared land with isolated riparian vegetation. An existing crossing is present, with a dam immediately downstream, one of several online dams on this stream network. Chennel incision and bank erosion are evident, macrophytes may be present within the dam. The unnamed stream is assessed as a **CLASS 2 Moderate KFH** stream, with defined banks Track grade: Upgraded tracks	-35.3731 147.8467	No field inspection.
V13. 2-101, 102	Darlows Creek	4	-	Very Poor	Murray Darling South	Darlows Creek runs through cleared pasture land with minimal riparian vegetation. Other disturbances include the presence of several online dams, and multiple dwellings in proximity to the creek. The creek is comprised mostly of elongated pools with incised banks, although deeper more permanent pools are present at meandering points likely flowing intermittently. Both macrophyte beds and areas of	-35.3695 147.9617	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						rocky habitat are present also. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks		
V13. 2-103	-	4	-	-	Murray Darling South	This reasonably large unnamed creek runs through cleared land with an existing crossing present. This creek has multiple tributaries that flow largely from bushland. The creek is comprised of elongated, incised channels. Although water permanence appears low, channel definition is clear. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-35.3644 147.8461	No field inspection.
V13. 2-104	-	-	-	-	Murray Darling South	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.3618 147.9318	No field inspection.
V13. 2-109	Windowie Creek	4	-	Very Poor	Murray Darling South	Windowie Creek runs through cleared pasture with remnant riparian vegetation present. Channel incision is evident, with a number of online dams in the locality. Semi-permanent to permanent pools, along with macrophytes, are likely. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-35.3537 148.1413	No field inspection.
V13. 2-110	Tarcutta Creek	6	Flathead Galaxias	Very Poor	Murray Darling South	Tarcutta Creek is a large river flowing through cleared pasture, largely without riparian vegetation. Bank attached bars are present, with macrophyte beds and riffles likely. An existing informal crossing (ford) is present immediately downstream of the indicative crossing location. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Upgraded tracks	-35.35 147.7821	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-111	College Creek	5	-	-	Murray Darling South	College Creek is a large creek running through mostly cleared pasture but with portions of intact riparian vegetation. Bank erosion is evident. The creek is predominantly comprised with shallower, elongated pools with larger pools at meandering corners, flowing likely intermittently. Macrophyte presence at the larger pools is likely. An existing informal (4wd) crossing appears to be present at this location, with an established road bridge downstream. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Upgraded tracks	-35.3433 147.7559	No field inspection.
V13.2-112	Comatawa Creek	4	-	-	Murray Darling South	Comatawa Creek runs through mostly cleared pastureland with multiple existing track crossings, including at this location. Some permanent pooling but not much in the way of good aquatic habitat. Very degraded. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.3389 147.7119	No field inspection.
V13.2-114 (V9-24)	Unnamed waterway	3	-	-	Murrumbidgee	The unnamed stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream, with its extent entirely cleared and grazed. An eroded and incised channel is evident, with a series of on-line dams interrupting connectivity. Track grade: Upgraded tracks	-35.3289 147.6977	No field inspection.
V13.2-115	-	-	-	-	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.3266 147.6469	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-116 (V9-29)	-	2	-	-	Murrumbidgee	The unnamed stream flows through cleared pasture and lacks riparian vegetation. A dam occurs immediately upstream of the indicative waterway crossing location, one of a series of dams along this stream network. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Upgraded tracks	-35.3258 147.686	
V13. 2-117	-	2	-	-	Murrumbidgee	This unnamed creek runs through cleared pasture land with multiple in line dams. An existing track runs through this location. The unnamed stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream, with its extent entirely cleared and grazed. An eroded and incised channel is evident, with a series of on-line dams interrupting connectivity. Track grade: Upgraded tracks	-35.324 147.664	No field inspection.
V13. 2-118	Keajura Creek	6	-	Very Poor	Murrumbidgee	Keajura Creek is a large creek running through predominantly pasture with good portions of riparian veg still existing, although the wider landscape is highly modified. The stream is crossed by established dirt tracks as well as a main sealed road. Large pools are present, with macrophyte beds. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.3234 147.6501	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-119 (V9-23)	-	3	-	-	Murrumbid gee	The unnamed stream flows through cleared pasture and lacks riparian vegetation. The indicative crossing location is between two online dams, part of a series of dams along this stream network. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Upgraded tracks	-35.3217 147.668	No field inspection.
V13. 2-120 (V9-22)	-	1	-	-	Murrumbid gee	The unnamed stream flows through cleared pasture and lacks riparian vegetation. A dam occurs immediately upstream of the indicative waterway crossing location, one of a series of dams along this stream network. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Upgraded tracks	-35.3114 147.6229	No field inspection.
V13. 2-121	-	2	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.3105 147.8798	No field inspection.
V13. 2-122	-	1	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.3079 147.609	No field inspection.
V13. 2-123	-	-	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.3071 147.6107	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 125 (V9- 21)	-	3	-	-	Murrumbid gee	The unnamed stream is located between a series of online dams amongst severely modified agricultural lands. The unnamed stream appears to be intermittent, although macrophytes occur within the channel zone. An existing track appears to cross the stream at this location. The surrounding landscape is dominated by agriculture with overstorey riparian vegetation absent. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-35.3054 147.6125	
V13. 2- 126	-	3	-	-	Murrumbid gee	The unnamed stream is located between a series of online dams amongst severely modified agricultural lands and is crossed by an established track. The unnamed stream appears to be intermittent, although macrophytes appear to occur within the channel zone. The surrounding landscape is dominated by agriculture with overstorey riparian vegetation absent. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-35.3048 147.616	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-127	Tooles Creek	5	-	-	Murrumbid gee	Tooles Creek is a large, though highly disturbed, system flowing through mostly cleared land with very thin, remnant riparian strip. There are both in line dams present as well as on many of the creek's tributaries. The surrounding land consists of large bare soil patches among dwellings, a large dirt track also crosses the creek. Tooles Creek appears to have intermittent flow through mostly elongate pools with largely eroded banks. There are some patches with likely macrophyte beds. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: New tracks	-35.304 147.5649	No field inspection.
V13. 2-128	Tooles Creek	6	-	Very Poor	Murrumbid gee	Tooles Creek again is large but severely disturbed. Macrophyte beds and permanent pools are present. Bank erosion is evident, with the stream already crossed by an existing informal crossing at this point. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Upgraded tracks	-35.3012 147.5528	No field inspection.

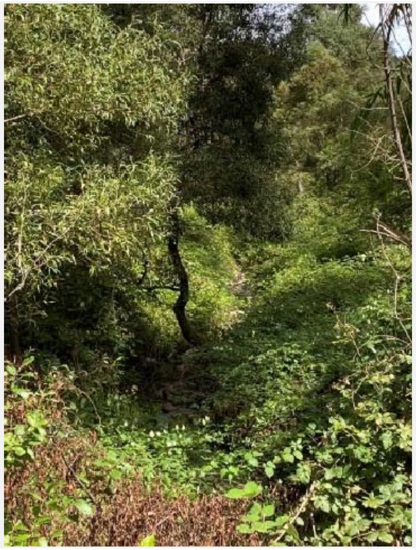
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-130	O'Brien's Creek	6	Flathead Galaxias	Very Poor	Murrumbidgee	O'Brien's Creek is a large system flowing through agricultural land but with a largely intact riparian strip. There is an existing crossing through the stream and many of the tributaries feature online dams. Despite this, there is evidence of extensive pooling with intact banks and coarse woody debris. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.2796 147.4926	
V13.2-132 (V9-30)	Big Spring Creek	4	-	-	Murrumbidgee	Big Spring Creek flows through modified paddocks, with an existing informal crossing present adjacent to this point. The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.2631 147.47	No field inspection.
V13.2-133	Foley's Gully	4	-	-	Murrumbidgee	Foley's Gully runs through cleared land and alongside a sealed main road. Without riparian vegetation and multiple online dams. Multiple track crossings are present. Some wetland areas connected by shallow, elongated pools yet only flowing intermittently with areas of potential microphyte establishment. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-35.2454 147.4515	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-134	Tywong Creek	4	-	-	Murrumbidgee	Tywong Creek is just downstream of Foley's Gully With similar habitat features. Elongated pools with highly eroded, incised banks, with large areas of exposed bank sediments. An existing established track crossing is present. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.2431 147.4359	No field inspection.
V13.2-135	-	-	-	-	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.2424 147.435	No field inspection.
V13.2-136	Gocup Creek	4	Murray Crayfish	Very Poor	Murrumbidgee	Gocup Creek flows through agricultural land with a largely intact riparian strip, with the exception the existing informal crossing at this location. There is a good mix of large, deeper pools connected by more narrow pools. Relatively intact banks are present throughout the system and macrophyte presence in some areas. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: New tracks	-35.2283 148.2087	No field inspection.
V13.2-137	-	3	-	-	Murrumbidgee	This tributary of Killimicat Creek runs through cleared pasture along an existing track. A drainage line with limited potential for permanent habitat. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing tracks/roads	-35.2261 148.2872	No field inspection.
V13.2-138	Killimicat Creek	5	-	Very Poor	Murrumbidgee	Killimicat Creek flows through cleared pasture with multiple tributaries many with on line dams. The riparian vegetation has been cleared, with an existing established access track present. Bank erosion is evident, although there is a good mix of	-35.2252 148.2954	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						larger pools connected by narrow sections and/or rocky riffle habitats. The stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads		
V13. 2-139	Sawpit Gully	4	-	-	Murrumbid gee	Sawpit Gully is a tributary to Killimicat Creek and runs through cleared pasture with other agricultural disturbances, including dwellings, on the banks as well as an existing crossing. The stream is mostly comprised of narrow pools with some deeper pools and rocky habitats likely flowing intermittently. The stream at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-35.2221 148.2921	No field inspection.
V13. 2-140 (V9-19)	-	3	-	-	Murrumbid gee	The stream is downstream of an online dam and appears to be discontinuous at the indicative crossing location. The broader landscape is highly modified by agriculture with the riparian zone severely diminished and downstream bank erosion evident. As the stream appears to be intermittent and is highly modified, it is assessed as a **CLASS 3 Minimal KFH** stream Track grade: Upgraded tracks	-35.22 148.278	No field inspection.

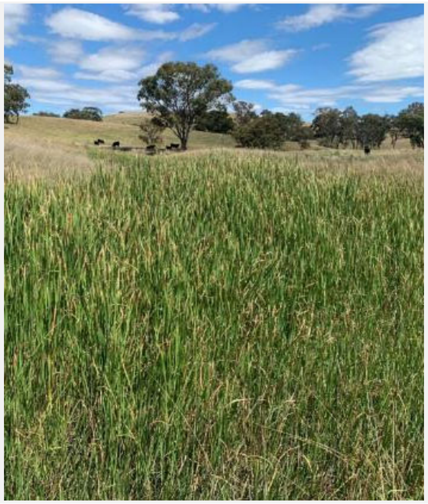
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 141	-	3	-	-	Murrumbid gee	This unnamed first order stream flows through cleared pasture with remnant patches of riparian vegetation present. An existing crossing runs through the waterway. The stream banks are incised, but mostly intact with macrophytes present. Semi-permanent pools likely flowing intermittently. The stream is assessed as a **CLASS 3 Minimal KFH** stream Track grade: Upgraded tracks	-35.2189 147.4022	
V13. 2- 142	-	3	-	-	Murrumbid gee	This unnamed first order stream flows through cleared pasture with remnant patches of riparian vegetation present. The stream banks are incised, but mostly intact with macrophytes present. Semi-permanent pools likely flowing intermittently. The stream is assessed as a **CLASS 3 Minimal KFH** stream Track grade: Upgraded tracks	-35.2169 147.4028	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-143	Sawpit Gully	4	-	-	Murrumbidgee	Sawpit Gully runs through cleared pasture with no riparian vegetation. An existing track crossing is present at this location. A large online dam is present further upstream. The creek is dominated by shallow, narrow pools with incised banks. Sawpit Gully is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-35.2081 148.2976	
V13.2-144	Brungle Creek	5	Murray Crayfish	Very Poor	Murrumbidgee	Brungle Creek is a large stream flowing through mostly cleared land with no riparian vegetation. Brungle Creek has a good mix of larger permanent pools interspersed by longer shallower sections with rocky/riffle areas. Vegetated sand bars and large macrophyte beds are also present. Overall, despite lack of surrounding vegetation, Brungle Creek has a good variety of aquatic habitat with high permanency. Brungle Creek is assessed as a **CLASS 1 Major KFH** stream. Track grade: New tracks	-35.1862 148.3356	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-145	Saw Mill Creek	1	-	Very Poor	Murrumbidgee	Saw Mill Creek runs through a mix of forested and undisturbed land with a mostly intact riparian zone except for clearing for the existing easement and an existing waterway crossing. Some interconnected wetland zones or macrophyte beds may be present, pools likely flowing intermittently. The stream is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing tracks/roads	-35.1157 148.3524	
V13.2-146	Saw Mill Creek	4	-	Very Poor	Murrumbidgee	Saw Mill Creek, downstream of 145, runs through a mix of forested and undisturbed land with a mostly intact riparian zone except for clearing for the existing easement and an existing waterway crossing. Rocky habitats are present. Some interconnected wetland zones or macrophyte beds may also be present. Saw Mill Creek is assessed as a **CLASS 2 Moderate** KFH stream. Track grade: Existing tracks/roads	-35.1089 148.352	No field inspection.
V13.2-147	-	4	-	-	Murrumbidgee	This unnamed creek runs through a forested zone upstream, but the landscape has been heavily modified and cleared at the crossing location. At the point of clearing the creek is crossed by a well	-35.1021 148.3723	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						established dirt trail. Reasonable potential for aquatic habitat in the forested area although very degraded with severe bank erosion, incision and minimal permanent habitat spots in the cleared zone. The waterway is assessed as a CLASS 2 Moderate KFH stream. Track grade: Existing tracks/roads		
V13. 2-148	-	4	-	-	Murrumbid gee	This small tributary of Adjungbilly Creek runs through cleared pastureland, an online dam occurs upstream of the existing crossing. Limited permanent aquatic habitat appears to be present downstream of the dam, with channel erosion and exposed bank sediments evident. The waterway is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing tracks/roads	-35.0925 148.3703	No field inspection.
V13. 2-149	-	1	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.0922 148.367	No field inspection.
V13. 2-150	-	1	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-35.0922 148.364	No field inspection.
V13. 2-151	-	2	-	-	Murrumbid gee	This small tributary of O'Brien's Creek runs through forested land with some remnant, riparian patches. This creek is crossed by well-established dirt track. Shallow pools with macrophytes present are likely. The waterway is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing tracks/roads	-35.0408 148.387	No field inspection.

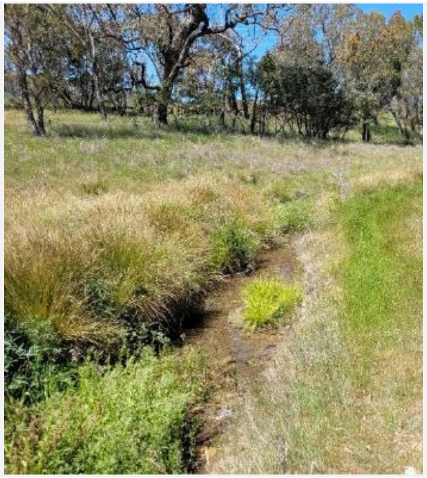
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-152	O'Brien's Creek	4	-	Very Poor	Murrumbidgee	O'Brien's Creek runs through forested land with a distinct riparian zone, although patchy in areas with clearing along this zone. A mix of larger pools connected by shallow, narrow areas flowing intermittently. Downstream, Forestry transitions to agricultural land use. Macrophytes are likely to be present. A large well established track crossing is present. The waterway is assessed as a **CLASS 1 Major KFH** stream. Track grade: Existing tracks/roads	-35.0399 148.3882	No field inspection.
V13.2-153	Cart Road Creek	4	-	-	Murrumbidgee	Cart Road Creek is a fourth order stream that appears to hold perennial pools with diminished semi-continuous riparian canopy species. The surrounding landscape has been heavily modified for agriculture with informal access tracks, dams and bank erosion evident. Cart Road Creek at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-34.988 148.3997	No field inspection.
V13.2-154	Yellow Clay Creek	3	-	Very Poor	Murrumbidgee	Yellow Clay Creek runs through mostly cleared land with very little remaining riparian vegetation and an existing track crossing. The Creek does include some larger pools with likely a good level of permanence connected by shallow, narrow sections as well as some likely rocky habitat. Some potential macrophyte beds may occur through the creek. Yellow Clay Creek at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads	-34.9583 148.4011	No field inspection.

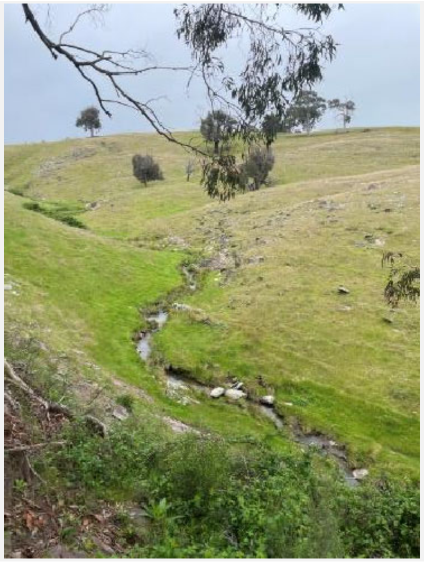
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 155	-	-	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.9579 148.4105	No field inspection.
V13. 2- 156	-	-	-	-	Murrumbid gee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.9576 148.4123	No field inspection.
V13. 2- 157	-	2	-	-	Murrumbid gee	This tributary to Yellow Clay Creek runs through cleared pasture, with some intact riparian vegetation upstream and downstream of the site. There is an existing crossing at this point, with an online dam upstream. The cleared section of this tributary features a mix dense macrophyte beds occurring up to the wetted perimeter of the stream. Channel incision is evident downstream of the. Yellow Clay Creek at the indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-34.9551 148.4169	
V13. 2- 158	Yellow Clay Creek	3	-	Very Poor	Murrumbid gee	Yellow Clay Creek runs through mostly cleared land with very little remaining riparian vegetation and an existing track crossing. The creek does include some larger pools with likely a good level of permanence connected by shallow, narrow sections as well as some likely rocky habitat. Some potential macrophyte beds may occur through the creek. Yellow Clay Creek at the indicative waterway	-34.953 148.431	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						crossing is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing tracks/roads		
V13.2-159	-	-	-	-	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.9203 148.458	No field inspection.
V13.2-160	-	-	-	-	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.9191 148.4586	No field inspection.
V13.2-161	-	3	-	-	Murrumbidgee	The unnamed steam flows through largely cleared pasture, with some canopy riparian vegetation present. The stream is crossed by an existing dirt crossing downstream of the point. Semi-permanent to permanent pools are likely, with potential for macrophyte beds to also occur. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-34.9172 148.461	No field inspection.
V13.2-162	Rocky Creek	2	-	Very Poor	Murrumbidgee	Rocky Creek runs through thinned but not entirely cleared land with only remnants of riparian vegetation present. Offline dams occur in the locality. Rocky Creek is comprised of elongated narrow pools with some small macrophyte beds present. An existing crossing is present at this point. Rocky Creek is considered a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-34.9173 148.466	No field inspection.
V13.2-163	Rocky Creek	3	-	Very Poor	Murrumbidgee	The indicative track alignment at this point features two stream crossings (at the site of established crossings) that occur immediately upstream of the	-34.9144 148.4602	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						confluence of Rocky Creek and its tributary [points 161 and 162]). Rocky Creek and its tributary are comprised of elongated narrow pools with some small macrophyte beds present. An existing crossing is present at this point. Rocky Creek is considered a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks		
V13. 2-164	Oak Creek	4	-	-	Murrumbid gee	Oak Creek runs though cleared pasture with some remnant riparian vegetation remaining. The creek has multiple small tributaries with dams and multiple existing track crossings. An existing major road crossing (Childowla Road) is present within the indicative track alignment. The creek is comprised mostly of elongated, shallow pools with pools likely to be permanent. There are patched of decent habitat (rocky/riffle zones and macrophyte beds). Oak Creek is considered a **CLASS 1 Major KFH** stream. Track grade: New tracks	-34.9015 148.5573	
V13. 2-165	Jugiong Creek	4	-	Very Poor	Murrumbid gee	Jugiong Creek runs through cleared agricultural land with a patchy riparian zone and many dammed tributaries in its system. Jugiong Creek runs alongside a sealed main road, with an informal crossing also present at this site. The creek is	-34.8791 148.6073	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						comprised of a mix of deeper more permanent pools interspersed by shallower, longer pools. Creek banks appear to be mostly in reasonable condition, with some macrophyte beds also likely to be present. The stream is considered a **CLASS 2 Moderate KFH** stream. Track grade: New tracks		
V13.2-166	-	2	-	-	Murrumbidgee	This unnamed tributary of Woolgarlo Creek runs through cleared land with patches of intact riparian vegetation. The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.8735 148.7171	
V13.2-167	-	2	-	-	Murrumbidgee	This unnamed tributary of Woolgarlo Creek is crossed by Black Range Road by an existing crossing. The landscape has been largely cleared, with some canopy riparian vegetation, with macrophyte beds and semi-permanent pools likely. The stream is considered a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-34.8719 148.7205	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-168	Woolgarlo Creek	3	-	-	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.866 148.7224	

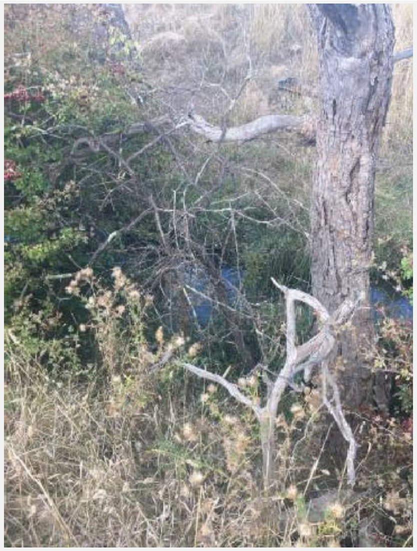
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 169	-	3	-	-	Murrumbid gee	This unnamed creek runs through mostly cleared and degraded agricultural land. A well established track crossing exists at this point. Rocky habitats and semipermanent to permanent pools are present. The stream is considered a **CLASS 2 Moderate KFH** stream. Track grade: Upgraded tracks	-34.8546 148.7505	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-170 (V9-14)	Derringullen Creek	5	-	Very Poor	Murrumbidgee	The indicative waterway crossing location is located along an informal existing access track along the banks of Derringullen Creek. The stream is characterised by bedrock control with some boulders present. Water clarity was described as turbid at the field assessment location. A limited riparian zone occurs along the immediate banks of the stream formed by the regular occurrence of native overstorey species and fringing macrophytes. Scattered Willows *Salix* sp. are also present along Derringullen Creek. The wider landscape is cleared and grazed, with similar conditions in the Yass River into which Derringullen Creek flows, downstream of the updated indicative disturbance area. Derringullen Creek is assessed as a **CLASS 1 Major KFH** stream given the inferred permanence of stream flow at this location. Track grade: New tracks	-34.8305 148.8104	
V13.2-171	Derringullen Creek	5	-	Very Poor	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.8167 148.844	No field inspection.
V13.2-172	Derringullen Creek	5	-	Very Poor	Murrumbidgee	Derringullen Creek at this point generally lacks riparian vegetation, with the surrounding landscape extensively cleared. An existing formal crossing is present at this point. Bank erosion is evident. Permanent flow and macrophyte beds are likely. Derringullen Creek is assessed as a **CLASS 1 Major KFH** stream given the inferred permanence of stream flow at this location. Track grade: Existing tracks/roads	-34.8165 148.852	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 173	-	3	-	-	Murrumbid gee	This small tributary of Derringullen Creek runs through cleared, degraded land with multiple track crossings and multiple dwellings along the banks. An existing dirt track crossing is also present. There are some small macrophyte beds, but lacks larger pools. This tributary is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing tracks/roads	-34.8161 148.85	No field inspection.
V13. 2- 174	Three-Waterhol es Creek	3	Southern Pygmy Perch	-	Murrumbid gee	Three Waterholes Creek runs through cleared degraded land, with significant bank erosion evident. Several dirt track crossings are present, including at the indicative access track site. Further, there is a major culvert a short distance downstream associated with the rail line. This notwithstanding, there are apparent semi-permanent to permanent pools with large macrophyte beds, including connected dams with apparent wetland vegetation. Three Waterholes Creek is assessed as a **CLASS 1 Major KFH** stream. Track grade: Upgraded tracks	-34.7713 149.0179	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 175 (V9- 13)	Yellow Creek	3	Southern Pygmy Perch	-	Murrumbid gee	This section of Yellow Creek appears to flow intermittently within a channelised stream with significant bank erosion apparent, in addition to a knickpoint downstream. Semi-continuous riparian vegetation occurs in thin bands along sections but is absent in others. Cleared land persists along both banks with minor fringing aquatic vegetation present. Numerous informal existing crossings are evident. The upstream stream network is similar in condition, with some online and offline dams present within the landscape. The upstream stream network does not extend into Bango Nature Reserve. Extensive agricultural land use dominates the surrounding landscape. Field inspection of stream conditions indicate extensive heavy bank incision and erosion, limited	-34.7692 148.9901	

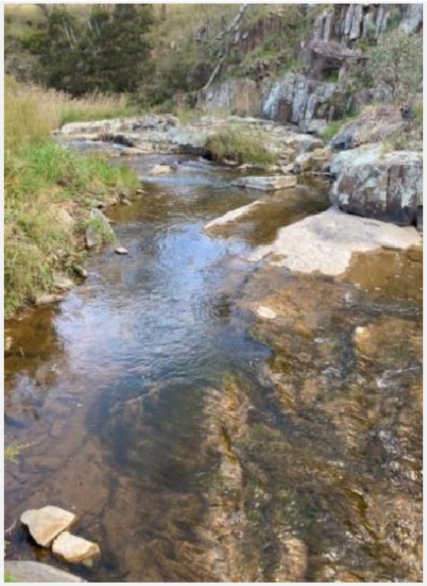
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						shading and elevated turbidity levels during baseflow conditions. Instream macrophytes were not present at this location. No freshwater fish community status classification is available. An existing informal crossing is present at this site, leading off in multiple directions from the creek bed, suggestive of generally prevailing dry conditions. Yellow Creek at the indicative waterway crossing point is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping., despite the marginal habitat conditions for the species at this site.		
V13.2-177	Three Waterholes Creek	3	Southern Pygmy Perch	-	Murrumbidgee	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.7666 149.0203	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-178	Bango Creek	3	Southern Pygmy Perch	-	Murrumbidgee	Bango Creek runs through predominantly cleared Agricultural land with a thin and patchy riparian strip. Downstream of the crossing point the creek has some larger pools with macrophyte beds that are likely permanent. Bank undercutting was observed in the field. Upper reaches of the creek are predominantly incised with evidence of bank erosion. There is an established existing track crossing present along the indicative access track alignment. No freshwater fish community status classification is available. Three Waterholes Creek at the indicative waterway crossing point is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-34.7663 148.9717	

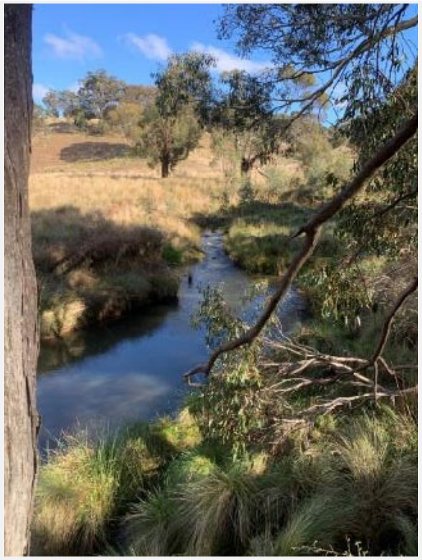
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-181	Catherines Creek	3	Southern Pygmy Perch	-	Lachlan	Catherines Creek runs through a mix of cleared pastural land (field inspection photo, downstream of the crossing location) as well as fragmented or remnant bush land (at the site of the indicative crossing alignment). The Creek has multiple existing track crossings as well as online dams in tributaries. The creek itself includes good mix of deeper more permanent pools interspersed by narrower channels including rocky habitats and fringing macrophytes. The indicative track alignment appears to follow an existing informal access track. No freshwater fish community status classification is available. Catherines Creek at the indicative waterway crossing point is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks	-34.7515 149.0525	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-182 (A-11)	Felled Timber Creek	3	-	-	Lachlan	Felled Timber Creek occurs within cleared pasture. Featuring a series of elongate pools separated by short sections of shallow or disconnected surface flows. Aquatic macrophytes occur within the channel zone that is dominated by fine sediment. Turbid conditions and bank erosion associated with grazing activity were observed. This section of Felled Timber Creek is connected to indicative mapping. of habitats for Southern Pygmy Perch and includes suitable habitat features. On this basis it is concluded the species has the potential to occur at this site and as such the stream is assessed as a **CLASS 1 Major KFH** stream. Track grade: New tracks	-34.7203 149.12	
V13.2-183	Jerrawa Creek	5	Southern Pygmy Perch	Very Poor	Lachlan	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.7029 149.1663	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-184	Jerrawa Creek	5	Southern Pygmy Perch	Very Poor	Lachlan	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.		No field inspection.
V13. 2-185	Jerrawa Creek	5	Southern Pygmy Perch	Very Poor	Lachlan	The indicative access track buffer intersects with the KFH buffer of the stream but no additional crossing is proposed.	-34.6964 149.1789	No field inspection.
V13. 2-186	-	2	-	-	Lachlan	This tributary of Dowling's Creek runs through cleared pasture with no riparian vegetation. There are multiple contributing tributaries with on-line dams as well as an existing track crossing. The creek is predominantly made up of long, narrower pools with eroded banks. Pools are likely to be semipermanent, macrophyte beds may be present. The stream is assessed as a CLASS 2 Moderate KFH stream. Track grade: Upgraded tracks	-34.692 149.1855	No field inspection.
V13. 2-187 (A-9)	Merrill Creek	4	Southern Pygmy Perch	Very Poor	Lachlan	The indicative access track buffer intersects with the KFH buffer of the stream, and runs in close proximity to the creek itself, but no additional crossing is identified in the indicative access track mapping at this point	-34.6786 149.2219	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-188 (A-9)						Merrill Creek has been assigned a “Very Poor” fish community status condition but is included in the indicative distribution mapping. for the Southern Pygmy Perch. An existing access track occurs at this location. The landscape is cleared and grazed with riparian vegetation lacking and the channel incised with some bank erosion evident. The stream is perennial with some aquatic vegetation present. Water clarity was described as turbid. Merrill Creek at the indicative waterway crossing point is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-34.6773 149.2157	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-189	Merrill Creek	4	Southern Pygmy Perch	Very Poor	Lachlan	Merrill Creek has been assigned a “Very Poor” fish community status condition but is included in the indicative distribution mapping. for the Southern Pygmy Perch. An existing access track occurs at this location. The landscape is cleared and grazed with riparian vegetation interrupted by cleared tracks. The stream is perennial with some aquatic vegetation present. The dominant substrate is sand, although some riffles are present. Merrill Creek at the indicative waterway crossing point is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks	-34.6744 149.2344	
V13.2-190	-	3	Southern Pygmy Perch	-	Lachlan	This unnamed tributary of Humes Creek (Very Poor fish community status) runs through cleared pasture with minimal riparian vegetation. Multiple existing track crossing are present, including an informal crossing at this point in the indicative track alignment. Although not a large creek, this tributary has a series of interconnected wetland areas with good macrophyte presence. These wetland areas also include some larger pools with likely higher permanence. Assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-34.6386 149.3758	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-191	Humes Creek	4	Southern Pygmy Perch	Very Poor	Lachlan	Humes Creek flows through fragmented bushland separated by agricultural zones with a number of tributaries that are interrupted by on-line dams. Semi-continuous riparian vegetation occurs along its longitudinal extent. Humes Creek is perennial with large pools connected by narrower sections and a few rocky/riffle habitats. An existing road bridge crossing is present. Assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-34.639 149.3749	
V13. 2-192	-	2	-	-	Hawkesbury -Nepean - South	This unnamed creek runs through a mix of cleared pasture with some fragmented bushland. The creek is quite degraded with multiple on-line dams and an existing established track crossing. Low potential for permanent aquatic habitat. The waterway is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing Tracks - Access	-34.5723 149.6583	No field inspection.
V13. 2-193	-	3	-	-	Hawkesbury -Nepean - South	This unnamed creek runs through a mix of cleared pasture with some fragmented bushland. The creek is quite degraded with multiple on-line dams and an existing established track crossing. Low potential for	-34.5807 149.6566	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						permanent aquatic habitat. The waterway is assessed as a **CLASS 3 Minimal KFH** stream. Track grade: Existing Tracks - Access		
V13. 2- 194	-	4	-	-	Hawkesbury -Nepean - South	This unnamed creek runs through cleared pasture with multiple tributaries with on-line dams. The creek is crossed by a well-established dirt track as well as a sealed main road. Dwellings and farming infrastructure are located along the banks. The creek has a series pools of variable size, with some potential for permanent aquatic habitat and macrophyte beds. The waterway is assessed as a **CLASS 2 Moderate KFH** stream. Track grade: Existing Tracks - Access	-34.5824 149.6254	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-197	Stockmans Creek	3	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	Very Poor	Murrumbidgee	Stockman's Creek runs through undisturbed native forest vegetation with an intact riparian zone throughout, with the exception of a dirt track crossing. No existing crossing is apparent at this indicative waterway crossing point. The creek is predominantly comprised of elongated pools with deeper pools present at confluences or meander bends. There appear to be areas of macrophyte beds as well as e rocky habitat. Assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.6617 148.2342	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 198	Germans Creek	3	-	-	Murrumbid gee	Germans Creek runs through forested land with an intact riparian strip distinct from the surrounding forestry. German's Creek crosses an existing track where the creek is dammed. Bank erosion is evident, with a number of existing crossings present. The indicative access track buffer intersects with the KFH buffer of the stream, and runs in close proximity to the Creek itself, but no additional crossing is identified in the indicative access track mapping at this point	-35.4969 148.0655	
V13. 2- 199	-	3	-	-	Murrumbid gee	This tributary of Adelong Creek flows through forested land with a distinct riparian zone that is bordered on both sides by dirt tracks, one of which crosses the creek. The indicative access track buffer intersects with the KFH buffer of the stream, and runs in close proximity to the creek itself, but no additional crossing is identified in the indicative access track mapping at this point	-35.4771 148.088	No field inspection.
V13. 2- 200	-	3	-	-	Murrumbid gee	This tributary of Adelong Creek flows through forested land with a distinct riparian zone that is bordered on both sides by dirt tracks, one of which crosses the creek. The indicative access track buffer	-35.4737 148.0877	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						intersects with the KFH buffer of the stream, and runs in close proximity to the creek itself, but no additional crossing is identified in the indicative access track mapping at this point		
V13. 2-201	-	4	-	-	Murrumbid gee	This unnamed creek flows through cleared pasture and is bordered by bushland on the eastern valley slope. The creek is comprised of a mix of deeper, more permanent pools interspersed by shallower, longer pools with areas of likely macrophyte beds also. Bank erosion is evident. While no existing crossing is apparent form the aerial imagery, informal access tracks occur along the banks. Assessed as a **CLASS 2 Moderate KFH** stream. Track grade: New tracks	-35.3578 147.8482	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-202	O'Brien's Creek	5	Flathead Galaxias	Very Poor	Murrumbid gee	O'Briens Creek is a stream running through mostly cleared agricultural land but with an intact riparian strip. There is evidence of agricultural disturbances throughout the system. The creek has large, permanent pools which are connected by a mix of riffle zones and narrower pools. Coarse woody debris is present. The indicative access track buffer intersects with the KFH buffer of the stream, and runs in close proximity to the creek itself, but no additional crossing is identified in the indicative access track mapping at this point	-35.2763 147.4944	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 203	-	3	-	-	Murrumbid gee	This tributary of O'Briens Creek has been extensively cleared for cropping and other agriculture, functioning more like an agricultural drain. Online dams occur along its extent, with gullying observed downstream at the confluence of O'Briens Creek. The indicative access track buffer intersects with the KFH buffer of the stream, and runs in close proximity to the Creek itself, but no additional crossing is identified in the indicative access track mapping at this point	-35.2757 147.4924	
V13. 2- 204	Gocup Creek	4	Murray Crayfish	Very Poor	Murrumbid gee	An existing crossing is located at the indicative crossing point along Gocup Creek. Although largely cleared pasture, remnant riparian canopy species occur along this part of the waterway. A narrow channel is evident, although lager pools occur throughout this stream section. Assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.2315 148.2137	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 205	Cooks Creek	4	Southern Pygmy Perch	-	Murrumbid gee	Cooks Creek has been extensively cleared, with isolated canopy riparian species remaining. The system is sand dominated and is comprised of narrow low flow channel sections and larger pool sections. The low flow channel is inset within larger microchannel banks, being largely disconnected from the floodplain. The indicative access track buffer intersects with the KFH buffer of the stream, and runs in close proximity to the creek itself, but no additional crossing is identified in the indicative access track mapping at this point	-34.7675 148.929	
V13. 2- 206	Merrill Creek	4	-	Very Poor	Lachlan	An established dirt road crosses this section of Merrill Creek. Intermittent pools occur along this section with macrophyte beds likely. Upstream, permanent pools are less likely with bank erosion and gullying evident. Immediately downstream Merrill Creek increases in size as tributaries join the main channel, with pool sizes increasing, and the integrity of riparian vegetation and the surrounding landscape also improving. Based upon the proximity and level of connectivity to Southern Pygmy Perch indicative habitat mapping. immediately downstream in Merrill Creek, this species is considered to have the potential to occur at this site. Assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-34.6595 149.2453	No field inspection.
V13. 2- 208	Yaven Yaven Creek	1	-	-	Murrumbid gee	This section of Yaven Yaven Creek is highly modified through a series of large on-line dams, such that little if any natural channel is left. An existing established crossing is present. The surrounding	-35.536 148.0621	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						landscape has been extensively cleared for agriculture, although some riparian vegetation remains between dams. Assessed as a **CLASS 3 Minor KFH** stream. Track grade: Existing Tracks - Access		
V13. 2-300	Yorkers Creek	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. Yorkers Creek is a small to moderate size stream flowing through the existing easement and has no existing crossing at the indicative track location, within native forest. While the track does not cross KFH mapping., the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.789367 148.310779	No field inspection.
V13. 2-301	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small to medium sized stream flowing through the existing easement. The track alignment is within the existing cleared easement but there is no existing crossing at the indicative track location. While the track does not cross KFH mapping., the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks	-35.782619 148.303177	No Field Inspection.
V13. 2-302	-	1	Riek's Crayfish (Commonwealth	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland and then onto the existing easement. The indicative access track alignment follows an existing established access track with an existing crossing.	-35.7808 148.300774	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
			DCCEEW, 2023a)			While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks		
V13. 2-303	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement but there is no existing crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.777454 148.300449	No field Inspection
V13. 2-304	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement but there is no existing crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.777567 148.29812	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-305	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.774881 148.297983	
V13. 2-306	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement but there is no existing crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.776083 148.296803	
V13. 2-307	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping.	-35.769323 148.292416	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: Existing tracks/roads		
V13. 2- 308	-	1	Riek's Crayfish (Common wealth DCCEEW ,2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement but there is no existing crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.770054 148.291579	
V13. 2- 309	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.758466 148.28663	No field inspection
V13. 2- 310	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping.	-35.757404 148.285192	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: Existing tracks/roads		
V13. 2- 311	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement but there is no existing crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.761478 148.282875	 Photo point just before easement.
V13. 2- 312	-	1	Riek's Crayfish (Common wealth DCCEEW ,2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.775695 148.268523	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-313	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small to medium sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.778515 148.262193	No field inspection
V13.2-314	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.72745 148.249352	No field inspection
V13.2-315	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping.	-35.74232 148.237999	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-316	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small to medium sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping., the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping.	-35.743504 148.237334	No field inspection
V13.2-317	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping.	-35.747852 148.236672	No field inspection
V13.2-318	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent and in close proximity to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping.	-35.753372 148.24017	No field inspection
V13.2-319	-	1	Riek's Crayfish (Commonwealth	-	Murrumbidgee	Riek's Crayfish desktop assessment. Modder Creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and	-35.761029 148.237238	No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
			DCCEEW, 2023a)			crossing at the proposed track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads		
V13. 2-320	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.764215 148.236187	No field inspection
V13. 2-321	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murray - East	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and bushland away from the main easement but through a second smaller easement. The access track alignment is within the existing cleared smaller easement with an existing track and crossing at the proposed track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.775499 148.237498	No Field Inspection.
V13. 2-322	-	1	Riek's Crayfish (Common wealth	-	Murrumbid gee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and crossing at the indicative access track	-35.713092 148.249811	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
			DCCEEW, 2023a)			location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads		
V13.2-323	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.710371 148.249587	No Field Inspection.
V13.2-324	Metty's Gully Creek	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. Metty's Gully Creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.697495 148.246385	No Field Inspection.
V13.2-325	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and crossing at the indicative access track location. While the track does not cross KFH	-35.686831 148.245199	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads		
V13.2-326	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing access track and crossing at the proposed track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.683659 148.245585	No Field Inspection.
V13.2-327	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through the existing easement. The access track alignment is within the existing cleared easement with an existing track and crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1 Major KFH** stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.67253 148.247905	No Field Inspection.
V13.2-328	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the easement. There is no existing track or track crossing at the indicative access track location. While the track does not cross KFH mapping, the stream is assessed as a **CLASS 1**	-35.670037 148.246982	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads		
V13. 2-329	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.668918 148.242809	No Field Inspection.
V13. 2-330	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.668988 148.240878	No Field Inspection.
V13. 2-331	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed creek is a small sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment does not follow an existing established track and is without an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major	-35.666936 148.237345	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						KFH stream, based on threatened species indicative habitat mapping. Track grade: New tracks		
V13. 2-332	Stockman 's -Creek	3	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. Stockman's Creek is a medium sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment does not follow an existing established track and is without an existing track crossing. The track crosses KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.662741 148.234246	No Field Inspection.
V13. 2-333	Stockman 's Creek	3	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. Stockman's Creek is a medium sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment does not follow an existing established track and is without an existing track crossing. The track crosses KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.663229 148.233988	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2- 334	-	3	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This unnamed creek is a medium sized stream flowing through bushland adjacent to the existing easement. The indicative access track alignment does not follow an existing established track and is without an existing track crossing. The track crosses KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.659489 148.233112	
V13. 2- 335	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through bushland at the site of the indicative easement. The indicative access track alignment does not follow an existing established track and is without an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.653989 148.229416	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-336	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.647093 148.225015	No Field Inspection.
V13. 2-337	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.654323 148.218092	No Field Inspection.
V13. 2-338	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This tributary of Buddong Creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.652248 148.215345	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-339	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This tributary of Buddong Creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.65047 148.215925	No Field Inspection.
V13.2-340	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed Creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.646019 148.21097	No Field Inspection.
V13.2-341	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed Creek is a small to medium sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.645705 148.210004	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-342	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This Unnamed Creek is a small to medium sized stream flowing through bushland adjacent to the indicative easement. The proposed small track alignment follows an existing established track with an existing track crossing. The widest track alignment also crosses this creek without an existing track or crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: New tracks	-35.639104 148.207673	No Field Inspection.
V13.2-343	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. Weir Gully is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.63495 148.204474	No Field Inspection.
V13.2-344	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping.	-35.616969 148.196554	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Track grade: Existing tracks/roads		
V13. 2-345	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This tributary of Snubba Creek is a small sized stream flowing through bushlandindicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.612259 148.195567	No Field Inspection.
V13. 2-346	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This tributary of Snubba Creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.610724 148.195911	No Field Inspection.
V13. 2-347	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small to medium sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.609024 148.196396	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-348	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed tributary of Snubba Creek is a small sized stream flowing through bushland adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.607629 148.195881	No Field Inspection.
V13.2-349	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed tributary of Snubba Creek is a small sized stream flowing through bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.606878 148.195667	No Field Inspection.
V13.2-350	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed tributary of Snubba Creek is a small sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.601741 148.193055	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-351	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.572977 148.19102	No Field Inspection.
V13. 2-352	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.572314 148.190162	No Field Inspection.
V13. 2-353	-	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small to medium sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.572279 148.188188	No Field Inspection.

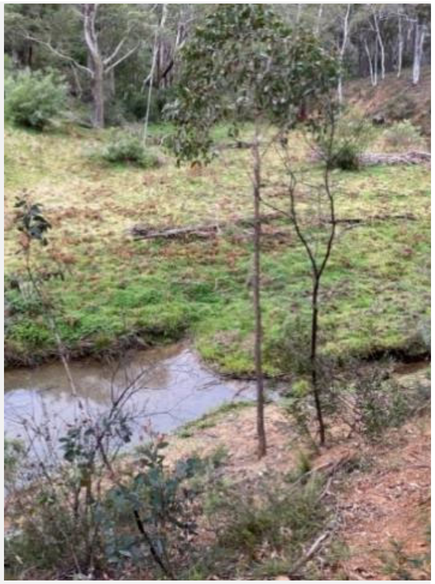
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.2-354	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.566764 148.182866	No Field Inspection.
V13.2-355	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.608728 148.185082	No Field Inspection.
V13.2-356	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and bush land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.606477 148.180726	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 2-357	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared land away from the indicative easement. The proposed track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.600959 148.175186	No Field Inspection.
V13. 358	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.60171 148.172204	No Field Inspection.
V13. 359	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through a mix of cleared and undisturbed land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.610994 148.155668	No Field Inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13.360	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through cleared land away from the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks	-35.609638 148.145715	No Field Inspection.
V13.361	-	1	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. This unnamed creek is a small sized stream flowing through cleared land within the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.610039 148.14578	No Field Inspection.
V13.362	Walker Creek	2	Riek's Crayfish (Commonwealth DCCEEW, 2023a)	-	Murrumbidgee	Riek's Crayfish desktop assessment. Walker Creek is a small to medium sized stream flowing through cleared land within the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks	-35.607632 148.14108	No Field Inspection.

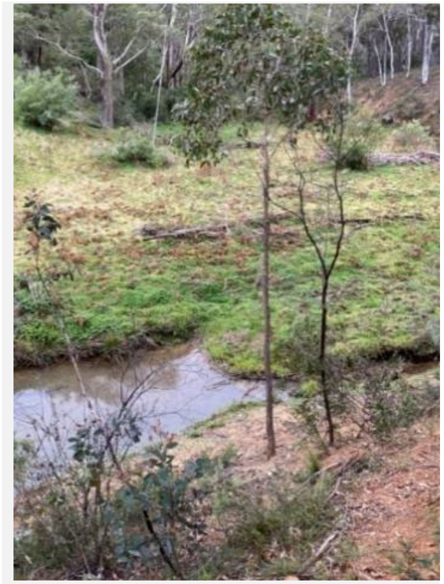
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V13. 363	Walker Creek	2	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. Walker Creek is a small to medium sized stream flowing through cleared land within the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Existing tracks/roads	-35.609797 148.140216	No Field Inspection.
V13. 364	-	1	Riek's Crayfish (Common wealth DCCEEW, 2023a)	-	Murrumbid gee	Riek's Crayfish desktop assessment. This unnamed creek is a small to medium sized stream flowing through cleared land adjacent to the indicative easement. The indicative access track alignment follows an existing established track with an existing track crossing. While the track does not cross KFH mapping, the stream is assessed as a CLASS 1 Major KFH stream, based on threatened species indicative habitat mapping. Track grade: Upgraded tracks	-35.606225 148.138427	No Field Inspection. `

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
Previous desktop aquatic assessment sites								
V9-1	Connors Creek	4	N/A	N/A	Hawkesbury -Nepean	Connors Creek: Connors Creek is located within a section of intact bushland. Connors Creek is predominantly a small stream over a mixture of substrate types, featuring occasional deeper pools. Connors Creek is largely unimpacted, apart from some grazing, although the landscape upstream and downstream of the updated indicative disturbance area has been cleared and grazed. The stream appears to be permanent and is assessed as a **CLASS 2 - Moderate KFH** stream.	-35.646019 148.21097	
V9-3	Unnamed waterway	1	N/A	N/A	Hawkesbury -Nepean	Unnamed Stream: The unnamed stream is approximately 280 m in length. The stream appears to be ephemeral and is assessed as a **CLASS 4 - Unlikely KFH** stream, flowing over a steep gradient into Connors Creek.	-35.639104 148.207673	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9-4	Unnamed waterway	3	N/A	N/A	Hawkesbury -Nepean	Unnamed Stream: The unnamed stream is part of a network of smaller tributaries that join and flow into Connors Creek. The stream occurs within a section of relatively intact bushland with a continuous riparian zone. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Connors Creek: The unnamed stream flows over a short distance over a high gradient slope into Connors Creek (within the updated indicative disturbance area).	-35.63495 148.204474	
V9-5	Unnamed waterway	3	N/A	N/A	Hawkesbury -Nepean	The unnamed stream flows over approximately 1.1 km into Connors Creek outside the updated indicative disturbance area. The stream flows through a section of relatively intact bushland with some clearing of riparian vegetation present. Farm dams and existing crossings are present along its course and tributaries. The stream appears to be intermittent and is assessed as a **CLASS 2 - Moderate KFH** stream.	-35.616969 148.196554	No field inspection.
V9-7		4	N/A	N/A			-35.610724 148.195911	

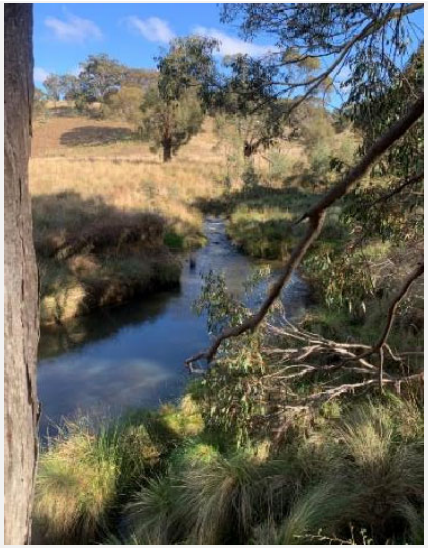
No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9-12	Connors Creek Unnamed waterway	1	Southern Pygmy Perch	N/A	Hawkesbury -Nepean Lachlan	Connors Creek: Connors Creek is located within a section of intact bushland. Connors Creek is predominantly a small stream over a mixture of substrate types, featuring occasional deeper pools. Connors Creek is largely unimpacted, apart from some grazing, although the landscape upstream and downstream of the updated indicative disturbance area has been cleared and grazed. The stream appears to be permanent and is assessed as a **CLASS 2 - Moderate KFH** stream. This mapped unnamed stream at the indicative access track location is highly modified, lacking channel definition or obvious flow, formed instead by a chain of online dams within a highly modified agricultural landscape. The indicative crossing location is situated at the most upstream extent of the mapped stream. The unnamed stream at the proposed indicative waterway crossing is assessed as a **CLASS 1 Major KFH** stream. While mapped as part of the Southern Pygmy Perch indicative threatened species distribution, no freshwater fish community status classification is available. Informal farm tracks are evident at this location which runs adjacent to the mapped stream. The landscape has been modified for agriculture, although stands of remnant canopy vegetation are scattered across the stream extent. The downstream Humes Creek appears to present variable conditions and habitats, eventually flowing into the Lachlan River. Humes Creek is included in a small section of Southern Pygmy Perch indicative distribution mapping., which is also	-35.609024 148.196396	 No field inspection

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						assigned a “Very Poor” freshwater fish community status.		
V9-15	Woolgarl o Creek	3	N/A	N/A	Murrumbid gee	Woolgarlo Creek flows through modified pasture adjacent to an existing access track. Nearby field investigation results indicate Woolgarlo Creek is an unshaded gravel bed dominated stream with clear surface water conditions, with both fringing and emergent macrophytes recorded with some bank undercutting. Overstory riparian vegetation was found to be largely absent, with some bank erosion evident. The surrounding landscape is dominated by agriculture. Woolgarlo Creek at the proposed indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream.	-35.607629 148.195881	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9-16	Unnamed waterway	3	N/A	N/A	Hawkesbury-Nepean	Unnamed Stream: The unnamed stream is part of a network of smaller tributaries that join and flow into Connors Creek. The stream occurs within a section of relatively intact bushland with a continuous riparian zone. The stream is assessed as a **CLASS 2 Moderate KFH** stream. Connors Creek: The unnamed stream flows over a short distance over a high gradient slope into Connors Creek (within the updated indicative disturbance area).	-35.606878 148.195667	
V9-18	Unnamed waterway	3	N/A	N/A	Murrumbidgee	The unnamed stream flows over a short distance over a relatively steep cleared landscape into Killimicat Creek, which is classed as having a "Very Poor" freshwater fish community status. The unnamed stream appears to be small, formed by short pool sections amongst rocky habitat. The surrounding landscape is dominated by agriculture. The unnamed stream at the proposed indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH stream**.	-35.601741 148.193055	No field inspection.
V9-20	Unnamed waterway	3	N/A	N/A	Murrumbidgee		-35.572977 148.19102	
V9-25	Unnamed waterway	3	N/A	N/A	Murrumbidgee		-35.572314 148.190162	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						The unnamed stream flows through cleared landscape into Killimicat Creek, which is classed as having a “Very Poor” freshwater fish community status. The unnamed stream is intermittent, with water held in bedrock pools along relatively high gradient slopes, with minor fringing and floating macrophytes. The surrounding landscape is dominated by agriculture with riparian vegetation absent. The unnamed stream at the proposed indicative waterway crossing is assessed as a **CLASS 2 Moderate KFH** stream. The unnamed stream is assessed as a **CLASS 2 Moderate KFH** stream, with defined banks. Its extent is entirely cleared and grazed. A series of elongate pools are evident within an incised channel. Wilds Road crosses the unnamed stream upstream of the indicative access track location.		 No field inspection.
V9-27	Stony Creek	3	N/A	Very Poor	Murrumbidgee	Stony Creek is a bedrock dominated third order stream, assessed as a **CLASS 2 Moderate KFH** stream and has been assigned a “Very Poor” freshwater fish community status. Although the landscape is modified for agriculture, vegetation persists along the surrounding hillslope, with an existing access track present within this area of vegetation.	-35.572279 148.188188	No field inspection.
V9-28 V9-31	Gilmore Creek Mudhole Creek	6 3	N/A N/A	Very Poor N/A	Murrumbidgee Murrumbidgee	Gilmore Creek is a bedrock dominated sixth order stream, assessed as a **CLASS 1 Major KFH** stream and has been assigned a “Very Poor” freshwater fish community status. The landscape immediately surrounding the location has been cleared and modified for agriculture, although vegetation	-35.566764 148.182866 -35.608728 148.185082	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						persists along the upstream extent of the waterway, particularly along the steeper gradients. Mudhole Creek flows through a steep gully, appearing to be bedrock or boulder dominated, and assessed as a **CLASS 2 Moderate KFH** stream. Within the updated indicative disturbance area, remnant riparian vegetation persists along the upstream extent, while downstream of the updated indicative disturbance area the landscape is cleared and modified, including surrounding Gilmore Creek, which Mudhole Creek flows into.		
V9 THR-1	Unnamed waterway	1	Southern Pygmy Perch	-	Lachlan	Cleared Downstream dams Ephemeral Highly modified	-35.606477 148.180726	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-2	Humes Creek	3	Southern Pygmy Perch	Very Poor KFH	Lachlan	Remnant stand of riparian vegetation Pools dominant with small riffle habitats Pebble dominated Boulders and snags Bridge upstream Grazed banks Channel incision Perennial	-35.600959 148.175186	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-3	Merrill Creek	4	Southern Pygmy Perch	Very Poor KFH	Lachlan	Landscape mostly cleared with some riparian vegetation remaining Some channel incision evident Fine sediment deposits occur within the low flow channel forming lateral bars Channel generally shallow with some intermittently deeper pools	-35.60171 148.172204	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-4	Lachlan River	6	Southern Pygmy Perch, Macquarie Perch	Very Poor KFH	Lachlan	Highly diminished riparian zone, extensive sediment present Snags and coarse woody debris Grazing on banks Meandering low flow channel with lateral and point bars/benches	-35.610994 148.155668	
V9 THR-5	Oolong Creek	4	Southern Pygmy Perch	Very Poor KFH	Lachlan	Cleared and grazed Existing waterway crossing Riparian vegetation lacking Incised channel Perennial Turbid discoloured water Some aquatic vegetation Bank erosion	-35.609638 148.145715	No photo available.
V9 THR-6	Jerrawa Creek	5	Southern Pygmy Perch	Very Poor KFH	Lachlan	Cleared and grazed Lacking riparian vegetation Incised channel	-35.610039 148.14578	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						Perennial with some degree of disconnectivity between ponds		
V9 THR-7	Jerrawa Creek	5	Southern Pygmy Perch	Very Poor KFH	Lachlan	Cleared and grazed Highly diminished riparian vegetation Willows and weed ingress Undercut banks and some fringing macrophytes present along lateral bars. Poor water clarity Eroded banks Existing dirt road network adjacent to stream	-35.607632 148.14108	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-8	Jerrawa Creek	5	Southern Pygmy Perch	Very Poor KFH	Lachlan	Willows present Riparian vegetation largely absent *Phragmites* sp., LWD present and undercut banks Deep pools with some submerged macrophytes. Bank erosion and grazing	-35.609797 148.140216	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-9	Flacknell Creek	4	Southern Pygmy Perch	Very Poor KFH	Lachlan	Lacking riparian vegetation Cleared and grazed Perennial water in deep pools Incised channel Some aquatic vegetation present Bank erosion	-34.728129, 149.099331	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-10	Three Waterholes Creek	3	Southern Pygmy Perch	N/A KFH	Murrumbidgee	Very poor condition Riparian vegetation absent Highly incised Turbid and discoloured water Some fringing aquatic vegetation and large woody debris present	-34.765993, 149.020098	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-11	Manton's Creek	2	Southern Pygmy Perch	N/A	Murrumbid gee	Limited riparian vegetation present Cleared and grazed Highly incised channel Limited LWD and habitat cover Clear water surface conditions Bank erosion	-34.771855, 149.007875	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-12	Yellow Creek	3	Southern Pygmy Perch	N/A KFH	Murrumbid gee	Eroded and incised banks Low flow channel with shallow pools between a knickpoint Limited overstorey riparian vegetation present Minor fringing aquatic vegetation present	-34.770108, 148.988969	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-13	Bango Creek	4	Southern Pygmy Perch	N/A KFH	Murrumbidgee	Cleared with minor riparian vegetation present Eroded and incised banks Small riffles and undercut banks Grazing on banks	-34.766795, 148.971004	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-14	Cooks Creek	4	Southern Pygmy Perch	N/A KFH	Murrumbid gee	Cleared with minor riparian vegetation present Eroded and heavily incised banks Channel modification Grazing on banks Floating and emergent macrophytes present in patches Some filamentous algae Exotic vegetation species	-34. 767441, 148.929639	

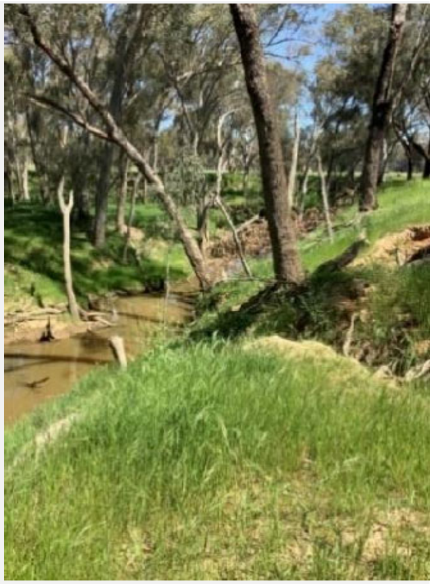
No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-15	Murrumbidgee River	9	Murray Crayfish, Trout Cod, Silver Perch	Poor KFH	Murrumbidgee	Major river Limited stands of riparian vegetation Broader landscape heavily modified Submerged macrophytes Grazing on banks	-34.911798, 148.531736	

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-16	Oak Creek	5	Murray Crayfish	Very Poor KFH	Murrumbidgee	Cleared with minor riparian vegetation present Eroded and incised banks Grazing on both banks Fringing aquatic vegetation	-34.969044, 148.403546	
V9 THR-17	Adjungbilly Creek	6	Macquarie Perch	Very Poor KFH	Murrumbidgee	Cleared with limited riparian vegetation present	-35.091574, 148.36173	No field inspection.
V9 THR-18	Brungle Creek	5	Murray Crayfish	Very Poor KFH	Murrumbidgee	Cleared with riparian vegetation absent Eroded and incised banks Perennial	-35.186202, 148.335309	No field inspection.
V9 THR-19	Bombowlee Creek	5	Murray Crayfish	Very Poor KFH	Murrumbidgee	Cleared with minor riparian vegetation present	-35.265594, 148.325034	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-20	Goobarra gandra River	7	Murray Crayfish	Very Poor KFH	Murrumbid gee	Major river Limited riparian vegetation Cleared banks	-35.327382, 148.319832	No field inspection.
V9 THR-21	Tumut River	7	Murray Crayfish, Flathead Galaxias	Very Poor KFH	Murrumbid gee	Major river Immediately downstream of the Blowering Reservoir Quarry and farming in the surrounding area as well as road/track networks	-35.393812, 148.249178	No field inspection.
V9 THR-22	Brungle Creek	5	Murray Crayfish	Very Poor KFH	Murrumbid gee	Cleared with riparian vegetation absent Incised banks Perennial	-35.175781, 148.330402	No field inspection.
V9 THR-23	Tumut River	8	Murray Crayfish, Flathead Galaxias	Very Poor KFH	Murrumbid gee	Major river Limited riparian vegetation Mostly cleared	-35.219707, 148.215689	No field inspection.
V9 THR-24	Tumut River (unmappe d anabranc h)	8	Murray Crayfish, Flathead Galaxias	Very Poor KFH	Murrumbid gee	Major river Limited riparian vegetation Mostly cleared	-35.221975, 148.213	No field inspection.
V9 THR-25	Gocup Creek	4	Murray Crayfish	Very Poor KFH	Murrumbid gee	Cleared with minor riparian vegetation present Eroded and incised banks Pools separated by ephemeral sections	-35.228606, 148.206504	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-26	Adelong Creek	5	Murray Crayfish	Very Poor KFH	Murrumbidgee	Steep forested slopes Forestry area Snags, boulders and undercut banks Downstream extent is cleared and grazed Perennial	-35.430833, 148.121639	
V9 THR-27	Tarcutta Creek	6	Murray Crayfish, Flathead Galaxias	Very Poor KFH	Murrumbidgee	Cleared with minor riparian vegetation present Channel incision Perennial	-35.349221, 147.781665	No field inspection.
V9 THR-28	Umbango Creek	7	Murray Crayfish, Flathead Galaxias	Very Poor KFH	Murrumbidgee	Cleared with limited linear riparian vegetation present Eroded and incised banks Perennial	-35.347722, 147.7768	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-29	Kyeamba Creek	7	Flathead Galaxias	Very Poor KFH	Murrumbid gee	Cleared with limited riparian vegetation present Grazing on banks Pugging Willows Coarse woody debris Bank erosion	-35.287909, 147.523635	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
V9 THR-30	O'Briens Creek	6	Flathead Galaxias	Very Poor KFH	Murrumbid gee	Cleared with limited linear riparian vegetation present Turbid low flow channel LWD and native riparian overstorey species present Some gullying and bank erosion Farm debris	-35.27587, 147.492651	
A-1	Unnamed waterway	3	N/A	N/A	Hawkesbury -Nepean	The unnamed stream flows over approximately 1.1 km into Connors Creek outside the updated indicative disturbance area. The stream flows through a section of relatively intact bushland with some clearing of riparian vegetation present, with farm dams and existing crossings present along its course and tributaries. The stream appears to be intermittent and is assessed as a **CLASS 2 – Moderate KFH** (desktop assessment) stream.	-34.4275, 149.9563	No field inspection.
A-2	Unnamed waterway	1	N/A	Very Poor	Hawkesbury -Nepean	The indicative access track occurs at the confluence of the unnamed stream and larger Turrallo Creek that is crossed at this location by Black Arm Road.	-34.5309, 149.743	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
						The stream appears to be ephemeral and is assessed as a **CLASS 4 Unlikely KFH** stream, with its extent entirely cleared and grazed and existing farm tracks crossing the stream. Turrallo Creek is also in very poor condition, lacking riparian vegetation in the updated indicative disturbance area and major channel erosion evident.		
A-3	Unnamed waterway	2	N/A	N/A	Hawkesbury -Nepean	The indicative access track occurs near the confluence of the unnamed stream and larger Turrallo Creek. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream, with its extent entirely cleared and grazed and existing farm tracks crossing the stream. An eroded channel is evident. Turrallo Creek is also in very poor condition, lacking riparian vegetation in the updated indicative disturbance area and major channel erosion evident.	-34.529, 149.7442	No field inspection.
A-4	Unnamed waterway	1	N/A	N/A	Hawkesbury -Nepean	The indicative access track occurs near the confluence of the unnamed stream and larger Turrallo Creek. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream, with its extent entirely cleared and grazed and existing farm tracks crossing the stream. An eroded channel is evident. Turrallo Creek is also in very poor condition, lacking riparian vegetation in the updated indicative disturbance area and major channel erosion evident.	-34.5286, 149.7442	No field inspection.

No.	Stream name	Stream order	DPI indicative threatened species distribution	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
A-5	Unnamed waterway	1	N/A	N/A	Hawkesbury -Nepean	Unnamed stream: The unnamed stream flows over approximately 325 m into the larger Cowpers Creek. The stream appears to be intermittent and lacks riparian vegetation. The stream is assessed as a **CLASS 3 Minimal KFH** stream. Cowpers Creek: Cowpers Creek itself is a perennial stream flowing through cleared pasture, lacking riparian vegetation with some bank erosion evident.	-34.5019, 149.8144	 **Cowpers Creek**
A-6	Unnamed waterway	1	N/A	N/A	Hawkesbury -Nepean	The indicative access track occurs near the confluence of the unnamed stream and larger Turrallo Creek. The stream appears to be ephemeral and is assessed as a **CLASS 3 Minimal KFH** stream, with its extent entirely cleared and grazed and existing farm tracks crossing the stream. An eroded channel is evident although the stream appears to be intermittent. Turrallo Creek is also in very poor condition, lacking intact riparian vegetation in the updated indicative disturbance area and major channel erosion evident.	-34.526, 149.7442	No field investigation.

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
A-7	Unnamed waterway	2	N/A	N/A	Hawkesbury -Nepean	Within the updated indicative disturbance area the unnamed stream flows through cleared pasture, adjacent to stream No. 6. The stream appears to be intermittent with the channel zone evidenced by more lush vegetation indicating the presence of water and major channel erosion in more upstream sections. The unnamed stream is fed by a small network of minor tributaries flowing through cleared pasture. The unnamed stream at the indicative waterway crossing is assessed as a **CLASS 3 Minimal KFH** stream.	-34.5033, 149.8048	No field investigation.
A-8	Unnamed waterway	2	N/A	N/A	Hawkesbury -Nepean	The indicative waterway crossing is located just downstream of a dam. An existing access track runs across the base of the dam. The channel is highly incised with gullying evident along the microchannel banks. Limited riparian vegetation occurs within the microchannel with the landscape entirely cleared and grazed, with the unnamed stream interrupted by multiple farm dams before flowing into Pejar Dam. Due to the presence of the online dam's, the unnamed stream is intermittent and is assessed as a **CLASS 3 Minimal KFH** stream.	-34.5709, 149.5972	

No.	Stream name	Stream order	DPI indicative threatened species distributio n	DPI fish community status	Catchment	Waterway CLASS, habitat features and condition factors (desktop assessment and / or field inspection)	Latitude and longitude	Site photograph
A-10	Oolong Creek	4	Southern Pygmy Perch	Very Poor	Lachlan	An existing waterway crossing occurs at the indicative crossing location. The landscape is cleared and grazed with riparian vegetation lacking and the channel incised with some bank erosion evident. The stream is perennial with some aquatic vegetation present. Water clarity was described as turbid. The stream is assessed as a **CLASS 1 Moderate KFH** waterway.	-34.6958, 149.1818	No photo available.
A-12	Unnamed waterway	3	N/A	N/A	Murrumbid gee	The unnamed stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream, with its extent entirely cleared and grazed. An eroded and incised channel is evident, with a series of on-line dams interrupting connectivity. An existing informal crossing appears to be present at this location.	-34.8205, 148.8315	No field inspection.
A-14	Unnamed waterway	2	N/A	N/A	Murrumbid gee	The unnamed stream flows through cleared pasture and is generally lacking in riparian vegetation. A dam occurs immediately upstream of the indicative waterway crossing location, one of a series of dams along this stream network. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream.	-35.2892, 147.5398	No field inspection.
A-15	Unnamed waterway	2	N/A	N/A	Murrumbid gee	The unnamed stream flows through cleared pasture and is generally lacking in riparian vegetation. A dam occurs immediately downstream of the indicative waterway crossing location, one of a series of dams along this stream network. The stream appears to be intermittent and is assessed as a **CLASS 3 Minimal KFH** stream.	-35.2904, 147.5484	No field inspection.

11 Matters of National Environmental Significance

This chapter addresses relevant MNES under the EPBC Act and supplementary SEARs requirements as detailed in Section 1.2.

A search of the EPBC Act PMST was undertaken on 23 April 2024 to inform potential MNES within 10 kilometres of the amended project footprint. A likelihood of occurrence assessment was undertaken to identify EPBC Act listed threatened species and ecological communities with a likely presence within the amended project footprint. Attachment 2 documents the assessment criteria and results for all potential MNES. A summary of the assessment results is provided below.

An analysis of the impacts of the 2019-20 bushfires on relevant EPBC Act listed threatened species and communities is presented in Section 11.8. The assessment is intended to determine whether the remaining habitat within the amended project footprint is of substantially greater importance to the survival of listed threatened species following the fires and/ or whether the population of the species in the area is considered an important population. The outcomes of the assessment have been considered when determining appropriate avoidance, mitigation and offset measures for the amended project.

11.1 Ramsar wetlands

Ramsar wetlands are representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity. A total of seven Ramsar wetlands were identified by the PMST search for the amended project footprint (refer to Table 11-1). All Ramsar wetlands listed are unlikely to be impacted as they are located at least 200 kilometres from the amended project footprint (as detailed in Table 11-1). As such they are not discussed further.

Table 11-1: Ramsar wetlands generated by the PSMT search for the locality

Name	Description	Distance from amended project footprint
Banrock Station Wetland Complex	This floodplain wetland is located on the Murray River floodplain immediately downstream of Kingston in South Australia. It comprises areas of freshwater and areas of secondary salinized floodplain with discrete wetland basins and channels.	600-700 km
Barmah Forest	The Barmah Forest Ramsar site is located on the Murray River floodplain in north Victoria. It is predominantly River Red Gum (*Eucalyptus camaldulensis*) forest and floodplain marshes.	200-300 km
Gunbower Forest	Gunbower Forest is one of a series of River Red Gum forests on the Murray River floodplain in northern Victoria. River red gums inhabit the low-lying, more frequently flooded areas whereas infrequently flooded areas support woodlands dominated by. Black Box (*Eucalyptus largiflorens*).	300-400 km
Hattah-kulkyne Lakes	The lakes are located in northern Victoria within the Murray-Darling Basin. The site contains 12 floodplain lakes, comprising of permanent freshwater lakes and seasonal intermittent freshwater lakes.	400-500 km
NSW Central Murray State forests	This site is located on the floodplain of the Murray River in south-central NSW, Australia. It is dominated by River Red Gum forest and woodland, wet grasslands and marshes as well as having significant areas of box woodland and sandhill communities.	200-300 km

Name	Description	Distance from amended project footprint
Riverland	The Riverland is in South Australia, in the Murray-Darling Basin. The site covers two systems on the lower floodplain along 80 km of the river, the site incorporates a series of creeks, channels, lagoons, billabongs, swamps and lakes.	500-600 km
The Coorong, and Lakes Alexandrina and Albert Wetland	Are located at the downstream end of the Murray River, in south-east South Australia. The Coorong is a long, shallow, brackish to hypersaline lagoon. Lake Albert is a terminal lake connected to Lake Alexandrina by a narrow channel.	600-700 km

11.2 Threatened ecological communities

A total of six TECs were generated by the PMST search for the amended project footprint (based on a 10 kilometre buffer) (refer to Attachment 25):

- Alpine Sphagnum Bogs and Associated Fens
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Temperate Grassland of the South Eastern Highlands
- Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion
- Weeping Myall Woodlands
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Section 6.5 of this BDAR provides results of the field investigation and determination of presence of EPBC Act TECs against key condition thresholds and diagnostic criteria for two of the above TECs (Alpine Sphagnum Bogs and Associated Fens and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland). Justification for the absence of the other four EPBC Act TECs from the amended project footprint against key condition thresholds and diagnostic criteria is provided in Sections 11.2.1 to 11.2.4 below.

Based on the results of the assessment, two EPBC Act listed TECs are known to occur within and/or adjacent to the amended project footprint:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Alpine Sphagnum Bogs and Associated Fens.

TEC extent within the amended project footprint is shown in Figure 6-1 (Attachment 5). A total of 827.43 hectares of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and 6.40 hectares of Alpine Sphagnum Bogs and Associated Fens has been mapped within the amended project footprint.

An assessment of amended project impacts to known and likely EPBC Act listed TECs is presented in Attachment 3 in accordance with the Commonwealth Significant Impact Guidelines 1.1: Matters of National Environmental Significance (DoE, 2013a). The results of the assessment are presented in Section 13.8.1 of this BDAR.

11.2.1 Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

Grey Box (*Eucalyptus microcarp*a) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia is listed as an endangered ecological community under the EPBC Act. Part of the national ecological community Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia is listed as endangered in New South Wales as "Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions" (TSSC, 2010a).

The tree canopy of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia 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 (TSSC, 2010a). Given *Eucalyptus macrocarpa* was not recorded in any plots in the amended project footprint, none of the PCTs recorded in the amended project footprint align with this TEC.

11.2.2 Natural Temperate Grassland of the South Eastern Highlands

Natural Temperate Grassland of the Southern Eastern Highlands is listed as Critically Endangered under the EPBC Act.

One of the key diagnostic characteristics of this TEC is that the area is not a derived or secondary grassland (i.e. a grassland derived from clearing of a woodland or forest community) (TSSC, 2016b). Only one PCT recorded in the amended project footprint is classified as grassland formation (PCT 1224 Sub-alpine dry grasslands and heathlands of valley slopes). The rest of the grasslands recorded in the amended project footprint occur as derived grasslands and therefore do not meet the definition of this TEC.

PCT 1224 occurs in the amended project footprint within the Australian Alps Bioregion, Snowy Mountains IBRA subregion (within which there may be occurrences of this TEC (TSSC, 2016b), however PCT 1224 is not associated with any EPBC Act listed TECs in the NSW vegetation classification system. Therefore, Natural Temperate Grasslands of the Southern Eastern Highlands TEC does not occur in the amended project footprint.

11.2.3 Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion

Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion is listed as Endangered under the EPBC Act. Parts of the national ecological community are listed as endangered communities in New South Wales: Robertson Basalt Tall Open Forest in the Sydney Basin Bioregion and Mount Gibraltar Forest in the Sydney Basin Bioregion. The ecological community predominantly occurs in the Moss Vale, Ettrema, Burragorang, Sydney Cataract, and Wollemi IBRA subregions. However, some patches of the ecological community may extend into in the Kanangra and Oberon IBRA sub-regions of the South Eastern Highlands bioregion that are adjacent to the western boundary of the Sydney Basin bioregion (TSSC, 2011a).

The amended project footprint does not occur in the Sydney Basin Bioregion, nor in the Kanangra and Oberon IBRA sub-regions of the South Eastern Highlands bioregion. Therefore, none of the PCTs recorded in the amended project footprint align with this TEC.

11.2.4 Weeping Myall Woodlands

Weeping Myall Woodlands is listed as an Endangered Ecological Community under the EPBC Act. The Weeping Myall Woodlands occurs on the inland alluvial plains west of the Great Dividing Range in NSW and

QLD. It occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Murray-Darling Depression, Nandewar and Cobar Peneplain IIBRA bioregions (TSSC, 2009a).

The Weeping Myall Woodlands occur in a range from open woodlands to woodlands, generally 4-12 metres high, in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species (TSSC, 2009a). Given *Acacia pendula* was not recorded in any plots in the amended project footprint, none of the PCTs recorded in the amended project footprint align with this TEC.

11.3 Threatened flora

A list of potentially occurring EPBC Act listed threatened flora species was derived for the locality from data sources including the BAM-C, NSW BioNet Atlas and EPBC Act PMS (search undertaken on 23 April 2024 using a 10 kilometre buffer to the amended project footprint). A total of 76 threatened flora listed under the EPBC Act were considered for assessment for the amended project footprint (Attachment 2, Attachment 25). Each of these species have been assessed in terms of their likelihood to occur within the amended project footprint (Attachment 2). Of these, 13 species were either recorded or considered to have a moderate or high likelihood of occurring within the amended project footprint. These are listed in Table 11-2. The six species recorded within and/ or immediately adjacent to the amended project footprint include:

- *Ammobium craspedioides* (Yass Daisy)
- *Leucochrysum albicans var. tricolor* (Hoary Sunray)
- *Pimelea bracteata*
- *Prasophyllum bagoense* (Bago Leek-orchid)
- *Prasophyllum keltonii* (Kelton's Leek-orchid)
- *Xerochrysum palustre* (Swamp Everlasting).

There were certain areas that could not be adequately surveyed due to amended project access and timing constraints (limitations outlined in Section 4.9). These areas have been identified as having potential to support habitat for seven additional EPBC Act listed threatened flora species (Table 11-2). The locations of threatened flora records are shown in Figure 13-8, Figure 13-11, Figure 13-13 and Figure 13-14 (Attachment 5) and described further in Section 7.2.2. Candidate MNES threatened flora recorded or with potential to occur within the amended project footprint are summarised in Table 11-2.

An assessment of amended project impacts to these EPBC Act listed threatened flora is presented in Attachment 3 in accordance with the *Commonwealth Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DoE, 2013a) and the NSW Assessment Bilateral (for those species determined to be potentially significantly impacted by the amended project). The results of the assessment are presented in Section 13.8.2 of this BDAR.

Table 11-2: EPBC Act listed threatened flora species recorded or with the potential to occur within the amended project footprint

Scientific name	Common name	BC Act Status	EPBC Act Status	Associated PCTs	IBRA subregion	Assessment outcome
Acacia bynoeana	Bynoe's Wattle	E	V	PCT 1093	Bungonia	Assumed present

Scientific name	Common name	BC Act Status	EPBC Act Status	Associated PCTs	IBRA subregion	Assessment outcome
					Crookwell	Assumed present
Ammobium craspedioides	Yass Daisy	V	V	PCT 266, 268, 277, 280, 283, 287, 290, 294, 295, 299, 343, 352, 679, 727, 731, 953, 1093, 1151, 1196, 1256 and 1330	Bondo	Recorded- 535 individuals within PCT 295 and 299
					Crookwell	Recorded- 772 individuals within PCT 731 and 1093
					Inland Slopes	Recorded- 87 individuals within PCT 266, 280 and non-native
					Murrumbateman	Recorded- 8,158 individuals within PCT 280, 1330 and non-native
					Snowy Mountains	Recorded 17 individuals within PCT 679, 953 and 1196
Diuris aequalis	Buttercup Doubletail	E	E	731, 1093, 1097, 1151, 1191	Bungonia	Assumed present
					Crookwell	Assumed present
Eucalyptus aggregata	Black Gum	V	V	PCT 679, 1191 and 1256	Crookwell	Assumed present
					Murrumbateman	Assumed present
Kunzea cambagei	Cambage Kunzea	V	V	PCT 1150	Bungonia	Assumed present
Leucochrysum albicans var. *tricolor*	Hoary Sunray	E	E	PCT 268, 280, 322, 335, 349, 351, 352, 679, 727, 731, 952, 953, 1093, 1097, 1151, 1191, 1196 and 1330	Crookwell	Recorded- 29,631 individuals within PCT 280, 679, 727, 731, 952, 1093, 1151, 1130 and non-native
					Murrumbateman	Recorded- 113,920 individuals within PCT 280, 322, 349, 1093, 1330 and non-native

Scientific name	Common name	BC Act Status	EPBC Act Status	Associated PCTs	IBRA subregion	Assessment outcome
Pimelea bracteata	-	CE	CE	PCT 285, 637, 679, 939, 953, 1196 and 1224	Bondo	Assumed present
					Snowy Mountains	Recorded – approximately 1,502 individuals recorded within PCT 679 and 953
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	PCT 300 and 1150	Bungonia	Assumed present
Prasophyllum bagoense	Bago Leek-orchid	CE	CE	PCT 953, 1196 and 1224	Snowy Mountains	Recorded- 33 individuals within PCT 953 and 1224. Recorded by NSW DCCEEW within the amended project footprint in December 2023, within the McPherson's Plain area.
Prasophyllum innubum	Brandy Marys Leek Orchid	CE	CE	PCT 1221	Snowy Mountains	Assumed present. Recorded by NSW DCCEEW in December 2023 within 200 m of the amended project footprint in the McPherson's Plain area. Historically recorded within 80 m of the amended project footprint (Canberra Orchid Society).
Prasophyllum keltonii	Kelton's Leek-orchid	CE	CE	PCT 953, 1196 and 1224	Snowy Mountains	Assumed present. Recorded adjacent to the amended project footprint. NSW DCCEEW recorded two

Scientific name	Common name	BC Act Status	EPBC Act Status	Associated PCTs	IBRA subregion	Assessment outcome
						individuals within the amended project footprint on 12 December 2023. Historical records (Canberra Orchid Society) within the amended project footprint.
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	PCT 637 and 939	Snowy Mountains	Assumed present
Thesium australe	Austral Toadflax	V	V	PCT 679, 1191, 1196, 1224 and 1330	Snowy Mountains	Assumed present
Xerochrysum palustre	Swamp Everlasting	-	V	PCT 637, 679 and 939	Snowy Mountains	Recorded- 6 individuals within PCT 679 and 953

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

11.4 Threatened fauna

A list of potentially occurring EPBC Act listed threatened fauna species was derived for the locality from data sources including the BAM-C, NSW BioNet Atlas (and EPBC Act PMST (search undertaken on 23 April 2024 using a 10 km buffer to the amended project footprint). A total of 59 threatened fauna listed under the EPBC Act were considered for assessment for the amended project footprint (Attachment 2, Attachment 25). Each of these species have been assessed in terms of their likelihood to occur within the amended project footprint (Attachment 2). Twenty-nine species were determined to have a moderate, high, or known likelihood of occurring within the amended project footprint. Ten of these species were recorded within and/ or adjacent to the amended project footprint:

- Gang-gang Cockatoo
- Glossy Black-Cockatoo
- Brown Treecreeper (eastern subspecies)
- Superb Parrot
- Diamond Firetail

- Greater Glider
- Yellow-bellied Glider
- Grey-headed Flying-fox
- Pink-tailed Legless Lizard
- Key's Matchstick Grasshopper.

Candidate MNES threatened fauna recorded or with potential to occur within the amended project footprint are summarised in Table 11-3. An assessment of amended project impacts to these species is presented in Attachment 3 in accordance with the C*ommonwealth Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DoE, 2013a) and the NSW Assessment Bilateral (for those species determined to be potentially significantly impacted by the amended project). The results of the assessment are summarised in Section 13.8.3 of this BDAR.

Table 11-3: EPBC Act listed threatened fauna species recorded or with the potential to occur within the amended project footprint

Scientific name	Common name	BC Act Status*	EPBC Act Status*	IBRA subregion	Assessment outcome
Frogs					
Crinia sloanei	Sloane's Froglet	V	E	Inland Slopes	Assumed present
Litoria booroolongensis	Booroolong Frog	E	E	Crookwell	Assumed present
				Inland Slopes	Assumed present
Litoria castanea	Yellow-spotted Tree Frog	CE	E	Crookwell	Assumed present
				Murrumbateman	Assumed present
				Snowy Mountains	Assumed present
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	CE	Inland Slopes	Assumed present
				Bungonia	Assumed present
				Crookwell	Assumed present
				Murrumbateman	Assumed present
				Murrumbateman	Assumed present
Aphelocephala leucopsis	Southern Whiteface	V	V	Bungonia	Assumed present
				Crookwell	Assumed present
				Murrumbateman	Assumed present
				Inland Slopes	Assumed present
				Snowy Mountains	Assumed present
Calidris acuminata	Sharp-tailed Sandpiper	-	V,M	Inland Slopes	Assumed present
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	Bondo	Recorded- 18 individuals within PCT 295, 299, 638 and non-native
				Bungonia	Recorded- 44 individuals within PCT 1093, 1150, 1330 and non-native

Scientific name	Common name	BC Act Status*	EPBC Act Status*	IBRA subregion	Assessment outcome
				Crookwell	Recorded- 27 individuals within PCT 679, 727, 731, 1151, 1330 and non-native
				Inland Slopes	Recorded- 19 individuals within PCT 268, 277, 280 and 316
				Murrumbateman	Recorded - 16 individuals within PCT 349, 1330 and non-native
				Snowy Mountains	Recorded- 80 individuals within PCT 300, 638, 679, 953, 1196 and non-native
Calyptorhynchus lathami	Glossy Black-Cockatoo -	V	V	Bungonia	Recorded- 6 individuals within PCT 1150
				Crookwell	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Assumed present
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	V	Bondo	Assumed present
				Bungonia	Assumed present
				Crookwell	Assumed present
				Murrumbateman	Recorded- 1 individual within PCT 1330
				Snowy Mountains	Recorded- 1 individual within PCT 953 and non-native
				Inland Slopes	Recorded- 17individuals within PCT 5, 266, 268, 290, 297 and 314
Gallinago hardwickii (BioNet)	Latham's Snipe	-	V,M	Bungonia	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Assumed present
				Snowy Mountains	Assumed present
Grantiella picta	Painted Honeyeater	V	V	Inland Slopes	Assumed present
Hirundapus caudacutus	White-throated Needletail	-	V	Bondo	Assumed present
				Bungonia	Assumed present
				Crookwell	Assumed present
				Inland Slopes	Assumed present

Scientific name	Common name	BC Act Status*	EPBC Act Status*	IBRA subregion	Assessment outcome
				Murrumbateman	Assumed present
				Snowy Mountains	Assumed present
Lathamus discolor	Swift Parrot	E	CE	Bungonia	Assumed present
				Murrumbateman	Assumed present
				Inland Slopes	Assumed present
Melanodryas cucullata cucullata	South-Eastern Hooded Robin	E	E	Bungonia	Assumed present
				Murrumbateman	Assumed present
Polytelis swainsonii	Superb Parrot	V	V	Crookwell	Assumed present
				Inland Slopes	Recorded- 11 individuals within PCT 277 and 343
				Murrumbateman	Recorded- 5 individuals within PCT 1330 and non-native
Pycnoptilus floccosus	Pilotbird	-	V	Bondo	Assumed present
				Inland Slopes	Assumed present
				Snowy Mountains	Assumed present
Stagonopleura guttata (PMST)	Diamond Firetail	V	V	Bondo	Assumed present
				Bungonia	Assumed present
				Crookwell	Assumed present
				Murrumbateman	Known – 14 individuals recorded
				Inland Slopes	Known – 2 individuals recorded
				Snowy Mountains	Known – 1 individual recorded
Insects					
Keyacris scurra	Key's Matchstick Grasshopper	E	E	Bungonia	Assumed present
				Crookwell	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Recorded- 8 individuals within PCT 280
Synemon plana	Golden Sun Moth	V	V	Inland Slopes	Expert report
				Murrumbateman	Expert report
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Inland Slopes	Assumed present
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Bondo	Assumed present
				Bungonia	Assumed present
				Crookwell	Assumed present

Scientific name	Common name	BC Act Status*	EPBC Act Status*	IBRA subregion	Assessment outcome
				Inland Slopes	Assumed present
				Murrumbateman	Assumed present
				Snowy Mountains	Assumed present
Mastacomys fuscus	Broad-toothed Rat	V	V	Snowy Mountains	Assumed present
Petauroides volans	Greater Glider	E	E	Bondo	Recorded- 18 individuals within PCT 300 and non-native
				Bungonia	Recorded - 2 individuals within PCT 1107 and 1150
				Crookwell	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Assumed present
				Snowy Mountains	Recorded- 14 individuals within PCT 300, 638, 953 and non-native
Petaurus australis	Yellow-bellied Glider	EP	V	Bondo	Recorded- 3 individuals within PCT 295 and non-native
				Bungonia	Assumed present
				Inland slopes	Assumed present
				Snowy Mountains	Recorded- 10 individuals within PCT 638, 679, 953 and non-native
Phascolarctos cinereus	Koala	E	E	Bondo	Assumed present
				Bungonia	Assumed present
				Crookwell	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Assumed present
				Snowy Mountains	Assumed present
Pseudomys fumeus	Smoky Mouse	CE	E	Bondo	Assumed present
				Snowy Mountains	Assumed present
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Bungonia	Assumed present
				Crookwell	Assumed present
				Inland Slopes	Recorded- 12 individuals within PCT 280
				Murrumbateman	Assumed present
Reptiles					
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	Bondo	Assumed present
				Bungonia	Assumed present

Scientific name	Common name	BC Act Status*	EPBC Act Status*	IBRA subregion	Assessment outcome
				Crookwell	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Recorded- 7 individuals within PCT 1330
Delma impar	Striped Legless Lizard	V	V	Bungonia	Assumed present
				Crookwell	Assumed present
				Inland Slopes	Assumed present
				Murrumbateman	Assumed present

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

11.5 Threatened aquatic species

Eight EPBC Act listed threatened aquatic species were identified as having the potential to occur within the updated indicative disturbance area (Table 11-4). Assessments of Significance under the EPBC Act (Attachment 3) were completed for all species except the Murray Cod and Bald Carp Gudgeon, as summarised in Table 11-4.

The other six potentially occurring aquatic species above have been assessed further due to the presence of potential habitat within the updated indicative disturbance area in Section 13.7.3.

Table 11-4: EPBC Act threatened aquatic species with the potential to occur within the updated indicative disturbance area

Scientific name	Common name	FM Act*	EPBC Act*	Source	Presence/absence	Further assessment required
Macquaria australasica	Macquarie Perch	E	E	PMST	Assumed present Considered to have a moderate likelihood of occurrence within the Lachlan River and Adjungbilly Creek within the updated indicative disturbance area as per indicative distribution mapping by DPI (DPI, 2023a).	Yes
Nannoperca australis	Southern Pygmy Perch	E	V	PMST	Assumed present Despite indicative distribution mapping by DPI (2023a) suggesting this species may occur in the Upper Lachlan and Murray River catchments, its known distribution is restricted to three waterways outside of the impact updated indicative disturbance area. The species has been assumed present on a precautionary basis.	Yes
Galaxias rostratus	Flatheaded Galaxias	CE	CE	PMST	Assumed present Despite indicative distribution mapping by DPI suggesting this species may occur in the Murrumbidgee and Lachlan rivers, the last record here was obtained	Yes

Scientific name	Common name	FM Act*	EPBC Act*	Source	Presence/absence	Further assessment required
					in 1971, is therefore considered unlikely to occur. The species has been assumed present on a precautionary basis.	
Maccullochella macquariensis	Trout Cod	E	E	PMST	Assumed present Trout Cod has the potential to occur within the updated indicative disturbance area in larger streams, particularly the Murrumbidgee River, where stocking has occurred with some success.	Yes
Bidyanus bidyanus	Silver Perch	V	CE	PMST	Assumed present Silver Perch has the potential to occur within the updated indicative disturbance area in larger streams, particularly the Murrumbidgee River.	Yes
Maccullochella peelii	Murray Cod	-	V	PMST	Assumed present Murray Cod has the potential to occur within the updated indicative disturbance area in larger streams, particularly the Murrumbidgee River, however these would not constitute any important populations identified in the recovery plan for the species (National Murray Cod Recovery Team, 2010). As no important populations would be impacted by the amended project the species has not been subject to a formal assessment and is not considered further.	No
Hypseleotris gymnocephala	Bald Carp Gudgeon	-	CE	PMST	The Bald Carp Gudgeon has a highly restricted distribution within, with the two known populations occurring outside the amended project footprint. The Urumwalla Creek population northwest of Dalton is not connected to any streams that flow downstream from the amended project footprint and therefore impacts are unlikely. The Meadow Creek Population near Gunning is located upstream of the footprint and therefore would not be impacted by the amended project. Therefore, the species has not been subject to a	No

Scientific name	Common name	FM Act*	EPBC Act*	Source	Presence/absence	Further assessment required
					formal assessment and is not considered further.	
Euastacus rieki	Riek's Crayfish	-	E	PMST	Assumed present Broadscale predicted habitat mapping for the species (Commonwealth DCCEEW, 2023a) includes a large portion of the southern arm of the updated indicative disturbance area around the Bago State Forest and Maragle State Forest.	Yes

* EPBC Act and FM Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable.

11.6 Migratory species

Species that migrate to Australia or pass through Australian waters during their annual migrations are listed as migratory under the EPBC Act. This includes species listed under the following international conventions: Bonn Convention, CAMBA, JAMBA, ROKAMBA and ACAP.

Three migratory species were recorded as a part of field surveys undertaken for the amended project: Fork-tailed Swift (*Apus pacificus*), Rufous Fantail (*Rhipidura rufifrons*) and Satin Flycatcher (*Myiagra cyanoleuca*) (Table 11-5).

Seven additional listed migratory species have previously been recorded (NSW DCCEEW, 2024a) from the locality and are considered likely to fly over or forage within the amended project footprint:

- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Red-necked Stint (*Calidris ruficollis*)
- Latham's Snipe (*Gallinago hardwickii*)
- White-throated Needletail (*Hirundapus caudacutus*).
- Common Greenshank (*Tringa nebularia*)
- Marsh Sandpiper (*Tringa stagnatilis*)
- Black-faced Monarch (*Monarcha melanopsis*).

A total of ten EPBC Act listed migratory species are considered relevant to the assessment (Table 11-5). An assessment of amended project impacts to these listed migratory species is presented in Attachment 3 in accordance with the *Commonwealth Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DoE, 2013a) and the NSW Assessment Bilateral (for those species determined to be potentially significantly impacted by the amended project). A summary of the assessment results is presented in Section 13.8.5 of this BDAR.

Table 11-5: Migratory species recorded or with potential to occur within the amended project footprint

Scientific name	Common name	BC Act status*	EPBC Act status*	SAII	IBRA subregion	Assessment outcome
Apus pacificus	Fork-tailed Swift	P	M	-	Inland Slopes	Recorded- 1 individual within PCT 290
Calidris acuminata	Sharp-tailed Sandpiper	P	M	-	Inland Slopes	Not recorded during surveys. High likelihood.
Calidris ruficollis	Red-necked Stint	P	M	-	Inland Slopes	Not recorded during surveys. High likelihood.
Gallinago hardwickii	Latham's Snipe	P	M	-	Bungonia, Inland Slopes, Murrumbateman and Snowy Mountains	Not recorded during surveys. Moderate to high likelihood
Hirundapus caudacutus	White-throated Needletail	P	M	-	Bondo, Snowy Mountains and Inland Slopes	Not recorded during surveys. 23 historic records (NSW DCCEEW, 2024a) approximately 12 – 18 km from the amended project footprint. Moderate to high likelihood.
Monarcha melanopsis	Black-faced Monarch	P	M	-	All	Not recorded during surveys. Low likelihood but included based on SEARs requirements
Myiagra cyanoleuca	Satin Flycatcher	P	M	-	Murrumbateman	Recorded- 2 individuals within PCT 280.
Rhipidura rufifrons	Rufous Fantail	P	M	-	Bondo	Recorded Bondo -6 times at 1 location, on deployed camera trap within PCT 953. Cannot be determined if same or numerous individuals recorded.
Tringa nebularia	Common Greenshank	P	M	-	Inland Slopes	Not recorded during surveys. High likelihood
Tringa stagnatilis	Marsh Sandpiper	P	M	-	Inland Slopes	Not recorded during surveys. Moderate likelihood

* EPBC Act and BC Act conservation status: CE- Critically Endangered; E -Endangered; V- Vulnerable; Epop – Endangered population; M- Migratory; P - Protected.

11.7 Bogong Moth

In December 2021, the Bogong Moth (*Agrotis infusa*) was added to the IUCN Red List as an Endangered Species. In accordance with the SEARs (issued March 2022), a detailed species assessment on potential impacts to the Bogong Moth (which is of cultural heritage value) is required.

The seasonal migration of Bogong Moth in Spring is typically greater than 1,000 kilometres and the species is known to travel at night – making their mechanism for navigation more complex as it uses the Earth's magnetic field (Dreyer et al., 2018).

Key summer aestivation sites are generally found in the caves, boulder fields and tors of the Australian Alps (Green, 2010). These sites are scattered across the south-eastern Australian alpine areas (limited to areas of the amended project footprint occurring in the Snowy Mountains IBRA subregion) (Keaney, 2016).

The Bogong Moth is of cultural significance and a central part of the Dreaming for many Indigenous peoples of south-eastern Australia. Significant cultural rituals are associated with the seasonal occupation of the Bogong high plains and other alpine areas of NSW to which Aboriginal people travelled to these summer aestivation cave sites to feast on Bogong Moth. The mountain caves where the adult moths aestivate were known to Aboriginal people. The Bogong Moth is also a critical food source to many native fauna species, including endemic alpine species such as the Mountain Pygmy-possum (*Burramys parvus*).

Given the species high cultural and ecological importance, potential impacts to the species are being considered in line with requirements for EPBC Act listed threatened species and communities (DPI, 2023c). Further assessment of potential impacts is required in accordance with Section 17 of the Supplementary SEARs. The results of this assessment are documented in Section 13.8.6.

11.8 2019-20 bushfire impacts

On Monday 20 January 2020 the then Commonwealth Department of Agriculture, Water and the Environment (DAWE) released an initial list of listed threatened or migratory species which have more than 10 per cent of their known or predicted distribution in areas affected by bushfires in southern and eastern Australia (DAWE, 2020a). The assessment by DAWE (2020a) states that for all priority species, protecting unburnt areas within or adjacent to recently burnt ground that provides refuge is essential.

The 2019-2020 bushfires affected the Bondo, Inland Slopes and Snowy Mountains IBRA subregions. EPBC Act listed species and communities and migratory species relevant to this assessment are documented in the preceding sections. Those that are known or considered likely to occur in the amended project footprint and are associated with severely burnt PCTs are detailed in Attachment 4. Assessments to clarify the importance of habitat within the amended project footprint in the context of the 2019-2020 bushfires, as per the requirements of the Supplementary SEARs, have been provided for these species. The assessments include the following information:

- The area (in hectares) of habitat for the MNES that are associated with severely burnt PCTs within the amended project footprint directly impacted by the fires (if any).
- Available information regarding the impacts of the fires on the population size (where relevant) for MNES within and surrounding the amended project footprint.
- The area (and per cent) of regional habitat for each species/ecological community that was burnt and remained unburnt in the fires. In this assessment regional habitat has been defined as an area of 100 kilometres surrounding the amended project footprint.

- A discussion regarding the importance and capacity of the remaining habitat within the amended project footprint to support remaining populations of each species.

The aim of these assessments was to clarify the importance of habitat within the amended project footprint in the context of the 2019-2020 bushfires. Table 11-6, Table 11-7 and Table 11-8 summarise the results of the assessments for the two TECs, 7 threatened flora and 13 threatened fauna species recorded or considered to have the potential to occur within the amended project footprint (see Attachment 4 for complete assessments).

Table 11-6: EPBC Act TEC bushfire impact assessment

TEC	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Relative importance of remaining unburnt habitats within the amended project footprint?
				Bondo	Inland Slopes	Snowy Mountains		
White Box, Yellow Box, Blakely's Red Gum Grassy Woodland, and Derived Native Grassland (Box-Gum Woodland)	CE	172.26	268, 280	-	30.33	-	18%	No change. The majority (82%) of Box-Gum Woodland TEC within the amended project footprint was not severely burnt as a result of the 2019/20 fires. Additionally, 83% of the potential Box-Gum Woodland TEC in the locality (20km) of the amended project footprint wasn't severely burnt. Given the extent of the Box-Gum Woodland TEC throughout NSW, it is possible that impacts as a result of the 2019/20 bushfires were more wide-ranging and severe than identified for the amended project locality. However, associated eucalypt communities are well adapted to fire and likely to regenerate quickly given suitable conditions. Whilst highly mobile fauna species may have become temporarily more reliant on unburnt Box-Gum Woodland within the amended project footprint post-fire, this reliance would reduce as burnt areas continue to recover.
Alpine Sphagnum Bogs and Associated Fens (Bogs and Fens)	E	2.54	939	-	-	0.88	35%	Greater. Approximately one-third of the Bogs and Fens TEC occurring within the amended project footprint was severely burnt as a result of the 2019/20 fires. Although this constitutes a relatively small area (0.88 ha), impacts as a result of the bushfire may still be considered significant given that the TEC only occurs as small, highly fragmented pockets of isolated remnant vegetation. Additionally, approximately 48% of the potential Alpine Sphagunm Bogs TEC in the locality (20km) was severely burnt. Unburnt areas are considered of high important for the recovery of the TEC given its fire ecology. Furthermore, unburnt areas are likely to be significant for the persistent of associated flora and fauna species within the amended project footprint given the long recovery periods typically associated with this community post-fire.

Table 11-7: EPBC Act threatened flora bushfire impact assessment

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
Ammobium craspedioides	Yass Daisy	V	1,965.10	268, 287, 290	-	43.00	-	2%	No. Although fires impacted on approximately 2% of the species suitable habitat within the amended project footprint, Yass Daisy is reported to respond well to fire (Doherty and Wright, 2006). Therefore, it is likely to have persisted post bushfire and the population of Yass Daisy in the amended project footprint is not considered to be an important population post 2019-2020 bushfire.	No change. There is approximately 1,965.10 ha of suitable habitat for the species within the amended project footprint, of which only 2% was severely burnt. Within 20km of the amended project footprint, approximately 37% of potentially suitable habitat for the Yass Daisy in the form of associated PCTs was severely burnt, and conversely, approximately 63% was low to moderately burnt, or remained unburnt. However, the species is reported to respond well to fire (Doherty and Wright 2006). The remaining habitat within the amended project footprint is therefore unlikely to be of substantially greater importance to the survival of Yass Daisy following the fires.
Leucochrysum albicans var. tricolor	Hoary Sunray	E	1,273.72	268, 953, 1196	-	6.48	21.12	2%	No. Although the small population of this species is known from only three geographically separate areas (DPE, 2022) and fires impacted on approximately 2% of the species suitable habitat in the amended project footprint, Hoary Sunray is thought to require frequent fires (Sinclair, 2010) for its longevity. Therefore, Hoary Sunray is likely to have persisted post bushfire and the population in the amended project footprint is not considered to be an important population post 2019-2020 bushfire.	No change. There is approximately 1,273.72 ha of suitable habitat for the species within the amended project footprint, of which only 2% was severely burnt. Within 20km of the amended project footprint, approximately 42% of potentially suitable habitat for the Hoary Sunray in the form of associated PCTs was severely burnt, and conversely, approximately 58% was low to moderately burnt, or remained unburnt. This species requires some disturbance (in the form of frequent fires) for its conservation (Sinclair, 2010). Therefore, the remaining habitat within the amended

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										project footprint is unlikely to be of substantially greater importance to the survival of this species following the 2019/20 bushfires.
Pimelea bracteata	-	CE	15.65	285, 679, 939, 953	8.56	-	1.24	63%	Yes. There are 3 *Pimelea bracteata* records within 20 km of the amended project footprint (BioNet, 2022). There were also individuals identified within the amended project footprint during targeted flora surveys for the amended project. Within the amended project footprint, 63% of habitat for the species was severely burnt while approximately 46% of potentially suitable habitat within the locality (20 km) was severely burnt. Although there is some evidence that the species may respond well through the response of seeds to smoke (Wash and McDougall, 2004), given that the geographic distribution of the species is highly restricted and ≥50% of the species modelled likely and known distribution was within fire affected areas (Auld et al., 2020 and DEE, 2020), any surviving population of *Pimelea bracteata* in the area is likely to be an important population post fires until there is substantial recovery of populations at burnt sites in the region and surrounds.	No change The species was recorded in two locations during targeted surveys within the amended project footprint, which contains associated PCTs and suitable habitat in severely burnt vegetation within the Bondo and Snowy Mountains IBRA subregions. Within 20 km of the amended project footprint, approximately 46% of potentially suitable habitat for *Pimelea bracteata* in the form of associated PCTs was severely burnt. Given three years post-fire, habitats within the amended project footprint shows strong signs of recovery with remaining impacts largely contained to the canopy strata. Unburnt habitats within the amended project footprint are not considered of greater importance for species survival given post-fire recovery observed and recent detection of the species population within burnt habitats.
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	37.17	300	4.40	-	-	10%	No. Approximately 37.17 ha of suitable habitat for *Pomaderris cotoneaster* habitat occurs in	No change. Although *Pomaderris cotoneaster* has a small population size, the geographic distribution

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									the amended project footprint. Of this, FESM data indicates that approximately 4.40 ha of suitable habitat within one PCT (300) in the Bondo IBRA subregion was severely burnt by the 2019/20 fires, or 10%. In total, approximately 90% of all suitable *Pomaderris cotoneaster* habitat (associated PCTs) recorded within the amended project footprint wasn't severely burnt. Additionally, approximately 18% of potential habitat within the locality (20 km) was severely burnt. The species was not recorded within the amended project footprint during targeted surveys. As only a small proportion of potential suitable habitat for the species was severely burnt within the amended project footprint, and no individuals have been recorded, there is not considered to be an important population of the species within the amended project footprint post fire.	isn't isolated and many populations are known to occur in areas often protected from wildfires (e.g. riparian corridors) (DECCW, 2009). Furthermore, 90% of the habitat within the amended project footprint was not severely burnt. Approximately 18% of potential habitat in the form of associated PCTs is present within 20 km of the amended project footprint and was severely burnt. Therefore, the remaining habitat within the amended project footprint is unlikely to be of substantially greater importance to the survival of this species following the 2019/20 bushfires.
Pterostylis oreophila	Blue-tongued Greenhood	CE	2.24	939	-	-	0.87	45%	Yes. Targeted flora surveys undertaken in areas of suitable habitat within the amended project footprint did not locate the species. There are five nearby records of *Pterostylis oreophila*, with the closest record 304 m outside the amended project footprint boundary (DPE, 2022). Of these records, none were in areas that were severely burnt, indicating that all records of *Pterostylis oreophila* in the area were not impacted by	Greater. The amended project footprint contains associated PCTs and suitable habitat in the Snowy Mountains IBRA subregion, including approximately 1.37 ha that was not severely burnt. Within 20 km of the amended project footprint, no associated PCTs for the species were mapped by the STVM. Given that the geographic distribution of the species is very highly restricted and that fires impacted an extensive area of *Pterostylis oreophila* habitat across NSW (Auld *et al*., 2020 and DEE, 2020), the remaining habitat

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									the 2019/2020 fires and most are likely persisting. Given the very low number of mature individuals, very restricted distribution (OEH, 2022), the extensive high risk impact the 2019/2020 fire had on this species (Auld et al., 2020 and DEE, 2020) and that some species of *Pterostylis genera* are fire sensitive (Duncan, 2012), any potential population of *Pterostylis oreophila* in the amended project footprint is likely to be an important population post fires. Furthermore, *Pterostylis oreophila* is likely to be threatened by environmental and demographic stochasticity due to the narrow areas of occupancy, small population sizes, and dispersed distribution of populations (NSWSC, 2008 cited in TSSC, 2012), indicating it could be vulnerable to stochastic events such as the 2019/20 wildfires.	within the amended project footprint is potentially of substantially greater importance to the survival of this species following the fires until there is substantial recovery of habitat at burnt sites in the region and surrounds
Xerochrysum palustre	Swamp Everlasting	V	2.43	679 & 939	-	-	1.25	51%	No. This species was recorded within the amended project footprint during targeted surveys and although 10 to <30% of the species modelled likely and known distribution was within fire affected areas (NSW) (DEE, 2020), this species has been observed to be relatively unaffected by fire (Walsh and McDougall, 2004). Therefore, the population of Swamp Everlasting within the amended project footprint is unlikely to be an important population post fires.	No change. While there is approximately only 1.18 ha of potential habitat for this species within the amended project footprint that was not severely burnt. Within 20 km of the amended project footprint, approximately 42% potential suitable habitat in the form of associated was severely burnt. Furthermore, this species has been observed to be relatively unaffected by fire (Walsh and McDougall, 2004). Therefore, the remaining habitat within the amended project

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										footprint is unlikely to be of substantially greater importance to the survival of *Xerochrysum palustre* following the fires.

Table 11-8: EPBC Act threatened fauna bushfire impact assessment

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
Anthochaera phrygia	Regent Honeyeater	CE	3,956.53	268, 280, 287	-	51.36	-	1%	No All remaining populations of Regent Honeyeater are considered to be important populations. There are no known populations of the species in the amended project footprint, and the amended project footprint is not within any known key breeding areas or areas mapped as important for the species, however the amended project will impact on foraging habitat for the species. The Regent Honeyeater is considered a single population throughout its range and is predominantly nomadic, moving through the landscape in response to the availability of foraging resources (Heinsohn et al., 2022). Given the time since the fires and the mosaic of vegetation recovery it is reasonable to assume that the population of Regent Honeyeater in the area is unlikely to be an important population post fires.	No change Regent Honeyeater was not detected within the amended project footprint during targeted surveys, there are 20 records within 20 km of the amended project footprint (estimated 83 individuals) and the closest record is 6 km from the amended project footprint (DPE, 2022). The amended project footprint contains associated PCTs and potential foraging habitat, including approximately 3,905.17 ha that was not severely burnt. Within 20 km of the amended project footprint, approximately 34% of potentially suitable habitat for the Regent Honeyeater in the form of associated PCTs was severely burnt, and conversely, approximately 66% was low to moderately burnt, or remained unburnt. Given the extent and severity of the 2019/20 bushfires across NSW, Regent Honeyeaters may be more reliant on habitat within the amended project footprint in the short-term. However, the Regent Honeyeaters habitat in proximity to the amended project footprint was not extensively burnt and it is unlikely the amended project footprint will have a discernible increase in Regent Honeyeater numbers. Furthermore, the mosaic of vegetation recovery throughout the burned landscape is likely to already provide foraging and nesting resources for

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										this species. With an increase in time since fire at burnt sites, there is likely to be a return of this species to its favoured locations.
Aphelocephala leucopsis	Southern Whiteface	V	1,519.35	268, 280, 287, 280, 297, 299, 306, 314, 679, 953, 1196	-	82.73	114.40	13%	No All remaining populations of Southern Whiteface are considered to be an important population. There are no known populations of the species in the amended project footprint, and the amended project footprint is not within any known key breeding areas or areas mapped as important for the species, however the amended project will impact on foraging habitat for the species. However, given that the species wasn't recorded within any IRBAs that were severely burnt, and the percentage of suitable habitat remaining that wasn't severely burnt (87%), it is reasonable to assume that the population of Southern Whiteface in the area is unlikely to be an important population post fires.	No change This species was recorded within the amended project footprint within the Crookwell IBRA subregion, however, was not recorded within any severely burned IBRA subregions within the amended project footprint. The amended project footprint contains associated PCTs and suitable habitat, including approximately 1,322.22 ha that was not severely burnt. Within 20 km of the amended project footprint, approximately 43% of potentially suitable habitat for the Southern Whiteface in the form of associated PCTs was severely burnt, and conversely, approximately 57% was low to moderately burnt, or remained unburnt. A reduction in suitable Southern Whiteface habitat surrounding the amended project footprint due to 2019/2020 bushfires may cause some surviving individuals to rely more on habitat in the amended project footprint, at least until there is extensive recovery of the ground-layer for foraging at burnt sites in the region and surrounds. However, given the large extent of unburnt habitat in proximity to the amended project footprint, there is unlikely to be a discernible increase in Southern Whiteface numbers.

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
Aprasia parapulchella	Pink-tailed Legless Lizard	V	352.63	290	-	5.82	-	2%	No Reptile species richness is known to have a positive response in bushfire affected areas (Price et al., 2022). This species was identified within the amended project footprint during targeted surveys, and one record was within an area that was severely burnt by the 2019/20 fires, suggesting that the burned landscape is already providing habitat for this species and the species can persist in severely burned areas. Therefore, it is reasonable to assume that the population of Pink-tailed Legless Lizards in the area is unlikely to be an important population post fire.	No change Pink-tailed Legless Lizard individuals were identified within the amended project footprint during targeted surveys and the amended project footprint contains associated PCTs and suitable habitat, including approximately 3,468.81 ha that was not severely burnt. Within 20 km of the amended project footprint, approximately 26% of potentially suitable habitat for the Pink-tailed Legless Lizard in the form of associated PCTs was severely burnt, and conversely, approximately 74% was low to moderately burnt, or remained unburnt. Given the extent and severity of the 2019/20 bushfires across NSW, there is the possibility that Pink-tailed Legless Lizard may be more reliant on habitat within the amended project footprint until there is substantial recovery of habitat at burnt sites in the region and surrounds. However, studies have found that reptiles generally respond positively to bushfire as burnt areas are used preferentially for foraging by survivors and/or immigrants (Price et al., 2022). Given this, and the time since the fires, it is unlikely that the remaining habitat within the amended project footprint is of substantially greater importance to the survival of the Pink-tailed Legless Lizard following the fires.
Callocephalon fimbriatum	Gang-gang Cockatoo	E	5,661.68	268, 280, 285, 287, 290, 295, 297, 299, 300,	58.03	82.84	174.67	6%	No This species' is considered to have a poor response to bushfire (Loyn, 1997), and	No change The amended project footprint contains associated PCTs and suitable habitat,

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
				306, 314, 638, 679, 953, 1196					around 26% of its Area of Occupancy (AOO) was burnt nationally (Todd & Maurer, 2020). However, numerous Gang-gang Cockatoo's were recorded within severely burned PCTs within the amended project footprint, suggesting that the burned landscape is already providing resources for this species. Therefore, it is reasonable to assume that the population of Gang-gang Cockatoo in the area is unlikely to be an important population post fire.	including approximately 2,015.33 ha that was not severely burnt. A reduction in suitable Gang-gang Cockatoo habitat surrounding the amended project footprint due to 2019/2020 bushfires may cause some surviving individuals to rely more on habitat in the amended project footprint, at least until there is extensive recovery of the canopy for foraging and breeding at burnt sites in the region and surrounds. However, given the large extent of unburnt potentially suitable habitat in proximity to the amended project footprint (53%), there is unlikely to be a discernible increase in Gang-gang Cockatoo numbers. Similarly, 80% of suitable habitat within the amended project footprint wasn't severely burnt. This species was recorded within severely burned PCTs within the amended project footprint, suggesting that the mosaic of vegetation recovery throughout the burned landscape is already providing some resources for this highly mobile species, thereby decreasing the importance of the areas of habitat that were not burnt. With an increase in time since fire at burnt sites, there is likely to be a return of this species to its entire AOO.
Calyptorhynchus lathami	Glossy Black-Cockatoo	E	2,430.26	290	-	10.14	-	0.4%	No South-eastern Glossy Black-Cockatoos are known to have a poor response to bushfire (Commonwealth DCCEEW, 2022j). Although the species is rare, they are	No change A significant proportion of South-eastern Glossy Black-Cockatoo's known range was burnt in the 2019/2020 bushfires (25%), with 34% of their total area of occupancy

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									widespread and highly mobile. A small percentage of potential breeding and/or foraging habitat within the amended project footprint was affected by the bushfires (0.4%), with 2,420.12 ha of suitable habitat remaining that wasn't severely burnt. Given this, the time since the fires and the mosaic of vegetation recovery it is reasonable to assume that the population of Glossy Black-Cockatoos in the area is unlikely to be an important population post fire.	affected. Despite this, 99.6% of suitable habitat for the species (2,420.12 ha) within the amended project footprint has been left unaffected by the fires. Within 20 km of the amended project footprint, approximately 45% of potentially suitable habitat for the Glossy Black-Cockatoo in the form of associated PCTs was severely burnt, and conversely, approximately 55% was low to moderately burnt, or remained unburnt. Considering this and that Glossy Black-Cockatoos are known to be highly mobile, it is unlikely that the remaining habitat within the amending project footprint is of substantially greater importance to the survival of the species following the fires.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	2,021.75	268, 280, 285, 287, 290, 297, 299, 306, 314, 679, 953, 1196	44.83	82.73	114.40	12%	No The proportion of bushfire impacts across the range of the Brown Treecreepers is unknown. However, multiple Brown Treecreepers were recorded within moderately burned PCTs within the amended project footprint, suggesting that the burned landscape is already providing resources for this species. Therefore, it is reasonable to assume that the population of Brown Treecreeper in the area is unlikely to be an important population post fire.	No change The amended project footprint contains associated PCTs and suitable habitat, including approximately 1,779.79 ha that was not severely burnt. There were multiple recorded sightings of the Brown Treecreeper within the amended project footprint found during targeted fauna surveys or incidentally during any other surveys. A reduction in suitable Brown Treecreeper (eastern sub-population) habitat surrounding the amended project footprint due to 2019/2020 bushfires may cause some surviving individuals to rely more on habitat in the amended project footprint, at least until there is extensive recovery of the canopy for foraging and

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										breeding at burnt sites in the region and surrounds. However, given the large extent of unburnt potentially suitable habitat in proximity to the amended project footprint (51%), there is unlikely to be a discernible increase in Brown Treecreeper numbers. Similarly, 78% of habitats within the amended project footprint wasn't severely burnt.
Dasyurus maculatus	Spotted-tailed Quoll	E	4,379.13	268, 280, 287, 290	-	61.51	-	1%	Yes The Spotted-tailed Quoll was not identified within the amended project footprint during targeted surveys, however there are multiple records within 5km (seven in Bondo, three in Inland Slopes and seven in Snowy Mountains). Although the species is widespread, there is locally abundant populations in the south of the state (i.e. Kosciuszko National Park and coastal national parks). Given this, and that 6% of the suitable habitat within the amended project footprint was affected by the 2019/20 bushfires, it is reasonable to assumed that any persisting populations within the amended project footprint would be considered more important post fires.	No change A significant proportion of the Spotted-tailed Quoll's known range was burnt in the 2019/2020 bushfires (29%). Despite this, 94% of suitable habitat for the species (5,295.10 ha) within the amended project footprint wasn't severely burnt by the fires. Within 20 km of the amended project footprint, approximately 45% of potentially suitable habitat for the Spotted-tailed Quoll in the form of associated PCTs was severely burnt, and conversely, approximately 55% was low to moderately burnt, or remained unburnt. Spotted-tailed Quolls are also often known to recover from the direct impacts of bushfires after initial population reductions, especially when there is adequate rocky refugia (TSSC, 2020a). It is therefore unlikely that the remaining habitat within the amended project footprint is of substantially greater importance to the survival of the species following the fires.

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
Grantiella picta	Painted Honeyeater	V	4,160.93	268, 280, 287, 290, 295, 297, 299, 306, 314	-	82.85	-	2%	No Painted Honeyeater was not recorded within the amended project footprint during field surveys. Historic records within 20 km of the footprint indicate presence of the species within the locality. Considering the dispersive habit of the Painted Honeyeater, the species is considered to have a single population (Commonwealth of Australia, 2021a). The proportion of bushfire impacts across the range of the Painted Honeyeater is unknown. However, given the species' broad range and mobility and the ongoing availability of suitable habitats throughout its range, it could be reasonably concluded that the species population is of no greater importance following the 2019/20 bushfires.	No change The amended project footprint contains associated PCTs and suitable habitat for foraging and nesting, including approximately 4,317.62 ha that was not severely burnt. There were no recorded sightings of the Painted Honeyeater within the amended project footprint during targeted fauna surveys or incidentally during any other surveys. There are 22 records within the broader Inland Slopes IBRA subregion, three of which occur within 20 km of the amended project footprint, and one which occurs within 5 km. Within 20 km of the amended project footprint, approximately 46% of potentially suitable habitat for the Painted Honeyeater in the form of associated PCTs was severely burnt, and conversely, approximately 54% was low to moderately burnt, or remained unburnt. Painted Honeyeaters have been found to be more abundant in locations where there are a large number of trees present and a high percentage of canopy cover (Commonwealth of Australia, 2021). Although many of the trees the Painted Honeyeater uses for habitat are known to readily regenerate post bushfire (eg. Eucalypts), populations of mistletoe, which they rely on for food, are often decimated by intense bushfires (Fagg, 2012). If a mistletoe population is killed by fire, a source of seed outside the burned

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										area is needed to replenish it, often via Dicaeum hirundinaceum (Mistletoe bird) (Gill, 1996). The rate and timing of reinvasion of Mistletoe post fire is unknown, as it can be highly variable dependent on the area affected by fire and distance from surviving Mistletoe populations. The proportion of bushfire impacts across the range of the Painted Honeyeater Is unknown. However, given the species' broad range and mobility and the ongoing availability of suitable habitats throughout its range, it could be reasonably concluded that unburnt habitats within the amended project are of no greater importance following the 2019/20 bushfires.
Lathamus discolor	Swift Parrot	CE	3,956.53	268, 280, 287	-	51.36	-	1%	No This species was not recorded in the amended project footprint during targeted surveys, however there are 69 records in the amended project locality. The amended project footprint is not within any known key breeding areas or areas mapped as important for the species. Swift Parrot populations, where they occur within the locality, would be considered an important population given the species' critically endangered conservation status regardless of any interactions with the 2019/20 fires. Given the time since the fires and the mosaic of vegetation recovery observed within the locality it is reasonable to conclude there has been no	No change The Swift Parrot was not recorded in the amended project footprint during targeted surveys. There are 69 records in the amended project locality (675 estimated individuals) focused on western extent of the amended project footprint. All records are outside the amended project footprint, with the closest record 1 km from the boundary of the amended project footprint. No pre 2019/2020 fire records of this species occur within severely burnt areas. Within 20 km of the amended project footprint, approximately 26% of potentially suitable habitat for the Swift Parrot in the form of associated PCTs was severely burnt, and conversely,

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									change to the status of populations within the amended project footprint, where they occur.	approximately 74% was low to moderately burnt, or remained unburnt. Where required nectar resources were impacted as a result of the fires, it is possible that Swift Parrot may be more reliant on unburnt habitats within the amended project footprint for foraging. However, given it is almost three years post-fire and field observations within burnt habitats indicate substantial recovery, it is likely that vegetation has recovered sufficiently to support flowing and associated foraging opportunities for Swift Parrot. The amended project footprint does not contain Swift Parrot Mapped Important Area (DPIE, 2021b) and is not considered to support breeding. Given the above, remaining unburnt habitat within the amended project footprint is not considered of greater importance to the survival of the species.
Litoria castanea	Yellow-spotted Tree Frog	E	1,519.35	268, 280, 287, 280, 297, 299, 306, 314, 679, 953, 1196	-	82.73	114.40	13%	No This species was not recorded in the amended project footprint during targeted surveys, however there are two records (400 estimated individuals) adjacent to the amended project footprint, with the closest record 9 km outside the amended project boundary (DPE 2022a). None of these records (pre-2019/20 bushfire) were in severely burnt areas, indicating that known Yellow-spotted Tree Frog habitat within 20 km of the amended project footprint was not severely burnt by the	No change. This species was not recorded in the amended project footprint during targeted surveys, however the amended project footprint contains associated PCTs and approximately 34.21 ha that was not severely burnt. There is only one known extant site of the species near Yass located outside the amended project footprint and around 30% of the species habitat within the locality was within the severely burnt areas. Considering there are no records within the amended project footprint and

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									2019/20 bushfires, therefore decreasing the potential need for Yellow-spotted Tree Frog to move into the amended project footprint. This is further evidenced by Yellow-spotted Tree Frog survey data collected since the 2019/20 bushfires, which suggests that there has not been an increase in the population within the amended project footprint. Furthermore, frogs are generally not significantly impacted by fire and though their abundance levels are lower during the first few years following a fire, they remain present in burned areas (Gillespie & West 2012). Therefore, it is reasonable to assume that the 2019-2020 bushfire would not have significantly impacted this species conservation and the population of Yellow-spotted Tree Frog in the area is unlikely to be an important population post fire.	there is only a small area of suitable habitat located within the amended project footprint it can assumed that the remaining habitat isn't considered of greater importance.
Melanodryas cucullata cucullata	South-Eastern Hooded Robin	E	4,571.68	268, 280, 287, 290, 297, 306, 314	-	82.03	-	2%	No The species was not recorded within the amended project footprint during targeted surveys, however there is a record within 20 km, in the Bondo IBRA subregion. There are also records in the greater Bondo (82), Inland Slopes (8) and Snowy Mountains (1) IBRA subregions. The South-Eastern Hooded Robin is highly mobile and there are recorded within all IBRAs that were impacted by bushfires. Considering that the species was not listed as requiring urgent management following the	No change The species was not recorded within the amended project footprint during targeted surveys; however, the amended project footprint does contain suitable habitat in the form of associated PCTs, approximately 4,489.65 ha of which was not severely burnt. Within 20 km of the amended project footprint, approximately 51 % of potentially suitable habitat for the Yellow-bellied Glider in the form of associated PCTs was severely burnt. The main known threat to the Hooded Robin

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									2019/20 bushfires and the high percentage of suitable habitat that wasn't severely burnt (98%), any populations persisting within the amended project following the fire is unlikely to be considered an important population.	following fire is reduction in suitable habitat and availability of foraging resources. Considering that the species hasn't been recorded within the amended project footprint, and 98% of the suitable habitat within the amended project footprint remains unburnt, it is safe to assume that the remaining habitat is not of substantially greater importance to the survival of the species following the fires.
Petaurus australis	Yellow-bellied Glider	V							Yes 29 Yellow-bellied Gliders were recorded in the amended project footprint or within the buffer during the surveys, post 2019/2020 bushfires. Considering the effects severe bush fires have on Yellow-bellied Gliders numbers and their habitat, any remaining populations of Yellow-bellied Gliders in the amended project footprint are likely to be considered more important post fires, until there is substantial recovery of suitable habitat and populations in the region and surrounds.	Greater The amended project footprint has suitable foraging and breeding habitat in the form of tall mature eucalypts forests and hollow-bearing trees. The amended project footprint contains associated PCTs and suitable habitat, including 2352.69 ha that was not severely burnt. There are 540 records within 5km of the amended project footprint, including 19 known records in the Snowy Mountains IBRA Subregion, 10 in Bondo situated within the amended project footprint and one record in Inland Slopes in the adjacent landscape assessment area (ie within 500 metres of the amended project footprint). Within 20km of the amended project footprint, approximately 51 % of potentially suitable habitat for the Yellow-bellied Glider in the form of associated PCTs was severely burnt, and conversely, approximately 49 % was low to moderately burnt, or remained unburnt.

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										The amended project footprint has a substantial amount of unburnt area and important habitat, (ie hollow-bearing trees). It has been previously seen that arboreal mammal population numbers increase in unburnt areas post fires (Banks et al., 2011). Considering the effects severe bush fires have on Yellow-bellied Gliders and their habitat, any remaining habitat of Yellow-bellied Gliders in the amended project footprint is likely to be considered more important post fires.
Petauroides volans	Greater Glider	E	2,569.12	299, 300, 638, 953, 1196	46.03	0.70	169.70	8%	No Greater Gliders persist within the amended project footprint and surrounding locality. It is unknown the extent of bushfire impacts more broadly across the species range. However, it is unlikely that populations within the amended project footprint would be of any more importance following the 2019/20 bushfires given the likely persistence of the species elsewhere within its broader range (much of this remaining unaffected by the fires).	Greater Greater Gliders were identified within the amended project footprint during spotlighting surveys (Snowy Mountain, Bungonia and Bondo IBRA subregion) and the amended project footprint contains associated PCTs and suitable habitat (containing hollow bearing trees), including approximately 246.71 ha that was not severely burnt. Within 20 km of the amended project footprint, approximately 51% of potentially suitable habitat for the Greater Glider in the form of associated PCTs was severely burnt, and conversely, approximately 49% was low to moderately burnt, or remained unburnt. Given the extent and severity of the 2019/20 bushfires across NSW and that this species has been listed as a priority species requiring urgent management intervention, it is likely that Greater Glider's may be more reliant on habitat (in

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										particular the hollow bearing trees) within the amended project footprint until there is substantial recovery of breeding resources at burnt sites in the region and surrounds.
Phascolarctos cinereus	Koala	V	342.94	295, 299, 300, 306, 638, 953, 1196	6.45	1.95	87.83	28%	No All remaining populations of Koala are considered to be an important population. There are no known populations of the species in the amended project footprint, however, amended project footprint contains suitable Koala habitat and there are 1,517 records of Koala within 20 km of amended project footprint and 8 of those that occurred within 5 km (DPE, 2022a). Therefore, given there was no Koalas found within the amended project footprint and the time that has passed since the fires it is reasonable to assume that the 2019-2020 bushfire would not have significantly impacted this species population of Koalas in the area and is unlikely to be an important population post fire.	No change The amended project footprint contains suitable Koala habitat (associated PCTs), including approximately 1,808.86 ha of unburnt suitable Koala habitat. The Koala has been listed as priority species requiring urgent management action. The assessment by DAWE (2020) states that for all priority species, protecting unburnt areas within or adjacent to recently burnt ground that provide refuges is essential. However, the 2019/2020 bushfires were concentrated on the far southern end of the amended project footprint (DPIE, 2020f). There are 1,517 records of Koala within 20 km of amended project footprint (DPE, 2022a). These records are predominantly at the northern end of the amended project footprint, with closest record approximately 6.5 km from the amended project footprint. Only one of these records (pre-2019/20 bushfire) were in severely burnt areas, indicating that areas predominantly inhabited by Koalas within 20 km of the amended project footprint were not severely burnt by the 2019/20 bushfires, therefore decreasing the potential need for any surviving Koalas to move into habitat in the amended

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										project footprint. This is further evidenced by Koala survey data collected since the 2019/20 bushfires, which suggests that there has not been an increase in the population within the amended project footprint. A reduction in suitable Koala habitat surrounding the amended project footprint due to 2019/2020 bushfires may lead some surviving individuals to move into the amended project footprint, at least until there is extensive recovery of the canopy at burnt sites in the region and surrounds. Within 20 km of the amended project footprint, approximately 44% of potentially suitable habitat for the Koala in the form of associated PCTs was severely burnt, and conversely, approximately 56% was low to moderately burnt, or remained unburnt. The amended project footprint may experience a small increase in interactions and/or competition from surrounding Koala populations due to the proximity of smaller fires, however given the extent of unburnt habitat in proximity to the amended project footprint, there is unlikely to be a discernible increase in Koala numbers. Furthermore, it is unlikely that there would be an increase in interactions and competition within the amended project footprint from the regions most impacted by fires as Koalas have limited ability to flee during a fire event, are attached to place, and sub-adults have a dispersal distance of only

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										1-10 km (DAWE, 2020). It can be assumed that the remaining Koala habitat found in the amended project footprint is not considered of more importance post fires.
Polytelis swainsonii	Superb Parrot	V	2,125.28	268, 280, 285, 287, 290, 295, 297, 299, 300, 306, 314, 638, 679, 939, 953, 1196	58.03	82.84	175.55	15%	No The Superb Parrot was recorded within the amended project footprint during targeted surveys in the Inland Slopes IBRA subregion (6 individuals). There are also numerous BioNet records in the Inland Slopes IBRA subregion (327 records), within 20 km of the amended project footprint. The spread of records within the IBRA subregion and the low percentage of suitable Superb Parrot habitat that was severely burnt by the fires (0.1%) means it is safe to assume that remaining populations of the species in the area wouldn't be considered more important post fire.	No change The Superb Parrot was recorded within the amended project footprint during targeted surveys, within the Inland Slope IBRA subregion There is also suitable habitat in the form of associated PCTs within the amended project footprint, and of this 3,099.10 ha wasn't severely burnt (99.9%). Within 20 km of the amended project footprint, approximately 36% of potentially suitable habitat for the Superb Parrot in the form of associated PCTs was severely burnt, and conversely, approximately 64% was low to moderately burnt, or remained unburnt. The large area of remaining habitat for the species and the suitable time since the fires to allow for Eucalyptus regeneration means it can be assumed that the remaining Superb Parrot habitat found in the amended project footprint is not considered of more importance post fires.
Pseudomys fumeus	Smoky Mouse	E	3,102.76	280, 299	3.60	0.06	-	0.1%	No There are no known populations of the species in the amended project footprint. However, the amended project footprint contains suitable Smoky Mouse habitat and there are 37 records of Smoky Mouse within 20 km of amended project footprint	No change The amended project footprint does contain a small amount of suitable habitat for the Smoky Mouse in the form of alpine sedge and heath environment. The amended project footprint also contains one associated PCT, including 2.18 ha that

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
									(DPE, 2022a). Given there are no known populations within the amended project footprint, and the likelihood of Smoky Mouse recolonisation elsewhere in the post fire landscape, it is unlikely that any individuals within the amended project footprint would be considered an important population.	was not severely burn. There are 37 records within 20 km of the amended project footprint, 28 in the Snowy Mountains IBRA Subregion, followed by 9 in Bondo. Within 20 km of the amended project footprint, approximately 54% of potentially suitable habitat for the Smoky Mouse in the form of associated PCTs was severely burnt, and conversely, approximately 56% was low to moderately burnt, or remained unburnt. A reduction in suitable Smoky Mouse habitat surrounding the amended project footprint due to 2019/2020 bushfires may lead some surviving individuals to move into the amended project footprint, at least until there is extensive recovery of the canopy at burnt sites in the region and surrounds. The amended project footprint may experience a small increase in interactions and/or competition from surrounding Smoky Mouse populations due to the proximity of smaller fires, however the lack of Smoky Mouse records within 5 km of the amended project footprint and this species ability to survive in situ after fires there is unlikely to be a discernible increase in Smoky Mouse numbers (Hale *et al.,* 2022). It can be assumed that the remaining Smoky Mouse habitat found in the amended project footprint is not considered of more importance post fires.

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
Pteropus poliocephalus	Grey-headed Flying-fox	V	13.17	638	10.99	-	-	83%	No Recent data provided by NSW DCCEEW indicates the presence of eight camps within 37 km of the amended project footprint. Three of these are within 9 km of the amended project footprint in the Inland Slopes IBRA subregion, which was impacted by the 2019-2020 bushfires. Given the significant impact of the prolonged drought and extreme heat during the spring and summer of 2019–2020 had on this species, local populations of Grey-headed Flying-fox are likely to have been considerably impacted. However, severely burnt lands were observed to support substantial post-fire recovery and would be actively supporting foraging opportunities for these populations. This is likely to have occurred more broadly throughout the range of the species and as such, local populations are not considered to be of any more importance as a result of the 2019/20 bushfires.	No change The amended project footprint does not contain any Grey-headed Flying-fox roost camps, however it has been assumed present as the amended project footprint contains associated PCTs and suitable habitat, including approximately 3,260.78 ha that was not severely burnt. There are 74 records within 20 km of the site, with the closest record 0.5 km from the amended project footprint. None of these records (pre-2019/20 bushfire) were in areas that were severely burnt by the 2019/20 bushfires. This suggests that areas of known Grey-headed Flying-fox habitat within 20 km of the amended project footprint were not severely burnt and remain suitable habitat, decreasing the need for any surviving Grey-headed Flying-foxes to move into the amended project footprint. Within 20 km of the amended project footprint, approximately 36% of potentially suitable habitat for the Grey-headed Flying-fox in the form of associated PCTs was severely burnt, and conversely, approximately 64% was low to moderately burnt, or remained unburnt. Given the extent and severity of the 2019/20 bushfires across NSW and the subsequent short-term and long-term significant impacts on the Grey-headed Flying-fox, it is likely that this highly mobile and nomadic species may have been more

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										reliant on foraging habitat within the amended project footprint immediately following the fires, until there was substantial recovery of foraging resources in the region and surrounds. Many of the foraging habitats the Grey-headed Flying-fox favours are well adapted to fire, and active regeneration has been observed within the amended project footprint during survey efforts, with the increase in time post-bushfire. Considering this, the area within the amended project footprint is unlikely to be of significantly greater importance to the survival of the Grey-headed Flying-fox, as active regeneration has meant that areas that were unaffected by the fires are no longer as important.
Pycnoptilus floccosus	Pilotbird	V	3,291.96	287, 290	-	31.18	-	0.9%	No Pilotbird was not recorded within the amended project footprint during field surveys. A number of records within 5km of the amended project footprint indicates presence of the species within the locality. According to studies (Todd and Maurer, 2020), the proportion of bushfire impacts across the range of the species was approximately 32%. Therefore, it could reasonably be concluded that any nearby population of the species is of no greater importance following the 2019/20 bushfires.	No change The amended project footprint contains associated PCTs and suitable habitat, including approximately 441.41 ha that was not severely burnt. A reduction in suitable Pilotbird habitat surrounding the amended project footprint as a result of the 2019/20 bushfires may cause some surviving individuals to rely more on habitat in the amended project footprint, at least until there is extensive recovery of the ground layer for foraging at burnt sites in the region and surrounds. However, given the large extent of unburnt potentially suitable habitat in proximity to the amended project footprint (42%),

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										there is unlikely to be a discernible increase in Pilotbird numbers. Similarly, 66% of habitats within the amended footprint remain unburnt. This species was not recorded within the amended project footprint in either unburnt or severely burnt areas. However, given the species' range ad mobility and the ongoing availability of suitable habitats throughout its range, it could be reasonably concluded that unburnt habitats within the amended project footprint are of no greater importance following the 2019/20 bushfires.
Stagonopleura guttata	Diamond Firetail	V	673.89	285, 287, 290, 295, 297, 299, 300, 306, 314, 638, 953,	58.03	52.52	121.93	34%	No This species was recorded within severely burned PCTs within the amended project footprint, suggesting that the mosaic of vegetation recovery throughout the burned landscape is already providing some resources for this species, thereby decreasing the importance of the areas of habitat that were not burnt. With an increase in time since fire at burnt sites, there is likely to be a return of this species to its entire AOO.	No change The amended project footprint contains associated vegetation formation and suitable habitat, including approximately 12.45 ha that was not severely burnt. A reduction in suitable Diamond Firetail habitat surrounding the amended project footprint as a result of the 2019/20 bushfires may cause some surviving individuals to rely more on habitat in the amended project footprint, at least until there is extensive recovery of the ground layer for foraging at burnt sites in the region and surrounds. However, given the relatively large extent of non-severely burnt potentially suitable habitat in proximity to the amended project footprint (41%), there is unlikely to be a discernible increase in Diamond Firetail numbers. Similarly, 93% of habitats within

Scientific Name	Common name	EPBC Act Status*	Habitat within amended project footprint (ha)	Associated PCTs severely burnt	Extent habitat severely burnt (ha) by IBRA subregion			% habitat severely burnt	Population of the species within the amended project footprint considered an important population?	Relative importance of remaining unburnt habitats within the amended project footprint?
					Bondo	Inland Slopes	Snowy Mountains			
										the amended project footprint weren't severely burnt. This species has been recorded within the amended project print in both unburnt and severely burnt areas. However, given the species' range and mobility and the ongoing availability of suitable habitats throughout its range, it could be reasonably concluded that unburnt habitats within the amended project footprint are of no greater importance following the 2019/20 bushfires.

Niche Environment and Heritage

Stage 2: Impact assessment

12. Avoid and minimise impacts

This chapter addresses proposed measures to avoid and minimise impacts to biodiversity in accordance with Section 7 of the BAM (DPIE, 2020a). The avoidance and minimisation measures detailed in this chapter also consider MNES under the EPBC Act.

A key part of management of biodiversity for the amended project is the application of the 'avoid, minimise, mitigate and offset' hierarchy as follows:

1. avoid and minimise impacts as the highest priority
2. mitigate impacts where avoidance is not feasible or practicable in the circumstance
3. offset where residual, significant unavoidable impacts would occur (if required).

Avoidance and minimisation measures relating to the amended project are detailed below, with mitigation detailed in Chapter 14.

12.1 Avoid and minimise direct impacts

Refer to Chapters 1 and 2 for a description of the amended project including the proposed amendments and refinements to the project since the EIS. An Options Report was prepared by Transgrid (2023b) to summarise the identification and assessment of options during development of the EIS project, including several options for the transmission line corridor and all associated infrastructure (substation, construction compounds, worker accommodation). Transmission line corridor options were developed by initially mapping constraints and identifying opportunities. Constraints were grouped as: Tier 1 constraints, which were no-go areas to be avoided and Tier 2 constraints, which were to be avoided if possible and impacts minimised.

Tier 1 constraints included:

- wilderness protection areas
- wetlands protected by international agreements
- areas of very high Indigenous significance and world heritage places
- Commonwealth Defence Land
- built-up areas (towns and dense residential areas)
- licensed airstrips
- areas of multiple transmission lines north of Lower Tumut Switching Substation.

Tier 2 constraints included:

- wetlands not listed as Tier 1 constraints
- ecological conservation areas (including national parks and nature reserves)
- endangered ecological communities (EECs) and, more broadly, plant community types (PCTs)
- heritage conservations areas and places
- Commonwealth land (non-Defence)
- areas subject to exclusive use Native Title determinations
- forested areas (due to elevated bushfire risk)
- intensive agricultural activities and horticultural use
- unlicensed airstrips

- active industry (mining, wind and solar farms, industrial use)
- residences
- water crossings greater than 800 metres.

Opportunities identified to minimise impacts from the amended project included:

- minimising overall transmission line length to reduce costs, impacts and construction duration
- paralleling existing transmission lines to:
  - utilise existing access tracks
  - avoid introducing new areas of visual impact
  - co-location with existing transmission lines or areas of disturbance to avoid and minimise additional clearance or fragmentation of vegetation wherever possible
- targeting areas of existing disturbance, such as roads, tracks and property boundaries to reduce environmental and property impacts
- Detailed design has been progressing in parallel with the preparation of the BDAR. Noting the number of threatened species and SAII species associated with McPhersons Plain near the future Maragle 500 kV substation, the assessment of opportunities for impact avoidance and minimisation through detailed design has been prioritised. The extent of impact avoidance and minimisation achievable through detailed design and construction planning undertaken to date is outlined below.
  - The central portion of McPhersons Plain is fenced to prevent impacts to threatened flora species by horses. This area has been identified in the HumeLink biodiversity constraints mapping as a no-go zone. To avoid impacts to threatened flora species in the no-go zone, an aerial stringing method for the transmission line would be employed between transmission line structures on either side of McPhersons Plain, as vehicle and plant movement within the fenced area using other stringing methods could impact threatened species or their habitat.
  - Potential habitat for the threatened species associated with McPhersons Plain extends beyond the fenced area. NSW DCCEEW Environment and Heritage has requested that a 30-metre exclusion buffer from the fenceline be applied for project infrastructure. While the length of the transmission line span across McPhersons Plain is limited by design requirements for alpine environments, where snow and ice loading must be considered, the span has been maximised to locate the transmission line structures and associated construction bench outside the 30-metre exclusion buffer.
  - Some clearing of tall-growing vegetation would be required within the 30-metre exclusion buffer to meet the vegetation clearing requirements for the transmission line easement and transmission line structures. Clearing methods that minimise ground disturbance will be used. Where there are known locations of recorded threatened species (as identified in the BDAR), the associated buffer areas will be demarcated as a biodiversity exclusion zone (mitigation measure B13 in Table 14.1). Any threatened species identified through additional surveys or captured as an unexpected find, will be dealt with in accordance with the BMP (mitigation measure B3 in Table 14.1).
  - The impact avoidance and minimisation outlined above has not been captured in the assessment outcomes or in the project impacts mapped in Figure 13-2 (map reference 38), which features the preliminary detailed design. However, new mitigation measure B38 has been developed to include the above avoidance and minimisation commitments (refer to Table 14.1).

Further route refinement and options analysis was undertaken over many months for the EIS project and amended project, including the following amendments and refinements which specifically reduced impacts to biodiversity:

- route adjustment which decreased the distance through intact native vegetation in Bago State Forest and diverted the amended project footprint away from areas supporting native vegetation on private land to largely pine plantation within Green Hills State Forest (referred to as the Green Hills corridor amendment), in areas where use of existing access tracks could be maximised. The Green Hills corridor amendment reduces the potential biodiversity impacts, requiring less native vegetation clearing, including reduced impacts to TECs and threatened species
- avoidance of reserves in State Forests, including Forestry Management Zone 3A Harvesting Exclusions Zone
- avoidance of Kosciuszko National Park, to minimise biodiversity impacts and offset requirements
- the Tumut north option was selected over the Blowering option (which was previously considered), as it had a lower ecological impact
- the Tumut north route was designed to avoid both Minjary National Park and Mudjarn Nature Reserve
- in the Bannaby area, the route selected minimised PCT impacts and avoided Tarlo River National Park
- avoidance of Back Arm Nature Reserve and Burrinjuck Nature Reserve
- north-east of Yass, a route avoiding Bango Nature Reserve and the Rye Park Wind Farm biodiversity offset area was selected.

It should be noted the potential for avoiding impacts by means of project siting is limited. For example, the location of the future Maragle 500 kV substation in a densely vegetated area in Bago State Forest adjacent to Kosciuszko National Park limits opportunities to avoid impacts to native vegetation in this area.

Ongoing commitment to avoid and minimise impacts on biodiversity values would be further achieved through micro-siting new transmission line structures, brake and winch sites and access tracks during the finalisation of detailed design, where practicable. To aid this process, detailed constraints mapping has been developed for the amended project footprint, which identifies CEECs and SAII species/habitat as a priority for design avoidance.

Table 12-1 outlines measures implemented as a part of project siting, project footprint selection and design development to avoid and minimise direct impacts to native vegetation, threatened species, TECs and their habitat.

Table 12-1: Measures implemented to avoid and minimise direct impacts

Avoidance principle (as per Section 7.1 of the BAM, DPIE, 2020a)	Measures implemented
Project siting	
Locating the project in areas where there are no biodiversity values	The options report prepared by Transgrid (2023b) details opportunities where corridor selection and route refinement reduced impact to biodiversity values, including avoidance of wilderness protection areas; and avoiding or minimising impacts to ecological conservation areas (including national parks and nature reserves), EECs and, more broadly, PCTs and waterway crossings greater than 800 metres. There are no wetlands protected by international agreements within 200 m of the amended project footprint. Other opportunities identified to minimise direct impacts that were adopted as part of the amended project include: • paralleling existing transmission lines to utilise existing access tracks and avoid and minimise additional clearance or fragmentation of vegetation wherever possible • targeting areas of existing disturbance, such as roads, tracks and property boundaries to reduce environmental and property impact.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition (ie areas that have a low VI score)	
Locating the project in areas that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT	
Locating the project outside of the buffer area of breeding habitat features such as nest trees or caves	

Avoidance principle (as per Section 7.1 of the BAM, DPIE, 2020a)	Measures implemented
	Route refinements that were actioned and resulted in a reduced impact on biodiversity include: • route adjustment which decreased the distance through intact native vegetation in Bago State Forest and diverted the amended project footprint away from areas supporting native vegetation on private land to largely pine plantation within Green Hills State Forest (referred to as the Green Hills corridor amendment) • the Green Hills corridor amendment as per the amended project was further refined to avoid impacts to native riparian vegetation, resulted in avoidance of 3.6 km in a FMZ 3A Harvesting Exclusion Zone and maximised use of existing access tracks in State Forests • avoidance of reserves in State Forests • avoidance of Kosciuszko National Park, to minimise biodiversity impacts and offset requirements • the Tumut north option was selected over the Blowering option due to reduced ecological impact • the Tumut north route was designed to avoid both Minjary National Park and Mudjarn Nature Reserve • in the Bannaby area, the route selected minimised PCT impacts and avoided Tarlo River National Park • avoidance of Back Arm Nature Reserve and Burrinjuck Nature Reserve • north-east of Yass, a route avoiding Bango Nature Reserve and the Rye Park Wind Farm biodiversity offset area was selected • where possible, existing tracks would be used for access to minimise clearing impacts. Micro-siting of infrastructure within the amended project footprint would continue to be undertaken during finalisation of the detailed design of the amended project. This would aim to minimise impact on biodiversity values where practicable (Table 14-1, B1).
Project location	
An analysis of alternative modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	Alternative technologies were considered for the amended project. GHD (2022) investigated several transmission network options for HumeLink which use underground cables (undergrounding). Clearing methodologies would be tailored to reduce impacts where practicable. Opportunities for individually assessing hazard trees will be considered further during detailed design where required to minimise impacts (Table 14-1, B21).
An analysis of alternative routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route An analysis of alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	As detailed above, the options report (Transgrid, 2023a) detailed further route refinement that included the following, which specifically reduced impacts to biodiversity (Transgrid, 2023a): • avoidance of Kosciuszko National Park, Minjary National Park and Tarlo River National Park • avoidance of Mudjarn Nature Reserve, Back Arm Nature Reserve and Burrinjuck Nature Reserve • narrowed corridor south-east of Bango Nature Reserve to avoid a biodiversity offset area • avoidance of native vegetation within Bago State Forest, diverting the amended project footprint route to Green Hill State Forest, dominated by pine plantation • prioritising the use of existing access tracks where possible (Table 14-1, B28).
An analysis of alternative sites within a property on which the project is proposed that	Where possible, transmission line structures and access tracks would be located in areas with lower biodiversity value (Table 14-1, B1).

Avoidance principle (as per Section 7.1 of the BAM, DPIE, 2020a)	Measures implemented
would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	As detailed above the route adjustment in the Green Hills portion of the amended project footprint diverts the updated indicative disturbance area away from areas supporting intact native vegetation, requiring less native vegetation clearing, including reduced impacts to TECs and threatened species.
Project design	
Reducing the project clearing footprint by minimising the number and type of facilities	As part of the options report and route refinement (Transgrid, 2023a), the total length of the transmission line was reduced from over 500 km to under 365 km when the decision was made to choose a double-circuit option (Transgrid, 2023a), decreasing impacts to biodiversity. Further, to minimise impacts on biodiversity, where practicable Transgrid have opted to include a partial clearing methodology, thereby retaining vegetation beneath the easement during the operational maintenance phase of the amended project, i.e. Transgrid are not adopting full continuous clearance of the easement (Transgrid, 2023b), which is the 'easier' maintenance option. See Chapter 13 for details regarding clearing impacts of the amended project. Detailed design has been progressing in parallel with the preparation of the BDAR and, noting the number of threatened species and SAII species associated with McPhersons Plain, the opportunities for impact avoidance and minimisation through detailed design has been prioritised in this area (mitigation measure B38): • The horse-exclusion fencing around the central portion of McPhersons Plain (to prevent impacts to threatened flora species) would be maintained and has been identified as a no-go zone. To avoid impacts to threatened flora species in the no-go zone, an aerial stringing method for the transmission line would be employed between transmission line structures on either side of McPhersons Plain. • Given potential habitat for the threatened species associated with McPhersons Plain extends beyond the fenced area, NSW DCCEEW Environment and Heritage has requested that a 30-metre exclusion buffer from the fenceline be applied for project infrastructure. The transmission line span across McPhersons Plain has been maximised to locate the transmission line structures and associated construction bench outside the 30-metre exclusion buffer. • Some clearing of tall-growing vegetation would be required within the 30-metre exclusion buffer to meet the vegetation clearing requirements for the transmission line easement and transmission line structures. Clearing methods that minimise ground disturbance will be used. Where there are known locations of recorded threatened species (as identified in the BDAR), the associated buffer areas will be demarcated as a biodiversity exclusion zone (mitigation measure B13, Table 14-1). Any threatened species identified through additional surveys or captured as an unexpected find, will be dealt with in accordance with the BMP (mitigation measure B3, Tabe 14-1).
Locating ancillary facilities in areas where there are no biodiversity values	The criteria for selection of substations, construction compound locations and other ancillary facilities included the following (Transgrid, 2023a): • avoid wilderness protection areas and wetlands protected by international agreements • minimise areas mapped as plant community types (especially endangered ecological communities) and threatened species habitat • minimise the need for vegetation clearing • maximise distance from waterbodies and waterways
Locating ancillary facilities where the native vegetation or threatened species habitat is in the poorest condition (ie areas that have a low VI score)	
Locating ancillary facilities in areas that avoid habitat for species and vegetation in high	

Avoidance principle (as per Section 7.1 of the BAM, DPIE, 2020a)	Measures implemented
threat status categories (ie an EEC, CEEC or an entity at risk of a SAII)	• target areas which have previously been disturbed, or would require disturbance as part of the construction of the amended project • use existing roads and farm tracks • avoid natural drainage lines and low wetland areas where possible. Or where unavoidable, waterway crossings would be designed to minimise impacts on KFH and riparian vegetation. • prioritising the use of existing access tracks where possible, (Table 14-1, B28). Detailed constraints mapping has been prepared that identifies CEECs, SAII species/habitat and high to very high condition habitats as a priority for design avoidance during finalisation of detailed design (Table 14-1, B1).
Implementing 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	Mitigation measures are detailed in Chapter 14 (Table 14-1) of this report and include revegetation of disturbed areas (B18) and preparation of rehabilitation plans (B9) and a Biodiversity Management Plan (B3), which would guide the restoration, protection and maintenance of biodiversity values within the amended project footprint.

12.2 Avoid and minimise prescribed impacts

Table 12-2 outlines measures implemented as a part of project siting and design to avoid and minimise prescribed biodiversity impacts, as detailed in Section 7.2 of the BAM (DPIE, 2020a).

Table 12-2: Measures implemented to avoid and minimise prescribed impacts

Avoidance principle (as per Section 7.2 of the BAM, DPIE, 2020a)	Measures implemented
Project siting	
Locating the envelope of surface work to avoid direct impacts on the habitat features identified in Chapter 8.	Prescribed impacts identified as relevant to the amended project include: • karst, caves, crevices, cliffs, rocks, and other geological features of significance • human-made structures • non-native vegetation offering habitat for threatened species • habitat connectivity • waterbodies, water quality and hydrological processes • vehicle strikes. Avoidance and minimisation of prescribed impacts was undertaken at the route options selection phase of the amended project. Where practicable, route options that avoided prescribed impacts were prioritised, such as avoidance of national parks and nature reserves and targeting areas of existing disturbance (thereby reducing habitat connectivity impacts), minimising impacts to riparian areas and use of existing water crossings, avoidance of impacts to areas supporting features of geological significance.
Locating the envelope of sub-surface work, both in the horizontal and vertical plane, to avoid and minimise operations beneath habitat features (ie excavation /controlled blasting sites away from geological features of significance or water dependent plant communities and their supporting aquifers)	Subsurface work for the amended project would include controlled blasting, excavations, and rock crushing (Table 14-1, B25): • Across the amended project footprint 21 potential controlled blasting areas have been identified. Specific controlled blasting locations within these areas (if required) will be confined to the location of proposed transmission line structure benches, where hard rock substrate has been identified. Crushing would subsequently be required to break up hard rock after controlled blasting • Telecommunication connections between the amended project and existing Transgrid substations are proposed along the transmission line corridor at four locations: Gadara 132kV substation, Gullen Range 330 kV substation, Crookwell 2 330 kV substation and Rye Park 330 kV switching station. Micro-siting of infrastructure requiring subsurface work, such as transmission line structures, within the amended project footprint would be undertaken as part of the detailed design stage of the amended project, to minimise prescribed impacts where possible (ie selecting appropriate construction methodologies to minimise impacts to /interaction with GDEs and supporting aquifers during activities such as transmission line structure piling). Minimising deep drilling and excavation work and spanning of transmission lines over rocky habitat where practicable would mitigate any impacts to potential cave roosting habitat, and any residual impact to threatened species habitat will be appropriately offset (Table 14-1, B20, B28). For further information, please refer to *Technical Report 9 - Noise and Vibration Impact Assessmen*t (SLR, 2023) and *Technical Report 9 - Noise and Vibration Impact Assessment Addendum* (SLR, 2024).
Locating the project to avoid severing or interfering with corridors connecting different areas of habitat, migratory flight paths or	Where possible, the amended project has been co-located with existing transmission infrastructure/areas of disturbance to avoid/minimise additional fragmentation.

Avoidance principle (as per Section 7.2 of the BAM, DPIE, 2020a)	Measures implemented
important habitat or local movement pathways	Mitigation includes the implementation of a Connectivity Strategy (Table 14-1, B10), including connectivity corridors and fauna movement corridors, to maintain connectivity in areas identified as facilitating fauna movement. This will include: • temporary installation of glider poles in proposed restoration areas to facilitate connectivity during vegetation establishment (Table 14-1, B10) • ongoing retention of large trees within HTZs that intersect glider corridors, subject to regular arboricultural assessment and ongoing tree maintenance/ pruning to minimise any safety risks (Table 14-1, B10).
Optimising the project layout to minimise interactions with threatened entities	Detailed design will include elements to minimise interactions with threatened entities, including: • retention of connectivity corridors and fauna movement corridors, to maintain connectivity in areas identified as facilitating fauna movement (Table 14-1, B10) • where proposed transmission lines will parallel existing lines, a small deviation of the route to facilitate retention of a vegetated stepping-stone is recommended between existing and proposed lines (Table 14-1, B10) • where tree retention is not feasible within the proposed easements, permanent installation of glider poles, to restore connectivity where feasible (Table 14-1, B10) • further assessment of potential collision risks and appropriate design mitigations, where required (Table 14-1, B11) • implementation of a Biodiversity Management Plan (BMP), including measures to reduce disturbance to sensitive flora and fauna and procedures for clearing of vegetation, including pre-clearing inspections, identification of clearing limits in relation to threatened species habitat, procedures for the relocation of flora and fauna (Table 14-1, B3) • establishment of biodiversity exclusion zones to protect threatened biodiversity (Table 14-1, B13) • partial clearing along riparian zones, retaining shrub or ground stratum (Table 14-1, B17). As a part of the BMP (Table 14-1, B3), a Connectivity Strategy will be developed (Table 14-1). The Connectivity Strategy will be implemented to maintain connectivity in areas identified as facilitating fauna movement. Consideration of connectivity corridors will occur as a minimum at: • key riparian crossings • areas of the transmission line joining proposed biodiversity stewardship sites (ie Donna Valley Biodiversity Stewardship Site) and/or conservation reserve estate (ie Tarlo River National Park, Bango Nature Reserve, Mudjarn Nature Reserve and Minjary National Park) • transmission line structure locations that occur in woodland vegetation at strategic locations (ie vegetation corridors with moderate to high landscape connectivity, and with moderate to high levels of fauna activity/ movement).
Locating the project to avoid direct impacts on water bodies or hydrological processes	To minimise impacts to surface water and groundwater, minimising direct impacts on waterways and higher risk erosion areas within the amended project footprint would continue to be considered when refining locations for construction activities and infrastructure (Table 14-1, B17). If impact to these areas cannot be avoided, appropriate environmental controls would be identified and implemented. Further information is provided in *Technical*

Avoidance principle (as per Section 7.2 of the BAM, DPIE, 2020a)	Measures implemented
	Report 12 – Surface Water and Groundwater Impact Assessment (Aurecon, 2023a). Waterway crossings required for construction/maintenance would re-use existing crossings or upgrade informal crossing locations where possible or otherwise would be established in lower Strahler order waterways where possible (Table 14-1, B30, B36). No permanent transmission line structure infrastructure is anticipated to be located within or underneath waterbodies.
Project location considerations	
An analysis of alternative modes or technologies that would avoid or minimise prescribed biodiversity impacts and justification for selecting the proposed mode or technology	As detailed in Table 12-1 above, alternative technologies were considered for the amended project, such as the use of underground cables. Clearing methodologies would be tailored to reduce impacts where practicable (Table 14-1, B16, B1). Opportunities for individually assessing hazard trees will be considered further during detailed design where required to minimise impacts (Table 14-1, B21).
An analysis of alternative routes that would avoid or minimise prescribed biodiversity impacts and justification for selecting the proposed route.	As detailed above, the options report (Transgrid, 2023a) detailed further corridor refinement that included the following which specifically reduced prescribed impacts to biodiversity (Transgrid, 2023a): • avoidance of Kosciuszko National Park, Minjary National Park, and Tarlo River National Park • avoidance of Mudjarn Nature Reserve, Back Arm Nature Reserve and Burrinjuck Nature Reserve • narrowed corridor south-east of Bango Nature Reserve to avoid a biodiversity offset area • route adjustment, which diverted the amended project footprint to largely pine plantation within Green Hills State Forest away from areas supporting intact native vegetation within private properties and reducing impacts to native vegetation in Bago State Forest, reducing potential biodiversity impacts, including reduced impacts to TECs and threatened species. The above avoidance and mitigation measures reduced the prescribed impacts to habitat connectivity from the amended project.
An analysis of alternative locations that would avoid or minimise prescribed biodiversity impacts and justification for selecting the proposed location	Further refinement of the location of the amended project infrastructure would be undertaken during finalisation of the detailed design stage of the amended project, with micro siting of infrastructure aiming to avoid and minimise prescribed impacts to rocky habitats and minimise prescribed impacts to surface water and groundwater, thereby minimising impacts to GDEs (Table 14-1, B1, B28).
An analysis of alternative sites within a property on which the project is proposed that would avoid or minimise prescribed biodiversity impacts and justification for selecting the proposed site	The general process of refinement during detailed design would include locating infrastructure within areas of lower biodiversity value, in an attempt to avoid and minimise impacts where possible, including prescribed impacts (Table 14-1, B1).
Locating the project in consideration of bushfire protection requirements and clearing for asset protection zones	Consideration of bushfire protection requirements and APZs has been built into vegetation clearance considerations (Transgrid, 2023b; Aurecon, 2023b). *Technical Report 13 – Bushfire Risk Assessment* was prepared for the EIS project and considers a range of existing risk factors associated with the amended project, including fire weather and climate, ignition sources, vegetation, slope, and access, as well as construction and operation, and cumulative bushfire impacts. Management and mitigation measures that would be implemented for the EIS project include APZs, transmission line clearances, construction requirements in accordance with the required Bushfire Attack Level (BAL) and emergency procedures (Aurecon, 2023b).

Avoidance principle (as per Section 7.2 of the BAM, DPIE, 2020a)	Measures implemented
	Technical Report 13 – Bushfire Risk Assessment Addendum (Aurecon 2024b) provides the updated APZs for the amended project.
Locating the project in consideration of flood planning levels	The *Technical Report 11 – Hydrology and Flooding Impact Assessment* prepared by Aurecon (2023c) identified relevant flood mitigation and management measures for both construction and operation of the EIS project at several locations. The resulting impacts from and on flooding is considered generally minor or low risk that can be managed through proper implementation of the recommended management measures. *Technical Report 11 – Hydrology and Flooding Impact Assessment Addendum* (Aurecon 2024c) provides the updated flooding assessment for the amended project with the outcomes and management response remaining generally consistent with that described for the EIS. Consideration of flood hazard will continue in detailed design.
Locating the project in consideration of servicing constraints	Maintenance of the infrastructure would be required for the amended project, particularly vegetation inspection and management along Transgrid's easement to maintain separation distance requirements. The BMP would include monitoring of the biodiversity impacts of the construction and operational impacts of the amended project, including maintenance work, to ensure impacts on biodiversity are minimised and are in line with the current assessment (Table 14-1, B3).
Project design	
Adopting engineering solutions to minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers	Geotechnical investigations for the amended project are ongoing. Appropriate construction methodologies will be selected to minimise interference with aquifers and to minimise groundwater extraction volumes (see updated project description in Appendix A of the Amendment Report for detailed construction methodologies). Some areas of limestone geologies have been identified in the amended project footprint, however, are not likely to support cave habitats (based on field observations), and none of these geologies are likely to be impacted. As part of the nomination of access tracks as part of the amended project design development, inclusion of existing tracks and tracks to be upgraded was prioritised where practicable in lieu of constructing all new access tracks.
Adopting engineering solutions to restore connectivity and movement corridors	Implementation of a Connectivity Strategy (Table 14-1, B10) as part of the BMP to maintain connectivity in areas identified as facilitating fauna movement, which would include the identification of connectivity corridors and fauna movement corridors, safeguards, and recommendations for where measures are appropriate to maintain connectivity - eg design vegetation stepping-stones, fauna fencing, re-use of fallen debris to create ground refugia, pre-construction surveys and micro-siting, reduce vegetation clearance, spanning of infrastructure, artificial connectivity structures (eg Glider Poles), and establishment of biodiversity exclusion zones.
Adopting project design elements that minimise interactions with threatened entities such as designing fencing to prevent animal entry to transport corridor	Detailed design will consider use of elements to minimise interactions with threatened entities, including: • conductor line-marking techniques (increasing transmission line visibility by marking them to reduce collision-induced mortalities for birds) and use of bird diverters during design refinement to minimise bird strike (Table 14-1, B11) micro-siting of transmission line structure locations and access tracks will be determined at detailed design and would consider location of threatened entities and avoid/minimise impacts where practicable (Table 14-1, B1).

Avoidance principle (as per Section 7.2 of the BAM, DPIE, 2020a)	Measures implemented
Maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with vegetation	Mitigations measures and micro-siting would include retention of habitat features such as rocky outcrops, surface rock, logs, wherever practicable and minimising impacts to waterways and karst/caves (Table 14-1, B1, B3).
Maintaining hydrological processes that sustain threatened entities	The resulting impacts from and on flooding are considered generally minor or low risk and can be managed through proper implementation of the recommended management measures (Aurecon, 2023c, 2024c). Overall, the impacts of construction and operation on groundwater would be minor to negligible (Aurecon, 2023a, 2024a). The following impacts were identified for the amended project on surface water, particularly during construction: erosion risk and sedimentation, geomorphology, water quality, water supply and wastewater disposal (Aurecon, 2023a). Potential impacts would be mitigated through soil and water management measures including erosion and sedimentation control during construction and implementation of appropriate design guidelines. These would be detailed within and controlled through implementation of the CEMP. To minimise impacts to surface water and groundwater, a range of measures would be implemented during the detailed design, construction, and operation of the amended project including (Aurecon, 2023a) (Table 14-1, B26): • consideration of waterway locations within the amended project footprint and higher risk erosion areas • preparation of Soil and Water Management Plans as part of the CEMP to manage water quality impacts during construction of the amended project • preparation of Erosion and Sediment Control Plans (ESCPs) and Water Quality Monitoring Plan within the SWMP • consideration of appropriately designed scour protection at new stormwater management points. Overall, hydrological processes are not likely to be disrupted as a result of the amended project.
Controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities	As detailed above, erosion and sedimentation risks to waterways during construction would be mitigated through soil and water management measures including erosion and sedimentation control (Table 14-1, B26). The largest source of wastewater during the construction phase would be from the worker accommodation facilities. Smaller volumes of wastewater from construction compounds would be collected and tankered to appropriate wastewater disposal facilities. Water use and wastewater disposal risks would be negligible during the operational phase as the volume of water required and the volume of wastewater generated would be low (Aurecon, 2023a).

13. Impact assessment

13.1 Approach to assessing impacts

The assessment of impacts to biodiversity values presented within this chapter has been carried out in accordance with Section 8 of the BAM (DPIE, 2020a).

This BDAR has assessed the biodiversity values within the amended project footprint so that the final transmission line easement and construction locations may be refined during detailed design (including to avoid and minimise biodiversity impacts) within the amended project footprint without the need to re-assess all biodiversity values.

An updated indicative disturbance area has been used to inform the extent of construction impacts, as defined in Table 13-1. The updated indicative disturbance area has been adopted to calculate a more accurate magnitude of impacts as use of the entire amended project footprint would result in a substantial overestimation of impact (due to its large width compared to the transmission line easement requirements) and the design and construction methodology is still being refined. The updated indicative disturbance area represents a likely worst-case impact scenario (noting it is designed to be relatively 'realistic' based on the current design that is still subject to refinement). Despite being indicative, the updated disturbance area would not move outside of the nominated amended project footprint and is reasonably certain in most areas particularly for example where the proposed easement is adjacent to existing transmission line easements. Final project impacts would be determined during the finalisation of detailed design in accordance with the approach outlined in Section 14.1.1.

The updated indicative disturbance area used for calculation of direct impacts associated with the amended project is shown in Figure 13-1. Within the updated indicative disturbance area there are three vegetation clearance scenarios:

- TCZ where all vegetation/habitat would be removed
- ECZ which would be subject to partial loss of vegetation associated with clearing taller vegetation within the easement
- HTZ which would be subject to partial loss of vegetation associated with removal of hazardous trees.

Details regarding the impacts associated with each of these vegetation removal scenarios is provided in Table 13-1.

A small overlap between the updated indicative disturbance area and the Snowy 2.0 Transmission Connection construction footprint (approximately 10 hectares) occurs at Maragle (Figure 13-1). The extent of this overlap has been excluded from any impact calculations herein.

Table 13-1: Clearing impacts within updated indicative disturbance area and relevant zones

Terminology	Definition
Updated indicative disturbance area (NB: disturbance area has the same meaning as 'Development footprint' as defined	The indicative disturbance area, updated since the EIS BDAR submission, that would be temporarily or permanently cleared during construction and operation of the amended project. The final disturbance area would be within the amended project footprint. This includes 1,846.00 ha of land shown in Figure 13-1 subject to varying levels of physical disturbance, as follows: • TCZ with full clearing

Terminology	Definition
by the BAM, DPIE, 2020a)	• ECZ and HTZ with partial clearing. Clearing, maintenance and control protocols relevant to the disturbance areas are described below and documented within: • *Transmission Line Construction Manual – Major New Build (*Transgrid, 2020a) • Maintenance Plan Easement and Access Tracks (Transgrid, 2020b) • HumeLink Vegetation Clearing Method and Management Memorandum (Transgrid, 2023b).
Total Clearing Zone (TCZ)	TCZ lands subject to total clearing and ground disturbance (including earthworks). Permanent structures including transmission line structures, access tracks and substations would be situated within this zone as well as temporary brake and winch sites and construction compounds. Use of existing access tracks, particularly those within non-wooded native pasture would not require clearing or ground disturbance however it is assumed this would occur for the purpose of impact quantification. The TCZ will require the complete removal of vegetation to facilitate safe access of construction vehicles, plant and equipment and erection of transmission line structures. Clearing would be undertaken with the use of machinery, or manually where it is unsafe to operate machinery or access is limited. Root balls will be removed at foundation locations and potentially in other earthworks areas. However, root balls would be retained where practicable within the transmission line structure zone to minimise potential environmental and heritage impacts. Where vegetation is removed by a forest mulcher or similar on heavily forested land, mulched material will be evenly spread on bare disturbed areas to assist in protection of the soil. Spread of mulched material to a depth of >50 millimetres will be avoided to the extent practicable to prevent suppression of germination and regeneration of native flora from the soil seed bank, as well as existing native groundcover. Wherever possible, topsoil stripped to enable construction activities will be stockpiled locally. The stockpile area will be determined during detailed design and construction planning. The period of topsoil stockpiling will be minimised to limit the loss of soil seed / propagule bank viability. On completion of construction activities, the stockpiled topsoil will be placed locally to rehabilitate disturbed areas. The topsoil should be stabilised in a manner that does not suppress germination / regrowth from the soil seed / propagule bank. If mulch is spread to aid stabilisation, mulch depth would be kept to a minimum. All areas that are part of the TCZ have been considered within the BAM-C as full and permanent loss of vegetation (refer to Section 13.2). However, assisted regeneration and/ or post-construction restoration would be carried out within: • Disturbed areas >20 metres from transmission line structures. Suitable low growing vegetation that do not pose a risk to the transmission line or structures would be maintained within these areas. • Brake and winch sites. Subject to operational setback and conductive clearance requirements, these locations could be restored to pre-disturbance condition.
Easement Clearing Zone (ECZ)	The ECZ includes land within the proposed transmission line easement where clearing and ongoing maintenance of tall growing vegetation would be undertaken. Earthworks and grubbing are not required within this zone except in limited circumstances. Tall growing vegetation is defined as any vegetation which may intrude on the Vegetation Clearance Requirements at Maximum Line Operating Conditions (maximum conductor sag and maximum conductor blowout) at that location now or at any time in

Terminology	Definition
	the future. Vegetation clearance heights are set by Transgrid for operational and safety requirements, including bushfire risk management (Transgrid, 2020a). All trees in ECZ polygons need to be removed regardless of height. Shrubs will be avoided to the extent possible, but the majority of clearing will be completed using machinery and there will likely be collateral impact on the existing shrub layer due to movement of machinery on site, as well as felling and removal of felled tree branches/barrels. For those parts of the easement that require access for clearing, impacts to native vegetation will be minimised by (but not limited to): • use of machinery that maximises vegetation clearance coverage/reach • use of machinery and tracks that minimises ground impacts • consolidating/minimising machinery access paths • restriction of machinery access within ecologically sensitive areas (e.g. wetlands and bogs) • use of non-lethal methods of temporary vegetation removal (eg mulching/slashing, cutting), that would allow native vegetation to re-grow • use of targeted methods of lethal vegetation control to avoid damage/death of non-target individuals (e.g. cut-stump painting of cleared woody individuals, rather than foliar spray applications). In areas of the ECZ that are not safely or practicably accessible for machine clearing, removal/ management of vegetation will be undertaken by hand clearing/felling. Hand clearing/felling may also be used in the immediate vicinity of areas of very high ecological sensitivity identified in the constraints mapping to minimise the potential for impacts. Fencing will be used to demarcate these areas. Felled trees will be: • tub ground to provide material for erosion/sediment control and rehabilitation • re-used by landowners (pending negotiations) • mulched and evenly spread on bare disturbed areas to assist with the protection of the soil. Spread of mulched material to a depth of >50 millimetres will be avoided where practicable. • Placed as logs on the edge of the easement in select areas where they will not impede easement access for maintenance. For conductor stringing purposes, all remaining shrubs within a 10-metre-wide area along the centre of the easement would need to be tied down or slashed to prevent snagging of the conductor. In areas where mature trees can be retained on easement (e.g. valleys), a stringing methodology that does not require vegetation disturbance would be used. All areas that are part of the ECZ have been considered as partial loss of vegetation (refer to Section 13.2).
Hazard Tree Zone (HTZ)	Includes land located adjacent to the transmission line easement where selective tree removal, trimming or lopping would be undertaken to manage any risk of damage to transmission lines and structures in the event of tree fall. LiDAR analysis was performed to identify hazard trees at maximum operating line conditions. All hazard trees would be assessed by a qualified Level 4 or Level 5 arborist

Terminology	Definition
	with Tree Risk Assessment Qualification. Any hazard tree showing risk of failure due to health, structure or defect shall be removed. The clearing of hazard trees will be planned and managed to minimise impacts to the mid- and understorey. Areas of high ecological sensitivity identified in the constraints mapping would be fenced off and hand clearing/felling employed if required to avoid impacts to these areas. All areas that are part of the HTZ have been considered as partial loss of vegetation (refer to Section 13.2).

13.2 Determining future vegetation integrity scores

The amended project has adopted measures to avoid and minimise impacts to biodiversity values in line with the guiding principle of the BAM (DPIE, 2020a), including through the management of the transmission line easement. The maintenance zone underneath the transmission line (ie ECZ) would be managed through the removal of trees and shrubs that can grow to within 3.9 metres of the overhead conductors plus a safety allowance of 1.5 metres leaving the ground layer largely intact. This partial clearing of the easement is part of the measures taken to minimise impacts to biodiversity. To facilitate these partial vegetation clearing scenarios the BAM (DPIE, 2020a) allows for future VI scores to be determined following the procedure in Section 6.4 of the BAM Calculator User Guide (DPIE, 2018).

In assessing direct impacts on native vegetation, future VI scores were calculated in the BAM-C for each clearing scenario and associated vegetation zone. For the TCZ, the future vegetation integrity score used was zero as it assumes total loss of native vegetation. For the ECZ, total loss was assumed for all tree and shrub attributes as outlined in Table 13-2. Future VI scores for other growth forms and function attributes have been determined using reference data from an existing transmission easement and where relevant, modifying the future VI attributes. Thirty plots were completed within existing transmission easements across five of the six IBRA subregions intersecting the amended project footprint. This comprised survey within five different vegetation formations. The mean attribute scores of these plots were calculated according to vegetation formation and compared to that obtained for BAM plots collected within the amended project footprint. The percentage change for each attribute collected was then calculated. This reflected the average loss or gain for each attribute as the result of being within an easement clearing zone. These percentage changes are shown in Table 13-3 and Table 13-4.

This analysis using the reference existing easement data showed that, in most cases, clearing of the canopy resulted in an increase in the structure and composition of grasses and forbs in the understorey (Table 13-3). This is supported by studies which have found that transmission line clearings develop into novel habitats over time (Eldegard *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 (Tsai *et al.*, 2018). Therefore, the current composition and structure scores for grasses and forbs were retained for the future scores within the ECZ. Future scores for the other attributes for vegetation zones within the ECZ was reduced as informed by the reference data analysis and outlined in Table 13-2.

For areas within the HTZ, future attribute scores were applied as per Table 13-2. This included setting the stem class for 50-79 centimetre DBH trees and number of large trees (greater than 50 centimetre DBH) to zero based on the precautionary assumption that all large trees would be deemed hazard trees and require removal. The structure attribute of the tree growth form would also be reduced according to mean number of large trees per vegetation zone, with one large tree resulting in a 60 square metre reduction in tree cover. This 60 square metres is equivalent to 15 per cent of the 20 metre by 20 metre floristic plot. Fifteen per cent was calculated based on a conservative estimate of canopy cover of large trees using the mean tree cover data in plots where only one large tree was recorded within the floristic plot, and no other trees were recorded. To calculate the estimated per cent cover of large trees per vegetation zone, this tree cover area of 60 square metres was multiplied by the average number of large trees recorded within each 50 metre by 20 metre plot, and then converted to per cent cover across the plot as outlined in the equation below. This estimate of per cent cover was then subtracted from the current tree structure score to generate the future tree structure score for the vegetation zone.

$$Estimated\ percent\ cover\ large\ trees\ per\ vegetation\ zone = \frac{(large\ tree\ area\ \times average\ number\ large\ trees)}{area\ of\ function\ plot} \times 100$$

where:

- large tree area = 60 square metres
- area of function plot = 1,000 square metres.

Due to limitations within the BAM-C, the regeneration scores within the HTZ areas could not be accurately inputted. For the HTZ areas, regeneration is expected to not be impacted and therefore the score within the BAM-C related to presence of regeneration would ideally not be changed from the current to future score. However, the BAM-C does not allow for this in most cases as the current score is calculated from an average of all plots, while when entering a future score, an average cannot be inputted. Instead, the score for regeneration must be either present (1) or absent (0). As a result, the future VI score can be either artificially higher or lower than the true score. In some instances, this affects the future VI score by up to 15 points. In order to overcome this, where the average of regeneration was 0.5 or less, regeneration was entered as absent and hence a score of 0 given. Where the regeneration average was above 0.5, it was entered as present and a score of 1 was given. This reduces the extreme artificial increases and decreases.

Table 13-2 provides a summary of the assumptions applied in determining future VI scores for the updated indicative disturbance area. A more detailed breakdown with future VI score is provided in Table 13-6 to Table 13-11.

Table 13-2: Summary of approach to determining future vegetation integrity for full and partial clearing scenarios[1]

Clearing activity/ management zone	Attributes with total loss	Attributes with partial or no loss
TCZ	Total clearing of trees, shrubs and groundcovers, BAM-C values set to zero for all attributes related to composition, structure and function	None
ECZ	Composition and structure attributes: • Trees and shrubs continually removed as part of long-term easement maintenance – tree and shrub growth forms set to zero. • Fern and 'Other' growth forms would remain in situ but are likely to be reduced as a result of changed environmental conditions and therefore reduced to zero as a conservative measure and based on relative change data as shown in Table 13-3. Function attributes: • Tree stem classes, large trees and hollow trees have been reduced to zero • The length of fallen logs is expected to reduce significantly over time with the absence of a tree canopy and therefore has been set to zero as a conservative measure.	Composition and structure attributes: • Grass and forb growth forms remain in-situ and would retain current VI condition based on relative change from reference data as shown in Table 13-3. Function attributes: • Leaf litter is expected to reduce over time with the absence of a tree canopy and therefore has been reduced by 50%.
HTZ	Function attributes: • The Stem class for 50-79 cm and number of large trees (>50 cm DBH) has been reduced to zero	Composition and structure attributes: • Structure of tree growth form to be reduced according to mean number of large trees per vegetation zone, with one large tree having an estimated cover of 60 m^2. • All other growth-forms remain in-situ, including shrubs and ground growth forms which would retain current VI condition

[1] Proposed clearing would allow for some tree and shrub retention on easement. This has not been incorporated into the partial clearing scenario area as Vegetation Integrity (VI) of retained vegetation is unable to be quantified, therefore partial losses for these attributes have not been realised in the BAM-C. The SBAS will outline opportunities for post clearing survey and credit liability reduction (Table 14-1, mitigation measure B5).

Table 13-3: Percentage change in composition and structure attributes between plots undertaken in the amended project footprint and the existing easement

Vegetation formation	Composition (% change)						Structure (% change)					
	Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other
Dry Sclerophyll Forests (Shrub/grass sub-formation)	-43%	-5%	31%	-4%	0%	-100%	-76%	675%	103%	-18%	-50%	-100%
Dry Sclerophyll Forests (Shrubby sub-formation)	-10%	-30%	25%	34%	146%	-14%	-93%	-64%	81%	21%	360%	-92%
Freshwater Wetlands	-67%	-33%	87%	19%	-100%	N/A	-17%	163%	52%	-79%	-100%	N/A
Grassy Woodlands	-30%	22%	0%	14%	-1%	-4%	-49%	-39%	41%	36%	211%	-72%
Wet Sclerophyll Forests (Grassy sub-formation)	-91%	-70%	19%	62%	-30%	-75%	-49%	-89%	11%	37%	-99%	-88%

Table 13-4: Percentage change in function attributes between plots undertaken in the amended project footprint and the existing easement

Vegetation formation	Function (% change)										
	Large Trees	Hollow trees	Litter Cover	Length Fallen Logs	Tree Regeneration	High Threat Exotic weeds	Tree Stem 5 to 10cm DBH	Tree Stem 10 to 20cm DBH	Tree Stem 20 to 30cm DBH	Tree Stem 30 to 50cm DBH	Tree Stem 50 to 80cm DBH
Dry Sclerophyll Forests (Shrub/grass sub-formation)	-75%	-88%	-46%	-92%	50%	N/A	0%	-75%	-75%	-75%	-75%
Dry Sclerophyll Forests (Shrubby sub-formation)	-100%	-100%	-88%	-88%	30%	-35%	-41%	-81%	-100%	-100%	-100%
Freshwater Wetlands	N/A	N/A	-38%	-96	-100	N/A	N/A	N/A	N/A	N/A	N/A
Grassy Woodlands	-100%	-100%	-33%	-43%	60%	-66%	7%	-28%	-49%	-47%	-71%
Wet Sclerophyll Forests (Grassy sub-formation)	-100%	-100%	-90%	-100%	-42%	345%	-100%	-100%	-100%	-100%	-100%

13.3 Direct impacts

13.3.1 Impacts to native vegetation

As detailed in Section 12.1, this BDAR has assessed the biodiversity values within the amended project footprint so that the final transmission line easement and construction locations may be refined during the finalisation of detailed design within the amended project footprint without the need to re-assess biodiversity values. However, the calculation of impact areas has been restricted to the updated indicative disturbance area for this stage of the development assessment. Amended project impacts and offset obligations would be revised prior to the commencement of construction once the detailed design has been finalised.

Direct impacts to native vegetation as a result of the amended project are summarised in Table 13-5, relative to other clearing impacts (including non-native vegetation and Category 1 exempt lands). Vegetation zone impacts and loss in VI is presented in Table 13-6 to Table 13-11 for each IBRA subregion.

Direct impacts have been calculated using the updated indicative disturbance area for the Bungonia, Crookwell, Murrumbateman, Inland Slopes, Bondo and Snowy Mountains IBRA subregions and excluding Category 1 exempt lands. This represents the maximum clearing area required for the amended project, however the exact location of the final transmission line easement and associated disturbance area within the amended project footprint would not be known until the completion of detailed design.

Vegetation and habitat clearing would be avoided along sections of the amended project footprint, including waterways and gullies. However, the amended project would result in the direct removal of native vegetation and habitat for construction of the transmission line and associated infrastructure, including access tracks, transmission line structure locations and the substation sites (Figure 13-3).

Approximately 866.16 hectares of native vegetation would be directly impacted by the amended project consisting of the PCTs listed in Table 13-6, Table 13-7, Table 13-8, Table 13-9, Table 13-10 and Table 13-11.

Table 13-5: Summary of direct impacts to native vegetation

IBRA subregion	Native vegetation subject to assessment (ha)	Native vegetation within Category 1 exempt lands (ha)	Planted native vegetation subject to streamlined assessment (ha)	Non-native vegetation, roads and waterbodies (ha)	Total (ha)
Bungonia	49.20	4.12	0.64	25.38	79.34
Crookwell	115.04	13.01	2.6	58.31	188.96
Murrumbateman	129.07	15.92	1.27	83.06	229.32
Inland Slopes	331.93	37.82	4.03	302.07	675.85
Bondo	39.49	0.06	0	401.68	441.23
Snowy Mountains	201.43	0	0	29.17	230.6
All IBRA subregions	**866.16**	**70.92**	**8.54**	**899.67**	**1845.3**
% total	**47%**	**4%**	**<1%**	**49%**	**100%**

Impacts to native vegetation within Bungonia

Table 13-6: Vegetation impacts within the Bungonia IBRA subregion

PCT ID	PCT Name	Condition	TEC	Patch size (ha)	Clearing zones (hectares)	Current VI Scores	Future VI Scores	VI Loss (%)
283	Apple Box - Blakelys Red Gum moist valley and footslopes grass-forb open forest	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.16	30.3	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.13	39.6	TCZ – 0	100.0
					ECZ – 0.06		ECZ – 11.2	71.7
					HTZ – nil		N/A	N/A
870	Grey Gum - Thin-leaved Stringybark grassy woodland	Very High	No associated TEC	>100	TCZ – 1.1	81.3	TCZ – 0	100.0
					ECZ – 0.76		ECZ – 23.6	71.0
					HTZ – nil		N/A	N/A
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Low	No associated TEC	>100	TCZ – 1.28	20.9	TCZ – 0	100.0
					ECZ – 0.04		ECZ – 2.9	86.1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.05	46.7	TCZ – 0	100.0
					ECZ – 0.17		ECZ – 6.7	85.7
					HTZ – 0.01		HTZ – 31.1	33.4
		High		>100	TCZ – 1.38	70.3	TCZ – 0	100.0
					ECZ – 0.36		ECZ – 22.4	68.1
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 1.91	85.4	TCZ – 0	100.0
					ECZ – 1.4		ECZ – 15.8	81.5
					HTZ – 0.03		HTZ – 61.1	28.5
1097	Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux	Very Low	Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	>100	TCZ – 0.28	3.2	TCZ – 0	100.0
					ECZ – 0.02		ECZ – 0.2	93.8
					HTZ – 0.01		HTZ – 0.5	84.4
		Low		<5	TCZ – nil	20.5	N/A	N/A
					ECZ – 0.02		ECZ – 0.7	96.6
					HTZ – nil		N/A	N/A
				>100	TCZ – 0.01	20.5	TCZ – 0	100.0
					ECZ – 0.01		ECZ – 0.7	96.6
					HTZ – nil		N/A	N/A
1107	River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes	High	Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	>100	TCZ – nil	66.3	N/A	N/A
					ECZ – 0.03		ECZ – 8.3	87.5
					HTZ – nil		N/A	N/A
1150	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges	Very Low	No associated TEC	>100	TCZ – 0.38	4.3	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 0.3	93.0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.26	22.3	TCZ – 0	100.0

PCT ID	PCT Name	Condition	TEC	Patch size (ha)	Clearing zones (hectares)	Current VI Scores	Future VI Scores	VI Loss (%)
					ECZ – 0.13		ECZ – 17.8	20.2
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.49	37.7	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 7.23	75.4	TCZ – 0	100.0
					ECZ – 7.07		ECZ – 10.8	85.7
					HTZ – 0.38		HTZ – 59.1	21.6
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 16.53	19.1	TCZ – 0	100.0
					ECZ – 0.24		ECZ – 14.4	24.6
					HTZ – nil		N/A	N/A
		Low		<5	TCZ – 0.07	29	TCZ – 0	100.0
					ECZ – 0.05		ECZ – 23.1	20.3
					HTZ – nil		N/A	N/A
				>100	TCZ – 3.99	29	TCZ – 0	100.0
					ECZ – 1.06		ECZ – 23.1	20.3
					HTZ – 0.06		HTZ – 28.8	0.7
		Moderate		>100	TCZ – 0.11	37.9	TCZ – 37.9	0.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.67	80.2	TCZ – 0	100.0
					ECZ – 0.95		ECZ – 23.7	70.4
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 0.22	80.1	TCZ – 0	100.0
					ECZ – 0.01		ECZ – 21	73.8
					HTZ – nil		N/A	N/A
			Total		**49.20**	–	–	–

Impacts to native vegetation within Crookwell

Table 13-7: Vegetation impacts within the Crookwell IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.18	23.2	TCZ– 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
280	Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – nil	1	N/A	N/A
					ECZ – 0.02		ECZ– 0.5	50.0
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.69	42	TCZ– 0	100.0
					ECZ – 0.94		ECZ– 14.3	66.0
					HTZ – 0.01		HTZ– 34.7	17.4
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 2.78	14	TCZ– 0	100.0
					ECZ – 0.13		ECZ– 6.4	54.3
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.24	30.3	TCZ– 0	100.0
					ECZ – 0.05		ECZ– 8.2	72.9
					HTZ – 0.01		HTZ– 30.3	0.0
		Moderate		>100	TCZ – 0.18	49.5	TCZ– 0	100.0
					ECZ – 0.1		ECZ– 19.8	60.0
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.6	64.8	TCZ– 0	100.0
					ECZ – 0.46		ECZ– 22.3	65.6
					HTZ – nil		N/A	N/A
335	Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys	Very high	No associated TEC	>100	TCZ – 0.36	84.4	TCZ– 0	100.0
					ECZ – 0.01		ECZ– 84.4	0.0
					HTZ – nil		N/A	N/A
679	Black Sallee - Snow Gum low woodland of montane valleys	Low	Monaro Tableland Cool Temperate Grassy Woodland	>100	TCZ – 0.36	41.8	TCZ– 0	100.0
					ECZ – 0.02		ECZ– 25	40.2
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.42		TCZ– 0	100.0
					ECZ – 0.08		ECZ– 25	40.2
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.07	81.7	TCZ– 0	100.0
					ECZ – 0.15		ECZ– 29.5	63.9
					HTZ – nil		N/A	N/A
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest	Very Low	No associated TEC	>100	TCZ – 0.64	10.5	TCZ– 0	100.0
					ECZ – 0.04		ECZ– 4.9	53.3
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.36	7.7	TCZ– 0	100.0
					ECZ – nil		N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 1.11	48.5	TCZ– 0	100.0
					ECZ – 0.07		ECZ– 9	81.4
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 1.33	86	TCZ– 0	100.0
					ECZ – 0.33		ECZ– 20.4	76.3
					HTZ – 0.01		HTZ– 65.8	23.5
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	Low	No associated TEC	>100	TCZ – 3.4	22.1	TCZ– 0	100.0
					ECZ – 0.18		ECZ– 12	45.7
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.36	62.5	TCZ– 0	100.0
					ECZ – 0.81		ECZ– 12.7	79.7
					HTZ – 0.01		HTZ– 61	2.4
		Very high		>100	TCZ – 1.01	81.9	TCZ– 0	100.0
					ECZ – 1.4		ECZ– 25.1	69.4
					HTZ – 0.07		HTZ– 66.1	19.3
952	Mountain Gum - Narrow-leaved Peppermint - Snow Gum dry shrubby open forest on undulating tablelands	Very Low	Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	>100	TCZ – 3.65	23.5	TCZ– 0	100.0
					ECZ – 0.04		ECZ– 7.4	68.5
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.72	26.8	TCZ– 0	100.0
					ECZ – 0.27		ECZ– 21.8	18.7
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.52	48	TCZ– 0	100.0
					ECZ – 0.39		ECZ– 6.7	86.0
					HTZ – nil		N/A	N/A
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands	Very Low	No associated TEC	>100	TCZ – 4.01	0.9	TCZ– 0	100.0
					ECZ – 0.29		ECZ– 0.5	44.4
					HTZ – 0.02		HTZ– 0.9	0.0
		Low		>100	TCZ – 3.10	28.2	TCZ– 0	100.0
					ECZ – 0.27		ECZ– 5.6	80.1
					HTZ – nil		N/A	N/A
				<5	TCZ – nil		N/A	N/A
					ECZ – 0.01		ECZ– 5.6	80.1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.67	50.9	TCZ– 0	100.0
					ECZ – 0.49		ECZ– 17.3	66.0
					HTZ – 0.01		HTZ– 46.6	8.4
				<5	TCZ –0.09		TCZ– 0	100.0
					ECZ – 0.03		ECZ– 17.3	66.0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 4.34	68.7	TCZ– 0	100.0
		High		>100	ECZ – 3.15	68.7	ECZ– 18.9	72.5
		High		>100	HTZ – 0.04	68.7	HTZ– 64.1	6.7
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Low	No associated TEC	>100	TCZ – 1.73	27.3	TCZ– 0	100.0
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Low	No associated TEC	>100	ECZ – 0.12	27.3	ECZ– 25.4	7.0
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Low	No associated TEC	>100	HTZ – 0.19	27.3	HTZ– 25.8	5.5
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	High	No associated TEC	>100	TCZ – 2.36	74.8	TCZ– 0	100.0
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	High	No associated TEC	>100	ECZ – 3.26	74.8	ECZ– 18.3	75.5
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	High	No associated TEC	>100	HTZ – 0.06	74.8	HTZ– 44.8	40.1
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Very High	No associated TEC	>100	TCZ – 0.85	81.6	TCZ– 0	100.0
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Very High	No associated TEC	>100	ECZ – 3.07	81.6	ECZ– 21.1	74.1
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Very High	No associated TEC	>100	HTZ – 0.13	81.6	HTZ– 55.9	31.5
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Very low	Monaro Tableland Cool Temperate Grassy Woodland	>100	TCZ – 0.69	5.6	TCZ– 0	100.0
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Very low	Monaro Tableland Cool Temperate Grassy Woodland	>100	ECZ – nil	5.6	N/A	N/A
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Very low	Monaro Tableland Cool Temperate Grassy Woodland	>100	HTZ – nil	5.6	N/A	N/A
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Moderate	Monaro Tableland Cool Temperate Grassy Woodland	>100	TCZ – 0.13	37.1	TCZ– 0	100.0
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Moderate	Monaro Tableland Cool Temperate Grassy Woodland	>100	ECZ – nil	37.1	N/A	N/A
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Moderate	Monaro Tableland Cool Temperate Grassy Woodland	>100	HTZ – nil	37.1	N/A	N/A
1256	Tableland swamp meadow on impeded drainage sites	Low	Montane Peatlands and Swamps	>100	TCZ – 0.29	27.8	TCZ– 0	100.0
1256	Tableland swamp meadow on impeded drainage sites	Low	Montane Peatlands and Swamps	>100	ECZ – 0.02	27.8	ECZ– 27.8	0.0
1256	Tableland swamp meadow on impeded drainage sites	Low	Montane Peatlands and Swamps	>100	HTZ – nil	27.8	N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 42.52	2.1	TCZ– 0	100.0
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	ECZ – 0.57	2.1	ECZ– 1.2	42.9
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	HTZ – 0.01	2.1	HTZ– 2.1	0.0
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	25 - 100	TCZ – 1.71	2.1	TCZ– 0	100.0
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	25 - 100	ECZ – 0.11	2.1	ECZ– 1.2	42.9
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	25 - 100	HTZ – nil	2.1	N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	TCZ – nil	2.1	N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	ECZ – 0.01	2.1	ECZ– 1.2	42.9
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	HTZ – nil	2.1	N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 7.32	24.7	TCZ– 0	100.0
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	ECZ – 2.85	24.7	ECZ– 13	47.4
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	HTZ – 0.03	24.7	HTZ– 20.9	15.4
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	25 - 100	TCZ – nil	24.7	N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	25 - 100	ECZ – 0.14	24.7	ECZ– 13	47.4
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	25 - 100	HTZ – 0.02	24.7	HTZ– 20.9	15.4
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	<5	TCZ – nil	24.7	N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Low	White Box Yellow Box Blakely's Red Gum Woodland	<5	ECZ – 0.05	24.7	ECZ– 13	47.4

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – nil	40.8	N/A	N/A
					ECZ – 0.06		ECZ– 4	90.2
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.64	79.3	TCZ– 0	100.0
					ECZ – 1.88		ECZ– 15.5	80.5
					HTZ – 0.05		HTZ– 62.1	21.7
				<5	TCZ – nil		N/A	N/A
					ECZ – 0.18		ECZ– 15.5	80.5
					HTZ – 0.01		HTZ– 62.1	21.7
		Very high		>100	TCZ – 0.65	87.9	TCZ– 0	100.0
					ECZ – 2.09		ECZ– 29.6	66.3
					HTZ – 0.16		HTZ– 74	15.8
Total					**115.04**	–	–	–

Impacts to native vegetation within Murrumbateman

Table 13-8: Vegetation impacts within the Murrumbateman IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
266	White Box grassy woodland	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 1.91	0.9	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Low		<5	TCZ – 0.11	45.9	TCZ – 0	100.0
					ECZ – 0.02		ECZ – 11.4	75.2
					HTZ – nil		N/A	N/A
				>100	TCZ – 0.1		TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.29	47.8	TCZ – 0	100
					ECZ – 0.02		ECZ – 21.6	54.8
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.18	27.9	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
280	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 8.61	6.9	TCZ – 0	100.0
					ECZ – 0.06		ECZ – 1.9	72.5
					HTZ – nil		N/A	N/A
		Low		<5	TCZ – 0.11	28.5	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				5-25	TCZ – 0.01		TCZ – 0	100.0
					ECZ – 0.01		ECZ – 16.8	41.1
					HTZ – nil		HTZ – nil	N/A
				>100	TCZ – 3.33		TCZ – 0	100.0
					ECZ – 0.01		ECZ – 16.7	41.4
					HTZ – nil		N/A	N/A
		Moderate		<5	TCZ – 0.03	40.1	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				5-25	TCZ – 0.2		TCZ – 0	100.0
					ECZ – 0.02		ECZ – 2.5	93.8
					HTZ – nil		HTZ – nil	N/A
				>100	TCZ – 0.41		TCZ – 0	100.0
					ECZ – 0.26		ECZ – 2.5	93.8
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 1.46	62.1	TCZ – 0	100.0
					ECZ – 0.9		ECZ – 19.5	68.6

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
					HTZ – 0.01		HTZ – 53.9	13.2
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	High	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.06	55.9	TCZ – 0	100.0
					ECZ – 0.37		ECZ – 24.3	56.5
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 0.18	82.3	TCZ – 0	100.0
					ECZ – 0.18		ECZ – 35.4	57.0
					HTZ – nil		N/A	N/A
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	Very Low	No associated TEC	>100	TCZ – 0.12	4.8	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 1.9	60.4
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.01	28.8	TCZ – 0	100.0
					ECZ – 0.21		ECZ – 5.2	81.9
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.78	41.7	TCZ – 0	100.0
					ECZ – 0.11		ECZ – 8.5	79.6
					HTZ – nil		N/A	N/A
322	Inland Scribbly Gum - Red Stringybark - Black Cypress Pine hillslope shrub-tussock grass open forest	Low	No associated TEC	>100	TCZ – 0.55	23.6	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.23	75.7	TCZ – 0	100.0
					ECZ – 0.1		ECZ – 23.4	69.1
					HTZ – nil		N/A	N/A
349	Inland Scribbly Gum - Red Stringybark open forest on hills composed of silicous substrates	Very low	No associated TEC	>100	TCZ – 1.26	15.6	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 1.9	87.8
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.7	26.7	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.8	50.6	TCZ – 0	100.0
					ECZ – 0.58		ECZ – 12.7	74.9
					HTZ – 0.01		HTZ – 13.4	73.5
		Very high		>100	TCZ – 0.25	77.6	TCZ – 0	100.0
					ECZ – 0.39		ECZ – 18.4	76.3
					HTZ – nil		N/A	N/A
351	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest	Very Low	No associated TEC	>100	TCZ – 1.15	10.2	TCZ – 0	100.0
					ECZ – 0.02		ECZ – 5.7	44.1
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.05	23.5	TCZ – 0	100.0
					ECZ – 0.04		ECZ – 3.8	83.8
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.97	56.7	TCZ – 0	100.0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
					ECZ – 1.12		ECZ – 8.1	85.7
					HTZ – 0.05		HTZ – 41.7	26.5
		High		>100	TCZ – 1.88	73.2	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 3.28	3.6	TCZ – 0	100.0
					ECZ – 0.02		ECZ – 0.9	75.0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 2.15	14	TCZ – 0	100.0
					ECZ – 0.23		ECZ – 2	85.7
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 1.13	38.3	TCZ – 0	100.0
					ECZ – 0.42		ECZ – 5.5	85.6
					HTZ – nil		N/A	N/A
731	Broad-leaved Peppermint - Red Stringybark grassy open forest	High	No associated TEC	>100	TCZ – 0.05	69.5	TCZ – 0	100.0
					ECZ – 0.53		ECZ – 27.6	60.3
					HTZ – 0.02		HTZ – 64.2	7.6
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Very Low	No associated TEC	>100	TCZ – 0.57	6.8	TCZ – 0	100.0
					ECZ – 0.01		ECZ – 1.3	80.9
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.09	22.5	TCZ – 0	100.0
					ECZ – 0.08		ECZ – 3.4	84.9
					HTZ – 0.04		HTZ – 22.5	0.0
		Moderate		>100	TCZ – 1.92	57.9	TCZ – 0	100.0
					ECZ – 1.65		ECZ – 11.9	79.4
					HTZ – 0.02		HTZ – 49.1	15.2
		Very High		>100	TCZ – 5.98	83.1	TCZ – 0	100.0
					ECZ – 7.34		ECZ – 19.8	76.2
					HTZ – 0.19		HTZ – 56.9	31.5
1256	Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands	Very low	Montane Peatlands and Swamps	>100	TCZ – 0.01	27.8	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.02	34.7	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	TCZ – nil	8.6	N/A	N/A
					ECZ – 0.01		ECZ – 4.1	52.3
					HTZ – nil		N/A	N/A
				>100	TCZ – 41.22		TCZ – 0	100.0
					ECZ – 1.03		ECZ – 4.1	52.3

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
					HTZ – 0.04		HTZ – 7.7	10.5
		Low		<5	TCZ – 0.08	16.1	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				>100	TCZ – 13.83		TCZ – 0	100.0
					ECZ – 3.43		ECZ – 4.7	70.8
					HTZ – 0.05		HTZ – 17.2	0
		Moderate		<5	TCZ – 0.2	45.9	TCZ – 0	100.0
					ECZ – 0.15		ECZ – 9	80.4
					HTZ – 0.03		HTZ – 32.8	28.5
				>100	TCZ – 2.52		TCZ – 0	100.0
					ECZ – 1.87		ECZ – 9	80.4
					HTZ – 0.02		HTZ – 32.8	28.5
		High		>100	TCZ – 1.27	70.2	TCZ – 0	100.0
					ECZ – 4.05		ECZ – 21.4	69.5
					HTZ – 0.16		HTZ – 61.3	12.7
		Very high		>100	TCZ – 0.5	72.9	TCZ – 0	100.0
					ECZ – 0.52		ECZ – 24.6	66.3
					HTZ – nil		N/A	N/A
Total					**129.07**	–	–	–

Impacts to native vegetation within Inland Slopes

Table 13-9: Vegetation impacts in the Inland Slopes IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Estimated clearing extent*(ha)	Current VI Scores	Future VI Scores	VI Loss (%)
5	River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains	Low	No associated TEC	>100	TCZ – 0.04	22.1	TCZ – 0	100.0
					ECZ – 0.05		ECZ – 5.4	75.6
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.48	43.4	TCZ – 0	100.0
					ECZ – 1.53		ECZ – 14.6	66.4
					HTZ – 0.22		HTZ – 31	28.6
266	White Box grassy woodland in the upper slopes sub-region of the NSW South-Western Slopes Bioregion	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	TCZ – nil	5.7	N/A	N/A
					ECZ – 0.02		ECZ – 1.2	79.0
					HTZ – nil		N/A	N/A
				>100	TCZ – 8.7		TCZ – 0	100.0
					ECZ – 0.01		ECZ – 1.2	78.9
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 23.66	54.4	TCZ – 0	100.0
					ECZ – 1.51		ECZ – 10.3	81.1
					HTZ – 0.14		HTZ – 39.9	26.7
		Moderate		>100	TCZ – 4.28	78.5	TCZ – 0	100.0
					ECZ – 1.03		ECZ – 22.8	71.0
					HTZ – 0.08		HTZ – 68.6	12.6
		High		>100	TCZ – 8.6	74.4	TCZ – 0	100.0
					ECZ – 1.9		ECZ – 20.8	72.0
					HTZ – 0.22		HTZ – 52.1	30.0
268	White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.4	3.5	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 15.35	36	TCZ – 0	100.0
					ECZ – 0.15		ECZ – 14	61.1
					HTZ – nil		N/A	N/A
				<5	TCZ –nil		N/A	N/A
					ECZ – 0.09		ECZ – 14	61.1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.64	40.3	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.25	67.4	TCZ – 0	100.0
					ECZ – 0.33		ECZ – 14.6	78.3
					HTZ – nil		N/A	N/A
		Very high		>100	TCZ – 7.42	80.8	TCZ – 0	100.0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Estimated clearing extent*(ha)	Current VI Scores	Future VI Scores	VI Loss (%)
					ECZ – 1.33		ECZ – 22.4	72.3
					HTZ – 0.05		HTZ – 80.8	0.0
277	Blakely's Red Gum - Yellow Box grassy tall woodland	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 102.79	11	TCZ – 0	100.0
					ECZ – 1.8		ECZ – 4.9	55.5
					HTZ – 0.22		HTZ – 10.7	2.7
				5 - 25	TCZ – 0.14		TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				<5	TCZ – 0.04		TCZ – 0	100.0
					ECZ – 0.15		ECZ – 4.9	55.5
					HTZ – 0.01		HTZ – 10.7	2.7
		Low		>100	TCZ – 6.85	37.2	TCZ – 0	100.0
					ECZ – 2.48		ECZ – 12.9	65.3
					HTZ – 0.28		HTZ – 29.6	20.4
				<5	TCZ – 0.81		TCZ – 0	100.0
					ECZ – 0.42		ECZ – 12.9	65.3
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 2.4	61.7	TCZ – 0	100.0
					ECZ – 1.2		ECZ – 24.1	60.9
					HTZ – 0.13		HTZ – 39.2	36.5
		High		>100	TCZ – 0.75	75.5	TCZ – 0	100.0
					ECZ – 3.2		ECZ – 28.7	62.0
					HTZ – 0.17		HTZ – 61.8	18.1
278	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 5.15	6.2	TCZ – 0	100.0
					ECZ – 0.06		ECZ – 0.9	85.5
					HTZ – 0.01		HTZ – 1.5	75.8
		Low		>100	TCZ – 0.76	30.2	TCZ – 0	100.0
					ECZ – 1.72		ECZ – 9	70.2
					HTZ – 0.1		HTZ – 16.3	46.0
				<5	TCZ – 0.06		TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 0.23	78.4	TCZ – 0	100.0
					ECZ – 0.83		ECZ – 25.3	67.7
					HTZ – 0.1		HTZ – 57	27.3
280	Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 29.03	7.4	TCZ – 0	100.0
					ECZ – 0.59		ECZ – 4	45.9
					HTZ – 0.02		HTZ – 7.5	0.0
				25 - 100	TCZ – 0.04		TCZ – 0	100.0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Estimated clearing extent*(ha)	Current VI Scores	Future VI Scores	VI Loss (%)
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				<5	TCZ – 0.03		TCZ – 0	100.0
					ECZ – 0.12		ECZ – 4	45.9
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.17	26.6	TCZ – 0	100.0
					ECZ – 0.11		ECZ – 16.8	36.8
					HTZ –nil		N/A	N/A
		Moderate		25 - 100	TCZ – 1.01	67.1	TCZ – 0	100.0
					ECZ – 0.27		ECZ – 11.7	82.6
					HTZ –nil		N/A	N/A
				>100	TCZ – 7.85		TCZ – 0	100.0
					ECZ – 2.14		ECZ – 11.7	82.6
					HTZ – 0.21		HTZ – 34.5	48.6
		High		25 - 100	TCZ – 0.82	67.1	TCZ – 0	100.0
					ECZ – 0.2		ECZ – 20.7	69.2
					HTZ – nil		N/A	N/A
				>100	TCZ – 5.39		TCZ – 0	100.0
					ECZ – 2.42		ECZ – 20.7	69.2
					HTZ – 0.11		HTZ – 53.6	20.1
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes	Very Low	No associated TEC	>100	TCZ – 1.3	26	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 8.3	68.1
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 0.1	26	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.76	48.5	TCZ – 0	100.0
					ECZ – 0.26		ECZ – 13.4	72.4
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 0.07	53.7	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Very high		>100	TCZ – 0.63	100	TCZ – 0	100.0
					ECZ – 2.2		ECZ – 20.7	79.3
					HTZ – 0.09		HTZ – 86.3	13.7
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass -	Very Low	No associated TEC	>100	TCZ – 4.4	10.2	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 5	51.0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.2	33.6	TCZ – 0	100.0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Estimated clearing extent*(ha)	Current VI Scores	Future VI Scores	VI Loss (%)
	shrub low open forest on hills				ECZ – 0.05		ECZ – 2.4	92.9
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.47	49.1	TCZ – 0	100.0
					ECZ – 0.17		ECZ – 8.1	83.5
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 3.2	74.2	TCZ – 0	100.0
					ECZ – 1.2		ECZ – 16.4	77.9
					HTZ – 0.03		HTZ – 71.4	3.8
294	Nortons Box - Red Box - White Box tussock grass open forest of the southern section of the NSW South Western Slopes Bioregion	Low	No associated TEC	>100	TCZ – 0.12	28.8	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ –0.02	40.4	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
295	Robertsons Peppermint - Broad-leaved Peppermint - Nortons Box - stringybark shrub-fern open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Moderate	No associated TEC	>100	TCZ – 0.57	39.8	TCZ – 0	100.0
					ECZ – 0.22		ECZ – 7.5	81.2
					HTZ –nil		N/A	N/A
297	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest	Very Low	No associated TEC	>100	TCZ – 0.54	8.2	TCZ – 0	100.0
					ECZ – 0.06		ECZ – 6.6	19.5
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.03	20.8	TCZ – 0	100.0
					ECZ – 0.02		ECZ – 4.4	78.8
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.87	52.7	TCZ – 0	100.0
					ECZ – 0.49		ECZ – 20.7	60.7
					HTZ –nil		N/A	N/A
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest	Very Low	No associated TEC	>100	TCZ – 0.13	4	TCZ – 0	100.0
					ECZ – 0.98		ECZ – 1	75.0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.05	44.9	TCZ – 0	100.0
					ECZ – 0.08		ECZ – 13.4	70.2
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.04	44.9	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ –nil		N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Estimated clearing extent*(ha)	Current VI Scores	Future VI Scores	VI Loss (%)
301	Drooping Sheoke - Ricinocarpus bowmannii - grasstree tall open shrubland of the Coolac - Tumut Serpentinite Belt	Very low	Coolac-Tumut Serpentinite Shrubby Woodland	>100	TCZ – 0.29	0.4	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 1.8	29.7	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.72	46.9	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 0.6	66.2	TCZ – 0	100.0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
306	Red Box - Red Stringybark - Nortons Box hill heath shrub - tussock grass open forest of the Tumut region	Very Low	No associated TEC	>100	TCZ – 2.45	14.7	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 8.4	42.9
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.25	23.4	TCZ – 0	100.0
					ECZ – 0.13		ECZ – 1.6	93.2
					HTZ – 0.03		HTZ – 13.4	42.7
314	Apple Box - Red Stringybark basalt scree open forest in the upper Murray River region	Very Low	No associated TEC	>100	TCZ – 2.5	1.8	TCZ – 0	100.0
					ECZ – 0.04		ECZ – 1	44.4
					HTZ – 0.01		HTZ – 1.8	0.0
		Low		>100	TCZ – 0.28	22.7	TCZ – 0	100.0
					ECZ – 0.12		ECZ – 4	82.4
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 2.6	41.4	TCZ – 0	100.0
					ECZ – 0.61		ECZ – 7.8	81.2
					HTZ – 0.04		HTZ – 30.3	26.8
		Very high		>100	TCZ – 1.2	90.7	TCZ – 0	100.0
					ECZ – 0.15		ECZ – 23.6	74.0
					HTZ – 0.01		HTZ – 86.5	4.6
316	Nortons Box - Red Box - Red Stringybark +/- Nodding Flax Lily forb-grass open forest	Very low	No associated TEC	>100	TCZ – 0.11	4.3	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 2.4	44.2
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 5.46	40.4	TCZ – 0	100.0
					ECZ – 0.09		ECZ – 2.1	94.8
					HTZ – nil		N/A	N/A
		Very high		>100	TCZ – 2.95	90.4	TCZ – 0	100.0
					ECZ – 7.97		ECZ – 28.7	68.3
					HTZ – 0.54		HTZ – 64.5	28.7

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Estimated clearing extent*(ha)	Current VI Scores	Future VI Scores	VI Loss (%)
319	Tumbledown Red Gum - White Cypress Pine hill woodland	Low	No associated TEC	>100	TCZ – 0.86	20	TCZ – 0	100.0
					ECZ – 0.01		ECZ – 11.6	42.0
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.53	54.1	TCZ – 0	100.0
					ECZ – 0.07		ECZ – 16.2	70.1
					HTZ –nil		N/A	N/A
343	Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates	Very Low	No associated TEC	>100	TCZ – 3.1	7	TCZ – 0	100.0
					ECZ – 0.12		ECZ – 4	42.9
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 0.89	31.8	TCZ – 0	100.0
					ECZ – 0.08		ECZ – 10.4	67.3
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.9	51.1	TCZ – 0	100.0
					ECZ – 0.75		ECZ – 12.4	75.7
					HTZ – 0.04		HTZ – 16.3	68.1
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 6.3	13.1	TCZ – 0	100.0
					ECZ – 0.03		ECZ – 7.5	42.8
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 1.39	13.7	TCZ – 0	100.0
					ECZ – nil		N/A	N/A
					HTZ –nil		N/A	N/A
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	Very Low	No associated TEC	>100	TCZ – 0.7	21	TCZ – 0	100.0
					ECZ – 0.07		ECZ – 11.3	46.2
					HTZ –0.03		HTZ – 19.9	5.2
		Low		>100	TCZ – 0.38	21	TCZ – 0	100.0
					ECZ – 0.07		ECZ – 11.3	46.2
					HTZ – 0.03		HTZ – 19.9	5.2
1191	Snow Gum - Candle Bark woodland on broad valley flats	Very low	No associated TEC	>100	TCZ – 0.16	11	TCZ – 0	100.0
					ECZ –0.17		ECZ – 1	90.9
					HTZ –nil		N/A	N/A
Total					**331.93**	-	–	–

Impacts to native vegetation within Bondo

Table 13-10: Vegetation impacts within the Bondo IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Low	No associated TEC	>100	TCZ - 1.06	30.5	TCZ - 0	100.0
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Low	No associated TEC	>100	ECZ - 3.06	30.5	ECZ - 2.5	91.8
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Low	No associated TEC	>100	HTZ - nil	30.5	N/A	N/A
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	High	No associated TEC	>100	TCZ - 1.08	87.7	TCZ - 0	100.0
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	High	No associated TEC	>100	ECZ - 3.73	87.7	ECZ - 25.2	71.3
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	High	No associated TEC	>100	HTZ - 0.2	87.7	HTZ - 61.5	29.9
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Very High	No associated TEC	>100	TCZ - 0.1	87.7	TCZ - 0	100.0
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Very High	No associated TEC	>100	ECZ - 0.38	87.7	ECZ - 25.2	28.7
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Very High	No associated TEC	>100	HTZ - 0.01	87.7	HTZ - 61.4	30.0
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Low	No associated TEC	>100	TCZ - 0.18	32.9	TCZ - 0	100.0
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Low	No associated TEC	>100	ECZ - nil	32.9	N/A	N/A
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Low	No associated TEC	>100	HTZ - nil	32.9	N/A	N/A
295	Robertsons Peppermint - Broad-leaved Peppermint - Nortons Box - stringybark shrub-fern open forest	Moderate	No associated TEC	>100	TCZ - 1.07	47.4	TCZ - 0	100.0
295	Robertsons Peppermint - Broad-leaved Peppermint - Nortons Box - stringybark shrub-fern open forest	Moderate	No associated TEC	>100	ECZ - 2.13	47.4	ECZ - 9.2	80.6
295	Robertsons Peppermint - Broad-leaved Peppermint - Nortons Box - stringybark shrub-fern open forest	Moderate	No associated TEC	>100	HTZ - nil	47.4	N/A	N/A
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Very low	No associated TEC	>100	TCZ - 0.49	2	TCZ - 0	100.0
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Very low	No associated TEC	>100	ECZ - 1.17	2	ECZ - 1.1	45.0
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Very low	No associated TEC	>100	HTZ - nil	2	N/A	N/A
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Moderate	No associated TEC	>100	TCZ - 3.96	62	TCZ - 0	100.0
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Moderate	No associated TEC	>100	ECZ - 11.28	62	ECZ - 14.6	76.5
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Moderate	No associated TEC	>100	HTZ - 0.22	62	HTZ - 55.2	11.0
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Low	No associated TEC	>100	TCZ - 0.14	68.8	TCZ - 0	100.0
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Low	No associated TEC	>100	ECZ - nil	68.8	N/A	N/A
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Low	No associated TEC	>100	HTZ - nil	68.8	N/A	N/A
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Moderate	No associated TEC	>100	TCZ - 0.35	68.8	TCZ - 0	100.0
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Moderate	No associated TEC	>100	ECZ - 1.06	68.8	ECZ - 15.3	77.8
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Moderate	No associated TEC	>100	HTZ - nil	68.8	N/A	N/A
352	Red Stringybark - Blakely's Red Gum hillslope open forest	Low	White Box - Yellow Box - Blakely's	>100	TCZ - 0.07	14.1	TCZ - 0	100
352	Red Stringybark - Blakely's Red Gum hillslope open forest	Low	White Box - Yellow Box - Blakely's	>100	ECZ - nil	14.1	N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
	on meta-sediments in the Yass - Boorowa - Crookwell region of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion		Red Gum Grassy Woodland and Derived Native Grassland		HTZ - nil		N/A	N/A
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	Very low	No associated TEC	>100	TCZ - 0.06	8.4	TCZ - 0	100.0
					ECZ - 0.14		ECZ - 0.7	91.7
					HTZ - 0.02		HTZ - 8.4	0
		Low			TCZ - 0.10	40.9	TCZ - 0	100
					ECZ - 0.05		ECZ - 14.5	64.55
					HTZ - nil		N/A	N/A
		High			TCZ - 1.52	60.6	TCZ - 0	100.0
					ECZ - 4.12		ECZ - 10.8	82.2
					HTZ - 1.11		HTZ - 55.4	8.6
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion	Very low	Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	>100	TCZ - 0.03	11.8	TCZ - 0	100
		Moderate			TCZ - 0.06	66.1	TCZ - 0	100.0
					ECZ - 0.53		ECZ - 15.9	75.9
Total					**39.49**	-	-	-

Impacts to native vegetation within Snowy Mountains

Table 13-11: Vegetation impacts within Snowy Mountains IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps in the NSW South Western Slopes	Low	No associated TEC	>100	TCZ- 0.41	32.5	TCZ- 0	100.0
					ECZ- 1.02		ECZ- 1	96.9
					HTZ- 0.09		HTZ- 27.2	16.3
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils	Low	No associated TEC	>100	TCZ - 0.49	33.1	TCZ - 0	100.0
					ECZ - 0.12		ECZ - 4.5	86.4
					HTZ - 0.13		HTZ - 33.1	0.0
		Moderate		>100	TCZ - 0.07	45.9	TCZ - 0	100.0
					ECZ - 0.2		ECZ - 2.4	94.8
					HTZ - 0.01		HTZ - 45.9	0.0
		Very High		>100	TCZ- 4.85	82	TCZ - 0	100.0
					ECZ- 9.02		ECZ - 19.2	76.6
					HTZ- 3.24		HTZ - 62.8	23.4
637	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	High	Montane Peatlands and Swamps	>100	TCZ- 0.02	75.2	TCZ- 0	100.0
					ECZ- nil		ECZ- nil	100.0
					HTZ- nil		HTZ- nil	100.0
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	Low	No associated TEC	>100	TCZ - 0.55	34.1	TCZ - 0	100.0
					ECZ - 0.77		ECZ - 7.2	78.9
					HTZ - 0.07		HTZ - 36.3	0.0
		Moderate		>100	TCZ - 4.93	45.4	TCZ - 0	100.0
					ECZ - 7.62		ECZ - 8.8	80.6
					HTZ - 3.23		HTZ - 40.6	10.6
		High		>100	TCZ - 12.83	67.1	TCZ - 0	100.0
					ECZ - 21.28		ECZ - 18	73.2
					HTZ - 7.62		HTZ - 58	13.6
679	Black Sallee - Snow Gum low woodland of montane valleys	Low	Monaro Tableland Cool Temperate Grassy Woodland	>100	TCZ - 0.27	32.9	TCZ - 0.0	100.0
					ECZ - 0.03		ECZ- 0.02	99.9
					HTZ - 0.01		HTZ - 32.9	0.0
		High		>100	TCZ - 1.55	69.8	TCZ - 0	100.0
					ECZ - 1.73		ECZ - 22.9	67.2
					HTZ - 0.17		HTZ - 51.6	26.1
939	Montane wet heath and bog of the eastern tablelands	High	Montane Peatlands and Swamps	>100	TCZ - 0.07	78.7	TCZ - 0	100.0
					ECZ - 0.45		ECZ - 63.5	19.3
					HTZ - 0.03		HTZ - 78.7	0.0
953		Low		>100	TCZ - 5.61	27.5	TCZ - 0	100.0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Future VI Scores	VI Loss (%)
	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges		No associated TEC		ECZ - 2.04		N/A	N/A
					HTZ - 0.4		N/A	N/A
		Moderate		>100	TCZ - 3.21	55.5	TCZ - 0	100.0
					ECZ - 5.04		ECZ- 13.9	75.0
					HTZ - 0.61		HTZ- 39.5	28.8
		High		>100	TCZ - 15.14	76	TCZ - 0	100.0
					ECZ - 17.53		ECZ- 16.9	77.8
					HTZ - 3.49		HTZ- 54.5	28.3
		Very High		>100	TCZ - 12.42	83.9	TCZ - 0	100.0
					ECZ - 19.7		ECZ - 15.8	81.2
					HTZ - 4.4		HTZ - 62.1	26.0
1196	Snow Gum - Mountain Gum shrubby open forest of montane areas	Low	No associated TEC	>100	TCZ - 0.93	35	TCZ - 0	100.0
					ECZ - 0.55		ECZ - 2.1	94.0
					HTZ - 0.11		HTZ - 35	0.0
		High		>100	TCZ - 6.16	73.4	TCZ - 0	100.0
					ECZ - 19.10		ECZ - 20.8	71.7
					HTZ - 2.09		HTZ - 62.9	14.3
1224	Sub-alpine dry grasslands and heathlands of valley slopes	High	No associated TEC	>100	TCZ - 0.02	88.4	TCZ - 0	100.0
					ECZ - nil		N/A	N/A
					HTZ - nil		N/A	N/A
Total					**201.43**	-	-	-

13.3.2 Impacts to threatened ecological communities

Table 13-12 and Figure 13-2 document potential direct impacts to TECs as a result of the amended project relative to each IBRA subregion. A total of five BC Act and two EPBC Act TECs could be impacted intersecting the updated indicative disturbance area (Figure 13-3). Each impact area provided is the sum of all clearing within each of the three clearing zones (TCZ/ECZ and HTZ). Total clearing areas for each TEC are as follows:

- 457.18 hectares of BC Act and 117.15 hectares of EBPC 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 Bioregion*
- 3.38 hectares of BC Act listed *Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions*
- 6.62 hectares of BC Act listed *Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions*
- 0.92 hectares of BC Act and 0.58 hectares of EPBC Act listed *Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands and Australian Alps bioregion / Alpine Sphagnum Bogs and Associated Fens*
- 1.92 hectares of BC Act listed *Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion.*

Table 13-12: Direct impacts to threatened ecological communities

Threatened ecological community	BC Act	EPBC Act	SAII	Impacts (ha)						
				BUN	CRO	MUR	INL	BON	SNO	All IBRA subregions
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 Bioregion	CE	CE	Y	24.33	67.43	97.08	268.27	0.02	-	457.18
				7.56 (EPBC Act)	19.39 (EPBC Act)	34.63 (EPBC Act)	55.57 (EPBC Act)	-	-	117.15 (EPBC Act)
Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions	E	-	Y	-	-	-	3.38	-	-	3.38
Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	E	-	Y	0.4	5.59	-	-	0.63	-	6.62
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South-East Corner, South-Eastern Highlands and Australian Alps bioregion / Alpine Sphagnum Bogs and Associated Fens	E	E	N	-	0.31	0.03	-	-	0.58	0.92
				-	-	-	-	-	0.58 (EPBC Act)	0.58 (EPBC Act)
Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion	CE	-	Y	-	1.92	-	-	-	-	1.92

Note: BC Act = *Biodiversity Conservation Act 2016*, EPBC Act = *Environment Protection Biodiversity Conservation Act 1999*, BUN = Bungonia IBRA subregion, CRO = Crookwell IBRA subregion, MUR = Murrumbateman IBRA subregion, INL = Inland Slopes IBRA subregion, BON= Bondo IBRA subregion, SNO = Snowy Mountains IBRA subregion.

13.3.3 Impacts to threatened species and their habitat

Direct impacts to species credit species

A total of 46 threatened flora species, 30 threatened fauna species[2] (including four frogs, two insects, three reptiles, 12 birds and 9 mammals) and two endangered fauna populations listed under the BC Act have the potential to be impacted by the amended project.

A summary of potential direct impacts on threatened species credit species as a result of the amended project, including recorded and assumed habitat, is shown in Figure 13-4 to Figure 13-14 and documented in Table 13-13. These calculations exclude any Category 1 exempt lands. Threatened species habitat subject to clearing within Category 1 exempt lands is documented in Attachment 24.

Potential impacts presented below are higher than impacts that would occur from the amended project due to the required BAM method employed, survey limitations and a reduction in impacts due to avoidance and mitigation measures detailed within Chapter 14 of this report. Table 15-8 and Table 15-9 of this report further classifies impacts for the below species into species likely to be impacted versus species with limited potential to be impacted.

Table 13-13: Summary of direct impacts to threatened species credit species

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
Acacia ausfeldii	Ausfeld's Wattle	V	-	FALSE	Inland Slopes	15.86 ha	Assumed present
Acacia bynoeana	Bynoe's Wattle	E	V	FALSE	Bungonia	1.26 ha	Assumed present
					Crookwell	2.63 ha	Assumed present
Acacia flocktoniae	Flockton Wattle	V	V	FALSE	Bungonia	10.08 ha	Assumed present
Ammobium craspedioides	Yass Daisy	V	V	FALSE	Bondo	5 c	Recorded
					Crookwell	2038 c	Recorded
					Inland Slopes	5040 c	Recorded
					Murrumbateman	1338 c	Recorded
					Snowy Mountains	12 c	Recorded
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	FALSE	Bungonia	9.39 ha	Assumed present
					Crookwell	9.77 ha	Assumed present
					Inland Slopes	8.35 ha	Assumed present
					Murrumbateman	6.61 ha	Recorded

[2] A total of 31 candidate fauna were subject to assessment, however, only 30 candidate fauna species would be impacted. As noted in Section 7.3.3, all potential habitats for Southern Corroboree Frog (*Pseudophryne corroboree*) were excluded through survey.

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
Baloskion longipes	Dense Cord-rush	V	V	FALSE	Bungonia	1.26 ha	Assumed present
Bossiaea fragrans	Bossiaea fragrans	CE	CE	TRUE	Inland Slopes	6.23 ha	Assumed present
Bossiaea oligosperma	Few-seeded Bossiaea	V	V	FALSE	Bungonia	2.36 ha	Assumed present
Burhinus grallarius	Bush Stone-curlew	E	-	FALSE	Inland Slopes	54.25 ha	Assumed present
Caesia parviflora var. minor	Small Pale Grass-lily	E	-	FALSE	Inland Slopes	1.68 ha	Assumed present
Caladenia concolor	Crimson Spider Orchid	E	V	TRUE	Inland Slopes	29.92 ha	Assumed present
					Murrumbateman	1.95 ha	Assumed present
Caladenia montana	Caladenia montana	V	-	FALSE	Bondo	9.3 ha	Assumed present
					Snowy Mountains	199.3 ha	Assumed present
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	FALSE	Bondo	31.74 ha	Recorded
					Bungonia	25.91 ha	Recorded
					Crookwell	31.27 ha	Recorded
					Inland Slopes	110.19 ha	Recorded
					Murrumbateman	43.64 ha	Recorded
					Snowy Mountains	187.4 ha	Recorded
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	V	FALSE	Bungonia	26.43 ha	Recorded
					Crookwell	13.43 ha	Assumed present
					Inland Slopes	0.93 ha	Assumed present
Cercartetus nanus	Eastern Pygmy-possum	V	-	FALSE	Bondo	22.99 ha	Assumed present
					Bungonia	24.19 ha	Assumed present
					Crookwell	38.15 ha	Assumed present
					Murrumbateman	34.78 ha	Recorded
					Snowy Mountains	108.9 ha	Recorded
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	TRUE	Inland Slopes	2.42 ha	Assumed present-foraging
Commersonia prostrata	Dwarf Kerrawang	E	E	FALSE	Crookwell	0.82 ha	Assumed present
Crinia sloanei	Sloane's Froglet	E	E	FALSE	Inland Slopes	0.66 ha	Assumed present
Cullen parvum	Small Scurf-pea	E	-	FALSE	Inland Slopes	16.55 ha	Assumed present

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
Cyclodomorphus praealtus	Alpine She-oak Skink	E	E	FALSE	Snowy Mountains	30.83 ha	Assumed present
Delma impar	Striped Legless Lizard	V	V	FALSE	Crookwell	17.43 ha	Species expert
					Inland Slopes	33.32 ha	Species expert
					Murrumbateman	39.32 ha	Species expert
Dillwynia glaucula	Michelago Parrot-pea	E	-	FALSE	Bungonia	1.26 ha	Assumed present
Diuris aequalis	Buttercup Doubletail	E	V	FALSE	Bungonia	6.07 ha	Assumed present
					Crookwell	36.36 ha	Assumed present
Diuris tricolor	Pine Donkey Orchidv	V	-	FALSE	Inland Slopes	1.27 ha	Assumed present
Eucalyptus aggregata	Black Gum	V	V	FALSE	Crookwell	4 c	Assumed present
					Inland Slopes	3 c	Assumed present
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	E	FALSE	Bungonia	12 c	Assumed present
Eucalyptus robertsonii subsp. hemisphaerica	Robertson's Peppermint	V	V	TRUE	Crookwell	2 c	Assumed present
Genoplesium superbum	Superb Midge Orchid	E	-	TRUE	Bungonia	9.42 ha	Assumed present
Grevillea iaspicula	Wee Jasper Grevillea	CE	E	TRUE	Murrumbateman	8 c	Assumed present
Grevillea wilkinsonii	Tumut Grevillea	CE	E	TRUE	Inland Slopes	21 c	Assumed present
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	FALSE	Bondo	0.43 ha	Assumed present
					Inland Slopes	2.48 ha	Recorded
Hieraaetus morphnoides	Little Eagle	V	-	FALSE	Bondo	4.85 ha	Species expert
					Bungonia	1.03 ha	Species expert
					Crookwell	0.35 ha	Species expert
					Inland Slopes	3.55 ha	Species expert
					Murrumbateman	0.1 ha	Species expert

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
					Snowy Mountains	79.28 ha	Species expert
Keyacris scurra	Key's Matchstick Grasshopper	E	-	FALSE	Crookwell	33.23 ha	Species expert
					Inland Slopes	74.12 ha	Species expert
					Murrumbateman	54.54 ha	Species expert
Kunzea cambagei	Cambage Kunzea	V	V	FALSE	Bungonia	7.29 ha	Assumed present
Lepidium hyssopifolium	Aromatic Peppercress	E	E	FALSE	Crookwell	64.5 ha	Assumed present
Leucochrysum albicans subsp. tricolor	Hoary Sunray	E	E	FALSE	Bungonia	6023 c	Assumed present
					Crookwell	24597 c	Recorded
					Inland Slopes	1041 c	Assumed present
					Murrumbateman	11201 c	Recorded
					Snowy Mountains	581 c	Assumed present
Litoria booroolongensis	Litoria booroolongensis	E	E	FALSE	Crookwell	0.01 ha	Assumed present
					Inland Slopes	0.05 ha	Assumed present
Litoria castanea	Yellow-spotted Tree Frog	CE	CE	TRUE	Crookwell	0.63 ha	Assumed present
					Snowy Mountains	0.54 ha	Assumed present
Lophoictinia isura	Square-tailed Kite	V	-	FALSE	Bondo	1.45 ha	Species expert
					Inland Slopes	2.46 ha	Species expert
					Snowy Mountains	33.4 ha	Species expert
Mixophyes balbus	Stuttering Frog	E	V	TRUE	Bungonia	13.87 ha	Assumed present
Myotis macropus	Southern Myotis	V	-	FALSE	Bondo	14 ha	Assumed present
					Bungonia	13.32 ha	Recorded
					Inland Slopes	3.14 ha	Recorded
					Murrumbateman	27.47 ha	Recorded
Ninox connivens	Barking Owl	V	-	FALSE	Bondo	8.41 ha	Species expert

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
					Bungonia	25.14 ha	Species expert
					Inland Slopes	69.77 ha	Species expert
					Snowy Mountains	137.47 ha	Recorded
Ninox strenua	Powerful Owl	V	-	FALSE	Bondo	7.22 ha	Species expert
					Bungonia	23.49 ha	Recorded
					Inland Slopes	14.53 ha	Recorded
					Murrumbateman	26.77 ha	Species expert
					Snowy Mountains	155.19 ha	Species expert
Persoonia marginata	Clandulla Geebung	V	V	FALSE	Inland Slopes	4.26 ha	Assumed present
Persoonia mollis subsp. revoluta	Persoonia mollis subsp. revoluta	V	-	FALSE	Bungonia	1.37 ha	Assumed present
Petauroides volans	Greater Glider	E	E	FALSE	Bondo	6.86 ha	Assumed present
					Bungonia	9.13 ha	Recorded
					Inland Slopes	11.48 ha	Assumed present
					Snowy Mountains	115.11 ha	Recorded
Petaurus australis - endangered population	Yellow-bellied Glider population on the Bago Plateau	EP	-	FALSE	Bondo	8.51 ha	Recorded
					Snowy Mountains	112.81 ha	Recorded
Petaurus norfolcensis	Squirrel Glider	V	-	FALSE	Bondo	4.69 ha	Assumed present
					Crookwell	10.85 ha	Recorded
					Inland Slopes	17.45 ha	Recorded
					Murrumbateman	6.19 ha	Recorded
					Snowy Mountains	20.97 ha	Recorded
Petaurus norfolcensis - endangered population	Squirrel Glider	EP	-	FALSE	Inland Slopes	10.46 ha	Recorded
Petroica rodinogaster	Pink Robin	V	-	FALSE	Bondo	10.69 ha	Assumed present
					Bungonia	0.03 ha	Assumed present
					Inland Slopes	0.03 ha	Assumed present

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
					Snowy Mountains	24.51 ha	Assumed present
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	FALSE	Bondo	5.78 ha	Assumed present
					Bungonia	19.39 ha	Assumed present
					Snowy Mountains	136.89 ha	Assumed present
Phascolarctos cinereus	Koala	E	E	FALSE	Bondo	32.99 ha	Assumed present
					Bungonia	6.19 ha	Assumed present
					Crookwell	41.8 ha	Assumed present
					Inland Slopes	119.51 ha	Assumed present
					Murrumbateman	52.02 ha	Assumed present
					Snowy Mountains	188.58 ha	Assumed present
Phyllota humifusa	Dwarf Phyllota	V	V	FALSE	Bungonia	10.5 ha	Assumed present
Pimelea bracteata	Pimelea bracteata	CE	CE	TRUE	Bondo	3.82 ha	Assumed present
					Snowy Mountains	0.83 ha	Recorded
Polytelis swainsonii	Superb Parrot	V	V	FALSE	Bondo	0.02 ha	Assumed present
					Crookwell	14.4 ha	Assumed present
					Inland Slopes	69.79 ha	Recorded
					Murrumbateman	29.41 ha	Recorded
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	FALSE	Bondo	1.41 ha	Assumed present
					Bungonia	6.67 ha	Assumed present
Pomaderris delicata	Delicate Pomaderris	CE	CE	TRUE	Bungonia	1.37 ha	Assumed present
Pomaderris pallida	Pale Pomaderris	V	V	TRUE	Murrumbateman	1.16 ha	Assumed present
Prasophyllum bagoense	Bago Leek-orchid	CE	CE	TRUE	Snowy Mountains	0.04 ha	Recorded
Prasophyllum innubum	Brandy Marys Leek-orchid	CE	CE	TRUE	Snowy Mountains	0.02 ha	Assumed present
Prasophyllum keltonii	Kelton's Leek-orchid	CE	CE	TRUE	Snowy Mountains	0.03 ha	Recorded
Prasophyllum petilum	Tarengo Leek-orchid	E	E	FALSE	Inland Slopes	17.83 ha	Assumed present
					Murrumbateman	26.92 ha	Assumed present

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
Pseudomys fumeus	Smoky Mouse	CE	E	TRUE	Bondo	5.78 ha	Assumed present
Pterostylis alpina	Alpine Greenhood	V	-	FALSE	Snowy Mountains	2.14 ha	Assumed present
Pterostylis foliata	Slender Greenhood	V	-	FALSE	Bondo	6.89 ha	Assumed present
					Snowy Mountains	43.07 ha	Assumed present
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	TRUE	Snowy Mountains	0.56 ha	Assumed present
Pultenaea humilis	Dwarf Bush-pea	V	-	FALSE	Inland Slopes	18.43 ha	Assumed present
Senecio garlandii	Woolly Ragwort	V	-	FALSE	Inland Slopes	9.88 ha	Assumed present
Solanum armourense	Solanum armourense	E	-	TRUE	Bungonia	0.35 ha	Assumed present
Swainsona recta	Small Purple-pea	E	E	FALSE	Inland Slopes	55.64 ha	Assumed present
					Murrumbateman	9.73 ha	Assumed present
Swainsona sericea	Silky Swainson-pea	V	-	FALSE	Bungonia	7.38 ha	Assumed present
					Inland Slopes	87.93 ha	Assumed present
					Murrumbateman	13.85 ha	Assumed present
Synemon plana	Golden Sun Moth	V	V	FALSE	Inland Slopes	9.82 ha	Species expert
					Murrumbateman	17.57 ha	Species expert
Thelymitra alpicola	Alpine Sun-orchid	V	-	FALSE	Snowy Mountains	0.54 ha	Assumed present
Thesium australe	Austral Toadflax	V	V	FALSE	Bungonia	23.87 ha	Assumed present
					Crookwell	59.32 ha	Assumed present
					Inland Slopes	0.33 ha	Assumed present
					Murrumbateman	58.44 ha	Assumed present
					Snowy Mountains	0.01 ha	Assumed present
Tyto novaehollandiae	Masked Owl	V	-	FALSE	Bondo	6.39 ha	Species expert
					Bungonia	3.58 ha	Species expert
					Inland Slopes	30.37 ha	Species expert

Scientific name	Common name	BC Act	EPBC Act	SAII	IBRA Subregion	Direct impact (hectare (ha)/count (c))	Species presence
					Snowy Mountains	138.09 ha	Species expert
Tyto tenebricosa	Sooty Owl	V	-	TRUE	Bondo	5.78 ha	Species expert
					Snowy Mountains	57.3 ha	Species expert
Xerochrysum palustre	Swamp Everlasting	-	V	FALSE	Snowy Mountains	0.68 ha	Recorded

13.3.4 Impacts to Groundwater Dependent Ecosystems

Proposed construction and operational activities associated with the amended project footprint are unlikely to pose a significant risk to GDEs given there are expected to be minimal impacts to ground water quality and flow with adequate mitigation measures in place (*Technical Report 12 – Surface Water and Groundwater Impact Assessment* (Aurecon, 2023a)).

Construction of the transmission line structures would involve excavation up to five metres in depth and piling up to 20 metres in depth for transmission line structure foundations, which would generally be located within elevated parts of the landscape outside of riparian areas and associated alluvials where ground-surface water interaction is most likely. Whilst some ground surface compaction is likely due to proposed earthworks and access track construction, this would not involve significant grouting and introduction of hardstand would be minimal and therefore would not pose any significant barrier to ongoing groundwater recharge.

Several potential controlled blasting areas have been identified for the amended project. Bench blasting may be required where hard rock has been identified under proposed transmission line structure benches. Vibrations and rock mass damage as a result of blasting have the potential to free soil particles into the groundwater and increase turbidity, alter groundwater flow pathways and cause groundwater drawdown. Of the 21 locations identified as potential controlled blasting areas within the amended project footprint, 13 are expected to occur within 50 metres of mapped GDEs, including:

- one high potential terrestrial GDEs (from regional studies): Montane wet heath and bog of the eastern tablelands, South Eastern Highlands Bioregion
- twelve high potential aquatic GDEs (from national assessment), including:
  - Bannaby Creek
  - First Creek
  - Connors Creek
  - Clydes Creek
  - Stockmans Creek
  - Mandys Creek
  - Sandy Creek
  - Mantons Creek
  - Weir Gully
  - Three Waterholes Creek
  - Sheepyard Creek
  - Adelong Creek.

However, controlled blasting would be limited to specific locations within the areas and may not occur if it is not determined to be the preferred construction method in an area. Where controlled blasting is required, a suitably qualified blasting specialist will conduct a detailed blasting assessment and trial blasts where necessary to delineate site-specific parameters and limits and ensure that impacts are highly localised. These findings will be used to inform site-specific Erosion and Sediment Control Plans (ESCPs) and Soil and Water Management Plans (SWMPs). Through these mitigation measures, it is expected that impacts to groundwater quality and hydrology can be managed and minimised.

Groundwater bores may be used as a non-potable water resource and have the potential to temporarily reduce water availability to groundwater dependent ecosystems and local users. To manage these risks, water would only be extracted following consultation with relevant councils and in accordance with Water Access Licences (WALs) and existing licensed extraction volumes.

The storage and use of chemicals during construction and ongoing infrastructure maintenance may pose an increased risk to groundwater quality (such as from hydrocarbon spill or ammonium nitrate used in blasting operations). However, this risk is considered negligible where effective controls are implemented to guide the storage and management of chemicals and other substances posing a potential hazard to sensitive receiving environments.

13.4 Indirect impacts

Table 13-14 provides a summary of potential indirect impacts on native vegetation, threatened entities and their habitat as a result of the amended project. The nature, extent, frequency, duration, and timing of indirect impacts has been identified including proposed mitigation measures to be implemented during construction and operation of the amended project. A more detailed assessment of potential indirect impacts is provided in Attachment 24, including methods, assumptions and limitations applied for the assessments. The general extent of indirect impacts is shown in Figure 13-1 and Figure 13-2 (Attachment 5), except where Table 13-14 indicates these are limited to the final disturbance area.

Table 13-14: Assessment of indirect impacts associated with the amended project

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
Inadvertent impacts on adjacent habitat or vegetation (Attachment 24, Section 1.1 - Edge effects)	Construction and operation	PCTs, TECs and threatened flora and fauna and aquatic habitats situated at the construction interface	There is a risk of disturbance and/ or destruction of adjacent habitats and vegetation through soil disturbance and construction activities and unauthorised vehicle movements potentially resulting in accidental clearing, sedimentation and erosion and mobilisation of contaminants within the disturbance area and into adjoining native vegetation and aquatic habitats. However, the consequence of the impacts is expected to be minor following the implementation of further design refinement and mitigation measures to protect these areas.	Within the final disturbance area, and adjacent (i.e., within 100 m).	Short-term	At a minimum, the BMP would include the following measures for the protection and management of adjacent areas: • Development of a Connectivity Strategy to mitigate impacts to connectivity (Table 14-1, B10). • Adjacent habitats and vegetation would be identified as a no-go zone within approved plans and on-site demarcation (Table 14-1, B13). • High visibility protection fencing would be erected on site including signage clearly identifying these areas as no-go zones (Table 14-1, B13). • Requirements for the protection and management of no-go zones to be addressed as a part of the site induction (Table 14-1, B13). • Work within proximity of aquatic ecosystems would require stringent erosion and sediment controls to avoid increased run-off and pollutant loads (Table 14-1, B8, B27, B30, B35, B36). Further detail on the above mitigation options is outlined in Chapter 14, and Attachment 24.
Reduced viability of adjacent habitat due to light, noise, dust, vibration, and controlled blasting and crushing (Attachment	Construction and operation	Nocturnal fauna, and breeding habitats (e.g., flying-fox camps, owls, bats, raptors, cockatoos, Superb Parrot)	**Artificial lighting impacts:** Areas within the amended project footprint (substations, workers accommodation facility etc), would likely require artificial lighting. Adjacent habitats are likely to be subject to disturbance during the construction phase as a	**Artificial lighting impacts:** Areas within the amended project footprint (night work, substations, workers accommodation and facilities etc), would likely require artificial lighting (Attachment 24, Section 1.2). **Noise and vibration impacts:**	Construction duration will differ for certain components of the amended project but would occur over a 2.5-year period. Most construction activities would be undertaken within standard work	Light spill would be managed as follows (Table 14-1, B24): • Directional lighting would be used for any permanent lighting and temporary lighting required (i.e., substations, worker accommodation) to minimise light spill as much as possible. • Permanent lighting will be erected at least 50 m from remnant vegetation where practicable. • Wherever possible, artificial lighting required during construction will be directed away from remnant vegetation.

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
24, Section 1.2)			result of increased noise, dust, and light spill. Light is a natural stimulus, which impacts on the physiology, behaviour, and movement of all organisms. Artificial lighting alters the length of the natural photoperiod, disrupting the natural circadian rhythm and sensory ecology of organisms. This change in photoperiod can affect the foraging, breeding, and dispersal behaviours of fauna. In addition, fauna also use lighting cues as a means for predator detection and habitat selection, both of which are impacted by the introduction of artificial light (Blackwell *et al.*, 2015). Based on available research, other impacts resulting from increased light pollution include (Altringham & Kerth, 2016; Haddock *et al.,* 2019): • potential decrease in species abundance and diversity • resource partitioning and shifts in foraging niches • increased predation • alterations to trophic interactions	Noise from transmission line and structure construction is likely to produce highly intrusive noise (greater than 20 decibels [dB] above the noise management levels) within 150 m of the amended project footprint during earthwork and clearing, and within 70 m for brake and winch sites and 160 m for access tracks during daytime (7am - 6pm) is predicted (SLR, 2023). Vibration and dust will also occur from vibratory rollers and construction hammers (see *EIS Technical Report 9 - Noise and Vibration Impact Assessment* (SLR, 2023) and Amendment Report *Technical Report 9 - Noise and Vibration Impact Assessment Addendum* (SLR, 2024)). The maximum controlled blasting and rock crushing impact distance threshold (1 km buffer of indicative controlled blasting and rock crushing areas) is inferred based on the data provided in both *Figure 6-2: predicted airblast overpressure (dBL)*	hours between 7am and 6pm, Monday to Friday and 8am to 1pm on Saturday. However, some works would be required outside of standard construction hours (at night), which would be managed by an Out of Hours Works protocol. Night-time works will include the installation of high voltage equipment, overhead stringing of conductors and earth wires and facility operation. **Controlled blasting:** The controlled blasting works including associated crushing activities would be short-term. Preliminary geotechnical investigations and further consideration of terrain within the amended project	• All feasible and reasonable measures would be applied to reduce the potential noise and vibration impacts from the amended project (Table 14-1, B25). Specific mitigation measures have been recommended based on the predicted impacts (SLR, 2023; SLR, 2024). Exact mitigation strategies would be determined as the amended project progresses. The construction contractors will be required to prepare a Noise and Vibration Management Plan (NVMP), detailing the implemented mitigation measures and strategies (SLR, 2023; SLR, 2024). Prior to blasting and/or crushing activities taking place an ecologist will be engaged to determine potential impacts on Bats, Owls, Cockatoos, Raptors and Superb Parrot. An impact assessment of proposed activities will be completed, and if impacts are likely, appropriate mitigation measures will be proposed, which may include cessation of certain activities, avoiding breeding seasons (where practicable) and/or amending the construction methodology including selecting alternative plant or equipment. In the unlikely event that impacts are unavoidable, offsetting requirements will be discussed with NSW DCCEEW Environment and Heritage. Dust suppression would be addressed as discussed in *Technical Report 17 – Air Quality Impact Assessment* (SLR, 2023a) of the EIS and *Technical Report 17 – Air Quality Impact Assessment Addendum* (SLR, 2024a) of the Amendment Report including: • visually monitoring dust generation from project-related traffic movements and at helipads. • Installing wind breaks in appropriate locations adjacent to dust generating crushing and screening equipment and processes. .

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			• physiological influences on species • potential behavioural adaptions. **Noise and vibration impacts:** Noise and vibration construction impacts associated with the amended project include the following vegetation clearing, controlled blasting, rock crushing, excavation, helicopter/ drone stringing/ construction work, construction road traffic noises, and the construction of transmission line infrastructure. Increased light, noise, vibration, and dust spill appears to have some level of influence on all trophic levels within urban terrestrial ecosystems, which in turn may result in both positive and negative feedback effects and impact overall ecosystem health. Although these impacts would be short-term and are unlikely to have long-term adverse effects on the viability of adjacent habitats. Any residual impacts are considered minor and are	*vs scaled distance* (noise impacts over distance from blasting) and *Figure 6-3: Ground vibration vs scaled distance (noise impacts over distance from blasting),* referenced in Section 6.6 of *Technical Report 9 - Noise and Vibration Impact Assessment* (SLR, 2024). At 1 km, vibration impacts resultant of blasting are predicted to be negligible, and similarly, for noise, the decibel levels were relatively low. As such, this prediction data formed the basis for our controlled blasting impact buffer for native fauna. There is a deficit in published research on the effects (including specific distance thresholds) of noise and vibration impacts on international or Australian fauna. Therefore, a conservative approach has been applied using the distances from human-sensitive receptors in the report (SLR, 2024) and apply those to fauna (not knowing specific sensitivity thresholds for certain fauna groups). Additional impact	footprint have identified several potential controlled blasting areas. However, controlled blasting would be limited to specific locations within the areas and may not occur if it is not determined to be the preferred construction method in an area. As such, the assessment of blasting is considered indicative only with further details including timing/staging/strategy of blasting to be confirmed during finalisation of detailed design. Operational impacts would mostly be limited to vehicle movements for maintenance activities and security lighting for substations. These activities would be	• Stockpiles will be kept covered with material to prevent the generation of dust. • Application of water as dust suppression during dust generating activities where practicable. • Dust suppression through wetting of exposed surfaces including access tracks.

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			likely to be adequately managed with mitigation measures.	assessments would be undertaken on potential avifauna breeding habitat which may occur in the vicinity of the works if blasting/crushing are proposed and once location/frequency and intensity are known. Detailed information on the magnitude of impacts to candidate fauna species resulting from increased artificial light spill, dust, noise, and vibration impacts from the amended project can be found in Section 1.2, Attachment 24.	periodic and short-term.	
Transport of weeds and pathogens from the site to adjacent vegetation (Attachment 24, Section 1.1 - Edge effects)	Construction and operation	TECs and threatened flora habitats situated at the interface to the proposed easement	There is the potential for the introduction or spread of weeds and pathogens by means of imported materials, machinery movements and increased foot traffic during construction and operation. Weeds recorded as a part of field survey activities are detailed in Section 6.4 of the BDAR relative to each vegetation zone and IBRA subregion. No evidence of pathogens such as Root Rot (*Phytophthora cinnamomi*),	Within the final disturbance area, and adjacent (i.e. within 100 m).	Long-term	Mitigation measures to control the spread of weeds, pathogens and pest animals are identified in Table 14-1 (B22). These would include the implementation of hygiene protocols such as vehicle washdown facilities and ensuring supplier provides certification that imported soils and materials for construction work are clean and free from contaminants. Weed and pathogen management during operation would occur in accordance with Transgrid operational procedures (Table 14-1, B23). It is recommended that the risk of spread of Phytophthora be managed through the use of wash down procedures for any plant travelling through infected areas, as dictated by the Biosecurity Management Plan to be prepared for the amended project (Table 14-1, B22). The Biosecurity

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			Myrtle Rust (*Austropuccinia psidii)* and Chytrid Fungus (*Batrachochytrium dendrobatidis)* was recorded within the amended project footprint. However, these have the potential to occur. Phytophthora has been detected in locations associated with the adjoining Snowy 2.0 project and in Lob's Hole (NSW DCCEEW submission). Recent surveys of Kosciuszko National Park have detected three species that are likely to be the most destructive of environmental values: *Phytophthora cinnamomi, Phytophthora gregata* and *Phytophthora multivora*. Very little of the park is currently suitable for *Phytophthora cinnamomi* but the area of suitable habitat is likely to increase in the coming decades as mean temperature increases. Only the western edge of KNP and the lower Snowy River valley are currently marginally suitable habitat for *Phytophthora cinnamomi.* The amended project footprint does not overlap			Management Plan will stipulate procedures to minimise the likelihood of spread of weeds and pathogens (Table 14-1, B22).

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			with Kosciuszko National Park. Phytophthora species are amongst the world's most destructive plant pathogens, causing catastrophic environmental degradation and can spread through the movement of vehicles, mountain bikes, horse riders, walkers, and large feral animals (McDougall & Wright, 2023). Should activities associated with the amended project increase the spread of Phytophthora in the region, this could result in further associated environmental degradation. However, the risk of the amended project increasing spread of Phytophthora in the region would be reduced though implementation of a Biosecurity Management Plan (Table 14-1, B22).			
Increased risk of starvation or exposure, and loss of	Construction	Fauna species situated at the construction interface	Displacement of resident fauna species during vegetation clearing is considered relatively low in some areas due to the	Within the final disturbance area, and adjacent (i.e. within 100 m).	Short-term	The displacement of fauna during clearing work would be managed through the following mitigation measures (Table 14-1, B3, B12, B19, B20): • Pre-clearing surveys and procedures for avoidance of habitat features, ecological

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
shade or shelter (Refer to Section 2.3 - Habitat Connectivity, Attachment 24)			modified vegetation structure resulting from long-term agricultural stock grazing. However, the risk is likely to increase in areas with larger intact remnants. Given the linear nature of the amended project, proposed mitigation options and the highly mobile nature of most potential resident fauna species, the increased risk of starvation, exposure and loss of shade or shelter due to the amended project is considered low.			supervision, and the relocation of fauna (if required). • Preparation of a fauna handling and rescue procedure to be implemented for the ethical handling of injured or displaced fauna. • Habitat supplementation measures such as nest boxes, hollow re-use / creation, and re-use of timber/logs as habitat in broader easement area if practicable. • Unexpected threatened species finds protocol to be implemented if TECs, flora and fauna species, not assessed in the BDAR, are encountered.
Trampling of threatened flora species (Attachment 24, Section 1.1 - Edge effects)	Construction/ operation	Threatened flora species situated at the construction interface, or within the disturbance area	Reduction in population extent and available habitat of threatened flora species that occur in the ground stratum could occur due to trampling, unauthorised material storage and/or vehicle and plant equipment movement during the construction and operation of the amended project.	Within the final disturbance area, and adjacent (i.e. within 100 m).	Long-term	Prior to any clearing or construction, features of high biodiversity conservation significance within the easement, including biodiversity exclusions zones (Table 14-1, B13) and retained habitat for threatened species, would be identified prior to construction, and recorded in Transgrid's GIS/GPS systems. The GIS information will be reviewed during the planning of all maintenance or other future activities that could cause disturbance.
Removal and disturbance of rocks, including bush rock (Attachment 24, Section 1.6)	Construction/ operation	Threatened fauna species situated at the construction interface, or within the disturbance area	Reduction in population extent and available habitat of small terrestrial fauna (small mammals, and reptiles) that occur in the ground stratum could occur due to the direct removal of habitat during the	Within the final disturbance area, and adjacent (i.e. within 100 m).	Long-term	Existing tracks and clearings would be used, where possible, to limit the construction of new tracks (Table 14-1, B28). Where this is not possible, the design would seek to minimise impacts to native vegetation, including cut and fill, as a priority. Design and micro-siting of new access tracks would avoid and minimise impacts to habitat trees, rock outcrops, large boulders, piled rock, and rock

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			construction and operation of the amended project.			features that provide potential sheltering and breeding habitat for fauna, including threatened species, where practicable (Table 14-1, B28).
Increase in pest animal populations and predation of native fauna (Attachment 24, Section 1.1 - Edge effects)	Construction/ operation	Threatened fauna species situated at the construction interface, or within the disturbance area	Section 13.9 identifies pest animals known or likely to occur within the amended project footprint. It is unlikely that work associated with the amended project would result in the introduction or spread of pest species within the amended project footprint. It should be considered that the amended project footprint consists of large areas of agricultural lands. Therefore, it is highly likely that those areas are already subjected to varying degrees of feral animal encroachment. Despite this, it is possible that native fauna may be more susceptible to predation as a result of vegetation clearing and increased levels of fragmentation within the locality.	Within the disturbance area, and adjacent (i.e. within 100 m)	Long-term	Transgrid would consult with relevant agencies and groups involved with pest management in order to contribute to existing or future monitoring and management programs. Consideration of potential contributions would be targeted towards areas where greatest impacts occur, particularly through relatively intact landscapes where easement introduction increases the risk of native fauna predation (Table 14-1, B22).
Reduced viability of adjacent habitat due to edge effects	Operation	PCTs, TECs and threatened flora and fauna situated at the construction interface	Much of the landscape surrounding the amended project footprint has been historically cleared and is subject to high levels of	Adjacent (i.e. within 20 m) to the final disturbance area within existing intact vegetated remnants	Long-term	Development of a Connectivity Strategy to mitigate impacts to threatened species susceptible to edge effects (Table 14-1, B10).

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
(Attachment 24, Section 1.1 - Edge effects)			fragmentation. Clearing as a result of the amended project is likely to have a negligible impact on existing cleared lands and access tracks due to the high levels of disturbance already associated with these areas. Vegetated fragments remaining within the landscape are generally small, isolated, and already likely to be subject to considerable edge effects such as weed invasion and altered floristic composition and structure. A total of 137.44 ha of native vegetation within the amended project footprint is considered likely to be subject to edge effects as a result of the amended project. Edge effects predicted to occur within these vegetation zones include increased weed incursion, light inputs, compositional and structural changes to vegetation and disturbance resulting in decreased viability of associated habitats. Likely changes to vegetation zones as a result of edge effects are			Weed and pathogen management during operation would occur in accordance with Transgrid operational procedures (Table 14-1, B23). Refer to mitigation measures (Table 14-1, B10, B23), and Attachment 24. In the unexpected event that a level of indirect or prescribed impact occur than is able to be mitigated under a mitigation measure (Table 14-1), further discussion will occur with NSW DCCEEW regarding potential conservation measures, offset requirements.

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			difficult to quantify. Operational weed management is recommended to manage the potential risks of weed incursion within these vegetation zones. However, there is likely to be some remaining residual impacts following implementation of weed management practices. In the unexpected event that a level of indirect or prescribed impact occur than is able to be mitigated under a mitigation measure (Table 14-1), further discussion will occur with NSW DCCEEW regarding potential conservation measures, offset requirements.			
Changed fire regimes (Attachment 24, Section 1.5)	Operation	All entities	Fire regimes within the locality are already subject to considerable alteration as a result of the agricultural and forestry land uses which dominate the landscape. There is an increased risk of bushfire where the transmission lines become damaged from storm activity or fallen vegetation. However, these risks would be low with appropriate maintenance.	Within the final disturbance area, and surrounding vegetation	Ongoing	During construction and operation, the required bushfire management measures would be implemented to manage any increased risk of bushfire. Design specifications would be adopted to ensure conductor clearance heights adhere to recommended levels to minimise any risk of arcing or potential fire events. Management and mitigation measures that would be implemented include APZs, transmission line clearances, construction requirements in accordance with the required Bushfire Attack Level (BAL) and emergency procedures (Aurecon, 2023b). *Technical Report 13 – Bushfire Risk Assessment Addendum* (Aurecon

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
						2024b) provides the updated APZs for the amended project. Vegetation maintenance would occur in accordance with HumeLink operational procedures . Impact calculations presented within this document incorporate this maintenance provision. The proposed new and upgraded access tracks and roads would provide additional opportunity for fire breaks across the regional landscape to enable better management of fire and reduce the potential for inappropriate fire intervals.
Electric and magnetic field exposure (Attachment 24, Section 1.4- Electric and magnetic field exposure)	Operation	Some increased risk to avifauna where nesting on transmission towers, and foraging microbats	**Birds** Based an analysis of predicted electric and magnetic field (EMF) levels as a result of the amended project, EMF would remain well below reference levels for maintaining public safety under all operational scenarios (refer to *Technical Report 15- Electric and Magnetic Field Study*). Native fauna interaction with the proposed transmission lines is likely to be transient and as such, risk of exposure to EMF is considered low. However, there is an increased risk of EMF exposure for some birds (i.e., White-bellied Sea-eagle) where nesting for prolonged periods on transmission line	In proximity to the transmission line	Ongoing	Deterrent strategies (including bird flappers and perching deterrents to deter raptors effectively and safely away from perching on energized infrastructure), and the development of a diverter model would be finalised during design refinement and would be developed as part of the Connectivity Strategy (Figure 13-2) (Table 14-1, B11, B10). The proposed locations where deterrent devices are considered appropriate is outlined in Attachment 24, Section 2.4.

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			structures in close proximity to transmission lines. Fernie & Reynolds (2005) indicate EMF impacts in birds are largely unknown, although changes in bird behaviour, physiology, endocrine system, and immune function have been noted with potential to compromise reproduction success and fitness in some species. These risks remain largely uncertain at this time. Design measures should be considered to discourage birds from nesting at transmission line structures where these intersect significant habitats. Based on the review of available scientific literature, the risk of EMF exposure on nesting birds is considered low. **Bats** Echolocation is microbats' navigation system and are high frequency sound waves made by the bat forcing air through its vocal cords. Bat vocal calls vibrate very rapidly, creating sound impulses that are either through their mouth or			

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
			nostrils. The call bounces back from surrounding objects and the bat then converts this to information about the size, texture, and distance of the surrounding objects (Moss & Surlykke, 2001; Churchill, 2009). It has been suggested that EMF associated with this type of infrastructure could potentially exert an aversive behavioural response in foraging bats (impacting echolocation capabilities, which provokes avoidance behaviour) (Moss & Surlykke, 2001). However, based on the information provided in *Technical Report 15 – Electric and Magnetic Field Study* (Aurecon, 2022) prepared for the EIS, the EMF emittance from the proposed transmission lines is highly unlikely to adversely affect foraging bats or their insect prey in the vicinity.			
Fauna collision, electrocution with transmission lines	Operations	Sixteen threatened fauna species and two endangered populations potentially affected by this operational indirect impact include:	Whilst several threatened fauna species are likely to occur in proximity to the proposed power lines, very few are likely to fly at elevations which would put them at risk from	In proximity to the transmission line	Ongoing	Mitigation measures for fauna collision, electrocution with transmission lines is addressed in further detail in Table 13-20 and Table 14-1 (B10, B11) of the BDAR, as well as Attachment 24.

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
(Attachment 24, Section 2.4 - Collision risks for candidate threatened fauna)		• Forest Owls and Cockatoos ▪ Barking Owl *(Ninox connivens)* ▪ Masked Owl *(Tyto novaehollandiae)* ▪ Powerful Owl *(Ninox strenua)* ▪ Sooty Owl *(Tyto tenebricosa)* ▪ Gang-gang Cockatoo *(Callocephalon fimbriatum)* ▪ Glossy Black-Cockatoo *(Calyptorhynchus lathami)* • Raptors: ▪ Square-tailed Kite *(Lophoictinia isura)* ▪ Little Eagle *(Hieraaetus morphnoides)* ▪ White-bellied Sea-eagle	transmission line strike, entanglement, or electrocution. Therefore, terrestrial fauna, mammals, reptiles, and amphibians are not at risk of transmission line strike. Flying and gliding mammals have the potential to make aerial movements at elevations where transmission lines are located, although many of those species are either not present locally, they do not fly at elevations where transmission lines are positioned (many microchiropteran bats and gliders) and they are unlikely to accidentally strike transmission lines, because they navigate by radar clicks and not sight (ie larger microchiropteran bats). The general fauna group most likely to have potential for transmission line strike are the birds, but only small subsets of birds are likely to fly at elevations that would place them at risk of transmission line strike (eg migratory birds, and raptors).			

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation

		(Haliaeetus leucogaster)
		• Megabats:
		  ▪ Grey-headed Flying-fox *(Pteropus poliocephalus)*
		• Microbats:
		  ▪ Large Bent-winged Bat *(Miniopterus orianae oceanensis*)
		  ▪ Large-eared Pied Bat *(Chalinolobus dwyeri)*
		  ▪ Southern Myotis *(Myotis macropus).*
		• Gliders
		  ▪ Southern Greater Glider (*Petauroides volans)*
		  ▪ Yellow-bellied Glider (*Petaurus australis*)
		  ▪ Yellow-bellied Glider population on
			The consequences of fauna collision, and electrocution with transmission lines is addressed in further detail in Table 13-20.			

Indirect Impact	Timing	Nature/impacted entities	Consequence	Extent	Duration	Mitigation
		the Bago Plateau (endangered population) ▪ Squirrel Glider (*Petaurus norfolcensis*) ▪ Squirrel Glider in the Wagga Wagga Local Government Area (endangered population). Mobile species may become entangled/ collide with powerlines (DAWE, 2021b). Similarly to electrocution, the risk of entanglement is higher in more urbanised areas (Tidemann, 1999; Tidemann & Nelson, 2011).				

13.5 Prescribed biodiversity impacts

13.5.1 Prescribed impact entities

As per the BAM (DPIE, 2020a), the assessor must assess the prescribed impacts that the amended project would, or is likely to have, on threatened entities and their habitat, taking into account:

- TECs, threatened species and their habitat
- ongoing or future impacts that the amended project will have on biodiversity values, considering the measures taken to avoid or minimise impacts
- the spatial and temporal extent of the impacts likely to result from changes in land use arising from the amended project, in accordance with Subsections 8.3.1–8.3.6 of the BAM (DPIE, 2020a).

The BDAR must include an assessment of any prescribed impacts of the amended project on threatened entities and their habitat, and describe:

- the nature, extent, frequency, duration and timing of prescribed impacts that may occur:
  - during construction
  - during operation
  - that are uncertain (predictions should be made).
- the consequences of prescribed impacts on biodiversity values
- any limitations to data, assumptions, and predictions about impacts on biodiversity (see Attachment 24).

An assessment for each of the relevant prescribed biodiversity impacts has been completed and is presented in the following sections.

13.5.2 Impacts to karst, caves, crevices, cliffs, rocks and other geological features of significance

The assessment of impacts to karst, caves, crevices, cliffs, rocks as a result of the amended project is detailed below in Table 13-15. Further detailed discussion on habitat associated with karsts, cliffs and gorges is presented in Table 13-6, and Attachment 24. Figure 7-1 and Figure 13-2 shows the potential extent of prescribed impacts associated with mapped karst, caves, crevices, cliffs, rocks, and other geological features of significance.

Table 13-15: Assessment of Prescribed Impacts (karst, caves, crevices, cliffs, rocks, and other geological features of significance)

Prescribed biodiversity impacts	Nature (relevance to the amended project)	Extent	Duration	Consequences
(a) impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance, or rocks.	The amended project has the potential to impact on caves, crevices, cliffs, rock habitats that are considered important to the lifecycle of threatened fauna. An important element of geodiversity is karst landforms. 'Karst' is a type of landscape formed by water dissolving carbonate rock, such as limestone, to make features like gorges and caves. Across the amended project footprint, there are a couple of limestone deposits displaying features we expect to see in karst environments. Further, some of those limestone deposits are of the same formation group and epoch as karst environments in the broader region (e.g. Bungonia Caves and Careys Cave). No cave environments were identified within the amended project footprint during field campaigns. However, there is important cave roosting habitat beyond the amended project footprint, including Large Bent-winged Bat roosts at: • Black Andrew Mine (within 14 km) • Dip Cave, Wee Jasper (within 28 km) • Punchbowl Cave (within 27 km, known roosting site and staging site for gravid females enroute to Church Cave maternity site) • Pylon 58 Cave (within 20 km) • Church Cave (within 27 km) (maternity roost site) • Drum Cave (within 37 km) (maternity roost site). Areas of typical rocky hillslope and rock overhangs occur throughout the amended project footprint, in areas with moderate to high topographic relief. This provides a different type of terrestrial habitat to other parts of the amended project footprint. Some of the potential karst locations (identified in the karst mapping), were subsequently ground-truthed and targeted for breeding bats (via harping trapping) during the Summer 2023 survey period. From the	Impacts would be negligible; the rocky environment described would be minimally impacted, and these habitats would remain post-construction. No potential karst, caves or cliffline habitats will be directly impacted by proposed subsurface works (eg blasting or excavation works). Controlled blasting may occur within a 200 metres of cliffline areas (the final controlled blasting locations are yet to be confirmed).	The minor impacts to the rocky woodlands would be permanent. Any indirect construction impacts would be relatively short-term in nature.	The consequence of the impacts would be minor and non-significant following further design refinement (avoidance) and the residual impact would be appropriately offset. Further detailed discussion of impacts on habitat associated with karsts, cliffs and gorges is presented in Table 13-6.

Prescribed biodiversity impacts	Nature (relevance to the amended project)	Extent	Duration	Consequences
	ground-truthing exercise, all potential karsts/caves areas were ground-truthed and discounted as being suitable habitat.			

Table 13-16: Impacts of the amended project on habitat associated with karsts, cliffs, and gorges

Cave/cliff-dependant species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
Large Bent-winged Bat	The amended project intersects 14.81 ha of potential karstic (cave-forming) geologies. All areas of karstic geologies within the amended project footprint were able to be ground-truthed, and targeted surveys were completed (via harp trapping) to rule out the presence of potential breeding habitat for Large Bent-winged Bat (e.g. caves). The amended project footprint is greater than 30 km from any known/ confirmed maternity sites for the species.	Lattice transmission line structures proposed as a part of the development are highly permeable and are unlikely to impede species movement. Earthworks would be limited to general subsurface work in the locality of the transmission line structures, ancillary infrastructure, and access roads. Provided the controlled blasting sites are confined to the location of the transmission line structure benches within the potential controlled blasting areas, no cliffline habitats would be directly	Any indirect construction impacts would be relatively short-term in nature. Once constructed, impacts from towers would potentially be long-term, however some level of accustomisation is expected.	Indirect impacts associated with controlled blasting (noise and vibration impacts) to nearby cliffline, and rocky habitats may occur as a result of the amended project. Indirect impacts to nearby potential cliffline habitats could be minimised/avoided through micrositing during the detailed design phase, and the implementation of smooth blasting methods[3] within proximity to these sensitive habitats. The consequence of the potential indirect impacts such as collision, vibration and noise would be minor and non-significant given	For rocky habitats within the amended project footprint, mitigation measures will include (Table 14-1, B1, B3, B20, B25, B28): • Avoidance of impacts to rocky habitats where possible • Retention of rocky habitat features where practicable • Pre-clearing surveys to confirm presence of karst roosting habitat for bats within areas identified as high potential karst habitats and develop adaptive safeguards to mitigate indirect impacts to roosting individuals

[3] Smooth blasting is the preferred method. This technique involves a row of closely spaced drill holes which are loaded with decoupled charges (charges with a smaller diameter than the drill hole) and fired simultaneously to produce an excavation contour without fracturing or damaging the rock behind or adjacent to the blasted face.

Cave/cliff-dependant species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
		impacted by the proposed subsurface works. It is anticipated that controlled blasting would be localised and shallow in the location of transmission line structure benches. Indirect impacts associated with controlled blasting (noise and vibration impacts) to nearby cliffline may occur as a result of the amended project.		appropriate distance from breeding areas (e.g. caves).	• Design and micro-siting of new access tracks will seek to avoid or minimise impacts to rocky habitats (ie rock outcrops, large boulders, piled rock, and rock features that provide potential sheltering) • Prior to blasting and/or crushing activities taking place an ecologist will be engaged to determine potential impacts on Bats. An impact assessment of proposed activities will be completed, and if impacts are likely, appropriate mitigation measures will be proposed, which may include cessation of certain activities, avoiding breeding seasons (where practicable) and/or amending the construction methodology including selecting alternative plant or equipment. .

Cave/cliff-dependant species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
					Any residual impact to threatened species habitat will be appropriately offset.
Large-eared Pied Bat	The amended project intersects approximately 6.23 ha of steep cliffline habitat within the Bungonia and Inland Slopes IBRA subregions of the amended project footprint. These areas may provide potential roosting habitat for Large-eared Pied Bat. The area of Large-eared Pied Bat habitat mapped is outlined in Attachment 24, Table 4.	Lattice transmission line structures proposed as a part of the development are highly permeable and are unlikely to impede species movement. Provided the controlled blasting sites are confined to the location of the transmission line structure benches within the potential controlled blasting areas, no cliffline habitats would be directly impacted by the proposed subsurface work. Controlled blasting would be localised and shallow in the location of the transmission line structure benches. Indirect impacts associated with blasting (noise and vibration impacts) to nearby cliffline habitats may occur as a result of the amended project.	No deep excavation, drilling or controlled blasting works are required in the location of high potential cliffline habitat intersecting the amended project footprint. However, controlled blasting may occur within a 200 metres of cliffline areas (the final controlled blasting locations are yet to be confirmed). Any indirect construction impacts would be relatively short-term in nature. Transmission lines would span across steep gullies and outcrops. This would be permanent.	The amended project is unlikely to directly impact any potentially suitable rocky habitat for this species. However, indirect impacts associated with controlled blasting (noise and vibration impacts) may occur as a result of the amended project. Indirect impacts to nearby potential karst and cliffline habitats could be minimised/ avoided through micrositing during the detailed design phase, and the implementation of smooth blasting methods within proximity to these sensitive habitats.	Suitable rocky habitat for Large-eared Pied Bat would be avoided. However, indirect impacts associated with controlled blasting (noise and vibration impacts) may occur as a result of the amended project. The following mitigation measures are recommended (Table 14-1, B1, B3, B20, B25, B28): • Avoidance of impacts to rocky habitats where possible • Retention of rocky habitat features where practicable • Pre-clearing surveys to confirm presence of karst roosting habitat for bats within areas identified as high potential karst habitats and develop adaptive safeguards to mitigate indirect impacts to roosting individuals • Design and micro-siting of new access

Cave/cliff-dependant species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
					tracks will seek to avoid or minimise impacts to rocky habitats (ie rock outcrops, large boulders, piled rock, and rock features that provide potential sheltering) Prior to blasting and/or crushing activities taking place an ecologist will be engaged to determine potential impacts on Bats. An impact assessment of proposed activities will be completed, and if impacts are likely, appropriate mitigation measures will be proposed, which may include cessation of certain activities, avoiding breeding seasons (where practicable) and/or amending the construction methodology including

Cave/cliff-dependant species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
					selecting alternative plant or equipment. .Any residual impact to threatened species habitat will be appropriately offset.
Masked Owl and Sooty Owl	The amended project intersects 6.23 ha of steep cliffline habitat within the amended project footprint that may be considered potential cave - nesting habitat for Sooty Owl or Masked Owl. The area of Sooty Owl and Masked Owl habitat mapped is outlined in Attachment 24, Table 4.	Lattice transmission line structures proposed as a part of the development are highly permeable and are unlikely to impede species movement. Provided the proposed controlled blasting sites are confined to the location of the transmission line structure benches, no cliffline habitats will be directly impacted by the proposed subsurface works. The controlled blasting sites would be localised and shallow in the location of transmission line structure benches. Indirect impacts associated with blasting (noise and vibration impacts) to nearby cliffline habitats may occur as a result of the amended project.	No deep excavation, drilling or controlled blasting works are required in the location of high potential cliffline habitat intersecting the amended project footprint. However, controlled blasting may occur within a couple hundred metres of cliffline areas. Any indirect construction impacts would be relatively short-term in nature. Transmission lines would span across steep gullies and outcrops. This would be permanent.	The amended project is unlikely to directly impact any potentially suitable rocky habitat for this species. However, indirect impacts associated with controlled blasting (noise and vibration impacts) may occur as a result of the amended project. Indirect impacts to nearby potential karst and cliffline habitats could be minimised/ avoided through micrositing during the detailed design phase, and the implementation of smooth blasting methods within proximity to these sensitive habitats.	Suitable rocky habitat for Masked Owl and Sooty Owl would be avoided. Further, pre-clearing surveys to determine the presence of nest trees and rock habitat would be undertaken (Table 14-1, B20). Indirect impacts associated with controlled blasting (noise and vibration impacts) may occur as a result of the amended project. The following mitigation measures are recommended (Table 14-1, B25): Prior to blasting and/or crushing activities taking place an ecologist will be engaged to determine potential impacts on Bats. An impact assessment of proposed activities will be completed, and if impacts are likely, appropriate mitigation measures will be proposed, which may include cessation of certain activities, avoiding breeding seasons (where practicable) and/or amending

Cave/cliff-dependant species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
					the construction methodology including selecting alternative plant or equipment. . Any residual impact to threatened species habitat will be appropriately offset.

13.5.3 Impacts to habitat connectivity and fauna movement

The assessment of prescribed impacts to habitat connectivity and fauna movement as a result of the amended project is detailed below in Table 13-17, and Attachment 24, Section 2.3. Further detailed discussion on associated impacts of reduced connectivity on threatened species likely to be affected is presented in Table 13-18. Figure 13-1 and Figure 13-2 show the location of existing habitat corridors in relation to the updated indicative disturbance areas, potential prescribed impacts, and associated mitigation options.

Table 13-17: Assessment of prescribed impacts (habitat connectivity and fauna movement)

Prescribed biodiversity impacts	Nature (ie relevance to the amended project)	Extent	Duration	Consequences
(c) impacts of development on habitat connectivity	Installation of line structures and transmission lines may impact on aerial species while clearance of vegetation within the easement may create an open-space barriers for terrestrial species. The nature of the potential impacts to connectivity primarily relate to impacts to aerial species such as birds or bats through interaction with the proposed line structures or associated lines.	Lattice transmission line structures proposed as a part of the development are highly permeable structures and are unlikely to impede species movement. Transgrid would aim to retain connectivity corridors near transmission line structure locations that occur in woodland vegetation at strategic locations that would be developed as part of a Connectivity Strategy. However, an unknown level of interaction such as bird strike (and fatality) may occur. A technical memo for glider movement corridors was developed by Niche (2023), identifying areas where glider activity in known. The memo assessed maximum glide distance of glider species in each corridor location. This information will inform the Connectivity Strategy,	The impacts to connectivity related to the installation of transmission line structures and lines would be permanent. However, they are likely to reduce over time as biodiversity acclimatises to the presence of the transmission line structures and lines. Further, a Connectivity Strategy is to be developed during detailed design to minimise the extent of connectivity impacts, which includes retaining of corridors adjacent to easement to facilitate fauna movement.	The consequence of the impacts is considered to be minor: aerial species have the ability to fly under/over/around the structures/lines. Impacts to terrestrial species that may be subject to open-space barriers would be addressed within the Connectivity Strategy where they occur or are considered likely to occur within proximity to the amended project. The amended project has also been co-located within existing transmission lines / areas of disturbance to avoid/minimise additional fragmentation. Further detailed discussion of amended project impacts on habitat connectivity is presented in Table 13-18, Figure 13-1, Figure 13-2 and Attachment 24.

Prescribed biodiversity impacts	Nature (ie relevance to the amended project)	Extent	Duration	Consequences
		mitigation options and detailed design for the amended project.		

Table 13-18: Impacts of the amended project on connectivity and fauna movement

Connectivity feature entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
Threatened microbat species that require cluttered or edge environments for foraging and may be affected by reduced connectivity: • Large-eared Pied Bat • Southern Myotis • Eastern False Pipistrelle.	Reduced connectivity can modify bat species assemblages. Specifically, it has been found that bat diversity, abundance, and foraging activity decrease as cover of remnant vegetation diminishes, although such effects are dependent upon functional identity of bat species (specifically, foraging guilds, morphology, and behavioural adaptions) (Hopkins, 2015; Threlfall *et al.*, 2011; Jung & Threlfall, 2016; Haddock *et al.*, 2019). Avoidance behaviour (such as avoiding nesting or foraging resources) and habitat utilisation (such as diverging around the broader area where easements, substations and transmission lines are located) may be affected. The amended project may create a barrier effect which causes microchiropteran bats to alter their flight pathways to avoid certain areas eg cleared areas where easements are located (Threlfall *et al.*, 2011).	The amended project footprint consists of a mosaic of large areas of intact remnant vegetation, smaller remnants, and agricultural lands. The loss and fragmentation of remnant vegetation are accompanied by an increase in the ratio of forest edge to interior forest, and as a result, the response of bats to this can vary among species (change species assemblages). The morphology of a species (body size, wing form and size ratio, echolocation call structure, feeding and roosting ecology) all determine how bats fly and use the landscape. Thus, the effects of fragmentation on bats are to a significant extent species-specific (Hopkins, 2015; Altringham & Kerth, 2016).	Reduced connectivity would be permanent, however, the impacts associated with reduced connectivity are likely to reduce over time as the animals acclimatise to the presence of the structures/gaps in the landscape, and connectivity is retained in other sections (implementation of a Connectivity Strategy)	The risk of isolating threatened microbats due to increased fragmentation is considered low across the amended project footprint. Further, microbats are considered highly mobile, and some remnants would be retained to maintain connectivity.	Development of a Connectivity Strategy to mitigate impacts to microbat species assemblages (Table 14-1, B10). A Connectivity Strategy would be developed to maintain fauna connectivity (Table 14-1, B10, and Attachment 24, Table 6). As such, additional offsets for impacts to connectivity are not proposed.
Terrestrial and arboreal mammals affected by	The ability of arboreal and terrestrial mammals to safely	The increased fragmentation resulting from the amended	Reduced connectivity would be permanent as the	The impacts on connectivity in some areas are likely to be	Development of a Connectivity Strategy (Table

Connectivity feature entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
reduced landscape connectivity: • Broad-toothed Rat • Koala • Eastern Pygmy-possum • Long-nosed Potoroo Smoky Mouse	traverse across the easement to retained patches of vegetation would become constrained, and it may represent a barrier to movement, and an increased predation risk to species such as the Koala that may be required to traverse open ground.	project, may hinder the ability for some arboreal species to traverse the landscape, hence, reducing the species overall home range and may indirectly increase predation risk for many species.	easement will be maintained free of trees/ canopy vegetation, however, the impacts associated with reduced connectivity are likely to reduce over time as biodiversity acclimatises, and connectivity is retained in other sections (implementation of a Connectivity Strategy).	permanent, and moderate in nature. However, those impacts may include increased risk of predation, reduce species dispersal, and reduce genetic exchange, and viability of a local population.	14-1, B10) to mitigate impacts to terrestrial and arboreal fauna species and use fauna sensitive design to facilitate fauna movement throughout the amended project footprint, and broader landscape (e.g., reduction in clearing footprint, use of artificial connectivity structures in areas of high activity and where clearing is unavoidable) (refer to Figure 13-1, Figure 13-2, and Attachment 24).
Gliding fauna affected by reduced landscape connectivity: • Southern Greater Glider • Yellow-bellied Glider • Yellow-bellied Glider population on the Bago Plateau (endangered population) • Squirrel Glider • Squirrel Glider in the Wagga Wagga Local Government Area (endangered population).	The ability of fauna to safely traverse across the easement to retained patches of vegetation would become constrained, and it may represent a barrier for gliding species. During the field surveys, Southern Greater Glider (Snowy Mountain IBRA region), Squirrel Glider (Inland Slopes IBRA subregion), and Yellow-bellied Glider (Snowy Mountain IBRA region), were recorded in several locations throughout the amended project footprint (refer to Section 7.3.3, and Figure 13-11, and Attachment 24).	The increased fragmentation resulting from the amended project, may hinder the ability for glider species to traverse the landscape, hence, reducing the species overall home range. This may indirectly increase predation risk for many glider species. Reduced connectivity in areas of the Inland Slopes and Snowy Mountains IBRA subregions may reduce the extent and habitat extent and connectivity with the broader landscape of listed endangered glider populations.	Reduced connectivity would be permanent as the easement will be maintained free of trees/canopy vegetation, however, the impacts associated with reduced connectivity are likely to reduce over time as biodiversity acclimatises, and connectivity is retained in other sections (implementation of a Connectivity Strategy).	The impacts on connectivity in some areas are likely to be permanent, and moderate in nature. However, those impacts may include increased risk of predation, reduce species dispersal, and reduce genetic exchange, and viability of a local population.	Development of a Connectivity Strategy (Table 14-1, B10) to mitigate impacts to gliding fauna species and use fauna sensitive design to facilitate fauna movement throughout the amended project footprint, and broader landscape (e.g., use of glider poles and other artificial connectivity structures in areas of high activity and where clearing is unavoidable) (refer to Figure 13-2 and Attachment 24). In line with the mitigation measures (refer to Table 14-1, B10 and Attachment 24; Table 6), fauna sensitive structures such as under

Connectivity feature entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
					transmission glider poles, vegetation steppingstones, or reduced clearing requirements would be recommended in a number of locations within the amended project footprint as outlined in the Glider Memo (Niche 2023), where gliders have been observed using the area. Recommended locations are also provided in Figure 13-2 and Attachment 24.
Small, sedentary (short dispersal distances) woodland birds which may be affected by reduced connectivity: • Flame Robin • Scarlet Robin • Varied Sitella.	For the woodland bird species like the Varied Sitella (species recorded in Murrumbateman and Inland Slopes), reduced landscape connectivity may create movement barriers (the sedentary nature of the species makes cleared land a potential barrier). Species such as Flame Robin (species recorded in Snowy Mountains, Bungonia, Inland Slopes and Bondo), Scarlet Robin (species recorded in Bungonia, Crookwell, Bondo, Inland Slopes, Crookwell, and Murrumbateman), they require connected corridors of vegetation for movement. Isolation of patches of habitat, particularly where	The amended project would result in varied types (hazard tree removal, partial and full removal) of vegetation clearance for the transmission line easements within the amended project footprint (Figure 13-2 and Attachment 24). As such, the amended project may reduce some landscape connectivity where it passes through remnant patches of native vegetation, however, the retention of some native vegetation within lower canopy and mid stratum layers would allow for some connectivity between patches of vegetation either side of the easement.	Canopy vegetation would be removed from the easement permanently; ground-layer and shrubs would be retained.	Reduced connectivity of the canopy vegetation would be permanent, however, the impacts associated with reduced connectivity are likely to reduce over time as the animals acclimatise, and connectivity is retained in other sections (implementation of a Connectivity Strategy). The retention of the ground and shrub-layers would also facilitate movement for these small woodland species.	The magnitude of vegetation clearing required for the transmission line easement is unlikely to impede species movement, particularly since landscape connectivity was considered during the conceptual design stage of the amended project and ground and shrub layer vegetation would be retained. As such, impacts to woodland bird species are likely to be negligible. As such, it is considered that additional offsets for impacts to connectivity of habitat for these species is not required. A Connectivity Strategy would be developed (Table 14-1, B10).

Connectivity feature entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
	these patches are smaller than 10 ha, may result in isolated individuals.				
Reptiles which may be affected by reduced connectivity: • Pink-tailed Legless Lizard • Striped Legless Lizard	For reptile species with restricted dispersal ability, such as Pink-tailed Legless Lizard and Striped Legless Lizard; the reductions in habitat connectivity may effectively isolate individuals, leading to a decline in the species population.	The increased fragmentation resulting from the amended project, may reduce landscape connectivity and create movement barriers for the species to traverse the landscape, effectively isolating individuals.	The impacts on connectivity in some areas are likely to be permanent, ranging from minor to moderate in degree.	Reduced connectivity would be permanent, however, the impacts associated with reduced connectivity are likely to reduce over time as biodiversity acclimatises, and connectivity is retained in other sections (implementation of a Connectivity Strategy).	Development of a Connectivity Strategy (Table 14-1, B10, B3) to mitigate impacts to reptile species using fauna sensitive design (such as considering placement of salvaged logs and rocks within cleared habitats) to facilitate fauna movement throughout the amended project footprint, and broader landscape (refer to Figure 13-2).
Amphibians which may be affected by reduced riparian/stream flow connectivity: • Stuttering Frog • Sloane's Froglet • Booroolong Frog • Yellow-spotted Tree Frog.	For amphibian species like Stuttering Frog, Sloane's Froglet, Booroolong Frog, Yellow-spotted Tree Frog, the installation of maintenance access tracks across waterways (formal or informal) may reduce connectivity along the length of the stream.	Localised reduced riparian/stream connectivity in areas where indicative waterway crossings are proposed. A total of 809 streams have been identified as intersected by the proposed access track footprint. Of these, 662 are first order or second order streams, combining to total 82% of KFH streams intersecting with indicative the proposed access track locations. This reflects the dominance of smaller streams within the amended project footprint.	Waterway crossings have been assessed as being permanent, maintained, structures. However, some of these waterway crossings may be removed where they are not required for easement access or asset maintenance.	Reduced stream connectivity may be permanent, in some areas (depending on whether the crossing is permanent structure or a temporary). However, most amphibian species are highly mobile and will disperse to find con-specific species and foraging resources. Therefore, the reduce stream connectivity is unlikely to reduce connectivity for this fauna group. Impacts to stream connectivity are likely to be minor, as the proposed design methods align with those included in Fisheries	Mitigation options to be considered during the detailed design, micro siting process and during operation for waterway crossings to minimise potential impacts to stream connectivity include (Table 14-1, B28, B30-B36): • Where waterway crossings are required, any existing crossings should be re-used or upgraded in preference to establishing new crossings where practicable. • To the fullest extent practical, the

Connectivity feature entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
		A description and assessment of potential impacts to stream ecology as a result of waterway crossings is presented in Sections 10.2 and 13.7 respectively. Potential impacts to riparian corridors are discussed in Section 13.7.5.		NSW guidelines (Fairfull, 2013), as detailed in Section 13.7.1. In instances where existing informal waterway crossings are to be upgraded, the constructed crossing is likely to achieve a more sensitive overall design in terms of preventing or minimising erosion and sedimentation impacts.	crossing design and work sites should minimise disturbance to any native vegetation, including native instream, fringing, and riparian vegetation within the access track alignment. • Crossing structures should be designed so that the existing nominal flow velocity, low flow conditions and fish passage are maintained wherever possible. The complete suite of mitigation measures in relation to managing risk to riparian corridors and stream connectivity throughout the design refinement, construction and operational stages of the amended project are presented in Section 14.2 (Table 14-1 (B28, B30-B36) and Figure 13-2).
TECs affected by reduced connectivity: • *Coolac-Tumut Serpentinite Shrubby Woodland TEC*	The proposed clearing work would result in further loss and fragmentation of TEC remnants within the amended project footprint.	These TECs have been extensively cleared and the communities are already severely fragmented. Many of these remaining patches	The impacts on connectivity in some areas are likely to be permanent, ranging from minor to moderate in degree.	Increased fragmentation may result in loss of community composition, structure, and function and reduced viability of resulting smaller remnants.	Design opportunities to minimise impacts to TEC connectivity should be explored during the detailed design phase. This would

Connectivity feature entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
• *Monaro Tableland Cool Temperate Grassy Woodland TEC* • *Tableland Basalt Forest TEC*		occur on road reserves, the edges of house paddocks, or beside steep slopes on the edges of cleared land. Proposed clearing would predominantly impact more degraded TEC patches and edge environments.		The integrity and survival of small, isolated stands of these TECs, may become impaired by reduced species assemblages, enhanced risks from environmental stochasticity, disruption to pollination and dispersal of fruits or seeds, and likely reductions in the genetic diversity. Fragmentation may also result in reduced fire frequencies within some patches, impacting the viability of some native plant populations. Fragmentation of habitats and disruption of these ecological processes can contribute to reduced ecological function of the communities.	include (Table 14-1, B1, B10, B17): • Consolidating clearing work and prioritising impacts within more degraded TEC remnants where possible. • Minimising total clearing work and identifying opportunities to retain understorey vegetation and connectivity.

13.5.4 Fauna injury and/ or mortality from transmission line collision, entanglement, or electrocution

The assessment of prescribed impacts associated with transmission line collision, entanglement, or electrocution is detailed below in Table 13-19. Further detailed discussion on associated impacts on threatened species is presented in Table 13-20. Figure 13-2 identifies areas within the amended project footprint with elevated risk of collision, entanglement or electrocution and proposed mitigation options. These are detailed further in Attachment 24.

Table 13-19: Assessment of Prescribed Impacts (Injury or mortality from transmission line collision, entanglement, or electrocution)

Prescribed biodiversity impacts	Relevant threatened entities	Nature (ie relevance to the amended project)	Extent	Duration	Consequences
Injury or mortality from transmission line collision, entanglement, or electrocution	Highly mobile species are likely to be more at risk of collision. The species considered most at risk, include: **Aves**: Forest Owls and Cockatoos • Barking Owl • Masked Owl • Powerful Owl • Sooty Owl • Gang-gang Cockatoo • Glossy Black-Cockatoo. Migratory birds: • White-throated Needletail (5 BioNet records within 1 km of amended project footprint (NSW DCCEEW, 2024a)) • Fork-tailed Swift • Sharp-tailed Sandpiper • Red-necked Stint • Latham's Snipe • Common Greenshank • Marsh Sandpiper. Raptors: • Square-tailed Kite	Interaction with the proposed transmission line structures or associated lines being altered flight patterns/behaviour or collision/injury/death.	Entire length of the amended project but potentially more likely in areas supporting remnant vegetation.	The structures would be permanent, but the risk of collision is likely to reduce over time as animals acclimatise to the presence of the transmission line structures and lines. Fauna deterrent devices would also be installed in higher risk area to deter species from nesting in the structures.	The consequences of the impacts are considered to be moderate in nature in, some areas of the amended project footprint. Based on review of avifauna records (aves and mammals), some fauna species that occur within proximity of the proposed transmission lines, may be at higher risk of collision, entanglement, or electrocution (Figure 13-2 and Attachment 24). Other less mobile fauna species are likely to habituate to the structures overtime, and therefore at lower risk of collision/electrocution. As part of the Connectivity Strategy (Table 14-1, B3, B10), adaptive management measures for collision-risk species are to be developed, with monitoring at nominated glider

Prescribed biodiversity impacts	Relevant threatened entities	Nature (ie relevance to the amended project)	Extent	Duration	Consequences
	• Little Eagle • White-bellied Sea-Eagle **Bats:** • Grey-headed Flying-fox. <u>Microbats</u> • Large Bent-winged Bat • Large-eared Pied Bat • Southern Myotis. **Gliders:** • Southern Greater Glider • Yellow-bellied Glider • Yellow-bellied Glider population on the Bago Plateau (endangered population) • Squirrel Glider • Squirrel Glider in the Wagga Wagga Local Government Area (endangered population).				corridors to assess collision-risk and the efficacy of fauna sensitive design measures implemented as part of the amended project. Deterrent strategies (including bird flappers and perching deterrents to deter avifauna effectively and safely away from energized infrastructure), and the development of a diverter model would be finalised during detailed design and would be developed as part of the Connectivity Strategy (Table 14 1 B10, B11 and Figure 13-2).

Table 13-20: Impacts to biodiversity from transmission line collision, entanglement, or electrocution

Threatened species at risk of collision/entanglement	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
Threatened microbat species that may be at risk of collision: • Large Bent-winged Bat • Large-eared Pied Bat • Southern Myotis • Eastern False Pipistrelle	There is an abundance of emerging research on the impacts associated with windfarm developments on insectivorous bats (Smales, 2014; Bennett *et al.*, 2022; Good *et al.*, 2022). However, information is currently very limited in relation to associated transmission line developments. Despite the limited research on the effects of transmission lines on microbats, it can be assumed that there is a degree of collision risk. The movement between territories for Large Bent-winged Bat is unusual compared to other species, some migration movements have been tracked up to 1,300 km. Large Bent-winged Bat and Little Bent-winged Bat are known to forage above the canopy and in open spaces (Churchill, 2009), and therefore more susceptible to collision strike. Other species, such as Large-eared Pied Bat, Eastern False Pipistrelle and Southern Myotis and show strong roost fidelity and will occupy those	It is assumed that collision risk would be higher near forest edges, during nightly foraging. Large Bent-winged Bat (and other above canopy foraging species) may exhibit this foraging behaviour in relation to tall transmission structures. However, at this stage there is no research to support this conclusion. The morphology of a species (body size, wing form and size ratio, echolocation call structure, feeding and roosting ecology) all determine how bats fly and use the landscape. Thus, the risk of collision is likely species specific.	The structures would be permanent; however, the risk of collision would likely reduce over time as animals acclimatise to the presence of the transmission line structures and transmission lines. Fauna deterrent devices would be installed in higher risk areas.	Collision may result in altered flight patterns/behaviour or collision/injury/death.	Development of a Connectivity Strategy to mitigate impacts to microbat species assemblages (Table 14-1, B10). The risk of collision is likely species specific for microbat species across the amended project footprint. Therefore, an adaptive management approach should be implemented to mitigate collision risks to microbats in locations where the relevant species were recorded/considered highly likely to occur (Table 14-1, B3 B11).

Threatened species at risk of collision/entanglement	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
	multiple roosts sites within their range, year after year. These species tend to be low to mid-canopy flyers, and therefore, are less likely to be susceptible to transmission line collision.				
Grey-headed Flying-fox	In Mo et al. (2020), a broad range of factors were involved in flying-fox mortality or injury, the main ones being entanglements and electrocutions. Upon review of BioNet records (NSW DCCEEW, 2024a), there have been numerous Grey-headed Flying-fox individuals that have experienced electrocution (resulting in injury or mortality from existing transmission lines), particularly within proximity to the Tumut River Island and Wagga Wagga flying-fox camps (more urbanised areas). However, based on knowledge of species behaviour and body size, it is likely that these electrocutions were associated with low voltage transmission lines which generally support line spacing	The overall risk of collision, entanglement, and electrocution of Grey-headed Flying-fox individuals as a result of the amended project are considered low due to the proposed spacing and height of transmission lines. However, electrocution from powerlines is a well-documented risk for this species, and there are several established Grey-headed flying-fox camps in less than 10 km from the amended project footprint: • Wagga Wagga (9 km from the amended project footprint) • Tarcutta (5 km from the amended project footprint) • Yass (6 km from the amended project footprint) • Tumut River Island (6 km from the amended project footprint).	The risk of collision is considered low due to the proposed spacing of transmission lines.	This risk of collision is considered low and unlikely to pose any long-term impacts.	Minimum spacing of transmission lines to exceed potential wingspan of the species. HumeLink high voltage lines would be spaced more than 6 m apart, minimising the risk of electrocution. The proposed mitigation measures in these higher risk locations (Attachment 24, Table 7, and refer to Figure 13-2), include (Table 14-1, B10, B11): • Positioning and exact diverter model will also be considered during detailed design and will be developed as part of the Connectivity Strategy project design. • Fauna deterrent methods proposed are outlined in the Connectivity Strategy.

Threatened species at risk of collision/entanglement	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
	of around 600 mm. There is a risk of electrocution from short circuit associated with these lines where the species has potential to contact more than one line with their feet or wings. In contrast to this, the amended project would involve high voltage lines spaced more than 6 m apart thus minimising any risk of electrocution.				
Birds Raptors: • Square-tailed Kite • Little Eagle • White-bellied Sea Eagle Migratory birds: • White-throated Needletail • Fork-tailed Swift • Sharp-tailed Sandpiper • Red-necked Stint • Latham's Snipe • Common Greenshank • Marsh Sandpiper Forest Owls and Cockatoos: • Barking Owl • Masked Owl • Powerful Owl • Sooty Owl	It is well documented that transmission lines, especially close to wetlands, forests or over floodplains, are a significant cause of mortality of many bird species (Baker *et al.*, 1998; Clancy, 2010; Loss *et al.*, 2014). Many birds which are strongly tied to terrestrial habitats, like understorey strata or other strata below the top of canopy height (particularly in open, shrubby or mallee woodland habitats) will rarely fly to the height of transmission lines and when they do, it is to perch and there is no risk of transmission line strike, since flights are made at relatively slow speeds and transmission lines	The overall risk of bird collision may increase as a result of the amended project. This risk is likely to be higher in areas adjacent to intact vegetation, wetlands, and riverine habitats.	The risk of collision would likely reduce over time as animals acclimatise to the presence of the transmission line structures and transmission lines.	Collision, entanglement, and electrocution by transmission lines. The consequence of the impacts is likely to be more severe directly adjacent to wetlands, forests or over floodplains (without appropriate mitigation).	Conductor line-marking techniques would be implemented during design refinement to minimise bird strike. Use of fauna deterrent devices, most likely consisting of the "flapper" variety, would be implemented. Positioning and exact diverter model would be finalised during design refinement and would be developed as part of impact mitigation. At minimum these would be used within 1 km of wetland/riverine habitats to reduce impacts on aerial fauna species from collision and allow safer passage within these areas (Table 14-1, B11), Figure 13-2, and Attachment 24).

Threatened species at risk of collision/entanglement	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
• Gang-gang Cockatoo • Glossy Black-Cockatoo	represent part of the habitat within their known territories. Generally, it is those groups of birds which are likely to fly at heights where transmission lines are located, and are not familiar with local habitat attributes, which have the most potential to encounter transmission line infrastructure. Such birds include, raptors, owls, cockatoos, and waterbirds, many of which move in response to changing distributions of resources. While there is always likely to be a subset of resident birds of prey, many of those species which are at risk, particularly waterbirds (eg egrets, herons) are unlikely to occur in habitats associated with most of the amended project footprint, because within the inland areas in the vicinity of the amended project those habitats remain dry for long periods of time. Many species within the waterbird groups are unlikely to fly at elevations of transmission lines, unless making local movements. Furthermore, much of the habitats through which the				

Threatened species at risk of collision/entanglement	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
	amended project traverses are devoid of the shallow aquatic habitats that are most likely to attract such species.				

13.5.5 Impacts to water quality, waterbodies, and hydrological processes

The assessment of prescribed impacts associated with water quality, waterways, and hydrological processes as a result of the amended project is detailed in Table 13-21. Further detailed discussion on associated impacts on threatened species is presented in Table 13-22. The location of streams, waterbodies and other relevant hydrological features is shown in Figure 5-1.

Table 13-21: Assessment of Prescribed Impacts (water quality, waterbodies, and hydrological processes)

Prescribed biodiversity impacts	Nature (ie relevance to the amended project)	Extent	Duration	Consequences
(d) impacts of development on water bodies, water quality and hydrological processes that sustain threatened species and threatened ecological communities.	A total of 1,548 stream sections (i.e. including tributaries and separate sections of stream that are intersected at multiple locations) are located within the amended project footprint (of various types and condition). There are several major waterways that intersect the amended project footprint, such as: • Goobarragandra River • Gocup Creek • Tumut River • Murrumbidgee River • Adjungbilly Creek • Lachlan River. These waterways are considered important in their bioregions for several species.	The extent of impact related to this issue is expected to be minor. The work would mostly be limited to transmission line structure construction and transmission line installation, which would avoid direct impacts to waterways, especially major waterways, with appropriate water management measures to be implemented. No direct impacts are expected to occur to these aquatic values of reliant terrestrial threatened species. Indirect impacts would include trimming and clearing of riparian vegetation to facilitate access track construction and maintain transmission line easements. Direct impacts to primarily smaller waterways through the construction and operation of indicative waterway crossings would occur, however these are unlikely to impact upon any threatened aquatic biota (Section 13.7)	The highest potential for these impacts is during construction. During operation these impacts are considered negligible on an ongoing basis. Waterway crossings have been assessed as being permanent, maintained, structures. However, some of these crossings may be removed where work is no longer required.	Localised and generally short-term impact. It is considered that the amended project would not result in substantial environmental impacts to aquatic systems within the amended project footprint (Section 13.7) and as such no offsets for FM Act listed biota or KFH would be required (Section 15.3). Further detailed discussion of impacts on threatened terrestrial biota is presented below, in Table 13-22. Implementation of the CEMP and the required construction and waterway crossing controls would mitigate potential impacts (see Chapter 14, Table 14-1, B26, B27, B30-B36). Co-locating required waterway crossings to existing crossings (where feasible) would further minimise impacts.

Table 13-22: Impacts on water quality, waterways, and hydrological processes

Aquatic dependent entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
Threatened microbats that use waterbodies as part of their foraging strategy or a primary source of food: • Southern Myotis (confirmed present) • Greater Broad-nosed Bat (confirmed present).	**Southern Myotis:** The selection of day roosts by microbats influences energetics, social interactions, and breeding success. Southern Myotis (*Myotis macropus*) relies on waterways for all stages of their lifecycle (such as breeding, roosting, and foraging). The species require waterways for foraging, and proximity and condition of suitable aquatic habitats are the primary force driving roost selection by this species (Campbell, 2009; Gonsalves & Law, 2017a). Given the species' affinity with waterways, the species can, directly and indirectly, be exposed to pollutants associated with run-off (heavy metals, inorganic compounds etc). Aquatic impacts are a key threat to the conservation of the species in some areas.	The extent of impact related to this issue is expected to be minor (no direct impacts likely with sediment and erosion controls to mitigate potential impacts to the aquatic environment (see Section 13.7).	Construction would mostly be limited to transmission line structure construction and transmission line installation, which would avoid direct impacts to waterways, especially major waterways, with appropriate water management measures to be implemented. No direct impacts are expected to occur to these aquatic values that would in turn impact reliant terrestrial threatened species.	The highest potential for these impacts is during construction. During operation these impacts are considered negligible on an ongoing basis.	Localised and generally short-term impact. The amended project is unlikely to result in significant environmental impacts to aquatic systems within the amended project footprint. Work within proximity of aquatic ecosystems would require stringent erosion and sediment controls to avoid increased run-off and pollutant loads (see Table 14-1, B26).

Aquatic dependent entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
	Greater Broad-nosed Bat: The species often uses creeklines for foraging (attracts insects), flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m.				
Amphibians which may be affected by erosion or sedimentation: • Stuttering Frog • Sloane's Froglet • Booroolong Frog • Yellow-spotted Tree Frog.	The candidate threatened frog species and amphibians spend most of their life cycle in water, and therefore may be susceptible to risks associated with reduced water quality. The installation of maintenance access tracks across waterways (formal or informal) have the potential to result in erosion or sedimentation, which may impact key habitats and breeding success of individuals. There is also an added indirect risk to downstream threatened frog habitats (increased sedimentation and erosion, and altered stream flows), during and post-construction.	Localised erosion or sedimentation impacts could occur at locations where indicative waterway crossings are proposed. A description and assessment of potential impacts to stream ecology as a result of waterway crossings is presented in Sections 10.2 and 13.7 respectively. The extent of impact related to this issue is expected to be minor (no direct impacts likely and sediment and erosion controls to mitigate potential indirect impacts will be implemented as detailed above). **Booroolong Frog:** Booroolong Frog habitat mapping provided by NSW DCCEEW has been reviewed against the indicative access track mapping to identify any areas of habitat at risk of direct or indirect impacts on the basis of proximity and location (upstream/downstream) to any potential waterway crossing works. Stream habitats identified as being potentially at risk include:	The work would mostly be limited to transmission line structure construction and transmission line installation, which would avoid direct impacts to waterways, especially major waterways, with appropriate water management measures to be implemented. Waterway crossings have been assessed as being permanent, maintained, structures. However, some of these waterway crossings may be removed where work is no longer required. Impacts associated with erosion or sedimentation are considered likely to be temporary pulse events. Nevertheless, these events have the potential to result in a loss of habitat in the short term. The indirect impacts associated with the construction of	Potential erosion and sedimentation events would be anticipated to be localised and temporary but have the potential to reduce stream habitats and breeding success of individuals. In stream works may also alter habitats or result in the increase of exotic weed encroachment within aquatic habitats.	Localised and generally short-term impact. The amended project is unlikely to result in significant environmental impacts to aquatic systems within the amended project footprint. Work within proximity of aquatic ecosystems would require stringent erosion and sediment controls to manage erosion and sedimentation risk to stream environments throughout the detailed design, construction, operation, and rehabilitation stages of the amended project. See aquatic impact assessment (Section 13.7) and mitigation measures (Table 14-1, B8, B30-B36) for details. Specific erosion and sediment control measures relevant to waterway crossings and work around waterways are specified in Table 14-1 (B26, B30-B36). Additional site-specific mitigation measures relevant to Booroolong Frog habitats (Figure 13-2) identified

Aquatic dependent entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
		• Tarlo River (and associated tributaries) will potentially be subject to indirect impacts from indicative transmission line structure benches adjacent to the creek lines and access track locations, which intersects with Sawpit Creek and other unnamed tributaries, approximately 120 m upstream of Tarlo River and mapped Booroolong Frog habitat. • Wollondilly River is potentially subject to indirect impacts from indicative transmission line structure bench and access track locations, which span either side of the Wollondilly River and mapped Booroolong Frog habitat. Clearing and construction work are proposed within 10 m of the eastern bank and 50 m of the western bank and have potential to also intersect an unnamed first order tributary approximately 150m upstream. • Adjungbilly Creek is potentially subject to direct and indirect impacts from an indicative transmission line structure bench location directly adjacent to mapped Booroolong Frog habitat along Adjungbilly Creek. A proposed access track also intersects unnamed first and second order tributaries, 60 m upstream of Adjungbilly Creek. • Brungle Creek is potentially subject to direct and indirect	waterway crossings, may impact downstream frog habitats during, and post-construction (altered flows, and potential ongoing erosional issues).		as potentially at risk include (Table 14-1, B8, B27): • Opportunities to avoid installing a waterway crossing should be considered during detailed design. • The crossing design should preference installing a single bridge structure spanning the waterway (no instream structures) to minimise the potential for hydrological change, erosion and sedimentation impacts of downstream environments. • Where possible, re-alignment of the access track to avoid disturbance within 50 m of the top of bank of the waterway including riparian vegetation and waterway banks. • A suitably qualified Ecologist should be engaged to complete a site inspection to guide micro-siting of the waterway crossing to avoid impacts to potential habitats or ecological features. • Develop site specific erosion and sedimentation control plans to ensure the potential for erosion and sedimentation impacts are minimized as far as practicable, including monitoring the success of erosion and sediment control measures. • A suitably qualified Ecologist should be engaged to

Aquatic dependent entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
		impacts from an indicative creek crossing location, as well an indicative transmission line structure bench and access track location, all of which are within mapped Booroolong Frog habitat. • Yaven Yaven Creek is potentially subject to direct impacts from a proposed construction compound location which intersects within mapped Booroolong Frog habitat. Also subject to indirect impacts from a potential transmission line structure bench location which intersects with an unnamed first order tributary, approximately 50 m upstream of Yaven Yaven Creek and mapped Booroolong Frog habitat. • Adelong Creek is potentially subject to indirect impacts from a proposed access track location, approximately 250 m upstream of Adelong Creek and mapped Booroolong Frog habitat.			undertake monitoring surveys for the species at the crossing site and in downstream receiving environments. A monitoring plan would be developed as part of the BMP in consultation with NSW DCCEEW. • Rehabilitate active erosion gullies (caused by construction works) to areas upstream of known breeding habitats. • Implement hygiene protocols during construction in line with Table 14-1, to avoid the spread of pathogens and exotic weeds.
TECs affected by altered hydrological regimes: • *Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion* • *White Box Yellow Box Blakely's Red Gum Woodland*	These communities are vulnerable to altered hydrological regimes which may impede quality or flow of subsurface water.	Location of infrastructure that may intersect with groundwater, sub-surface flows or surface water would be developed at the detailed design phase of the amended project. However, impacts to groundwater have been determined to be minimal during construction and negligible during operation of the amended project (Aurecon, 2023a, 2024). Micro-siting of infrastructure requiring sub-surface work would be undertaken	The work would mostly be limited to transmission line structures and line stringing, which would avoid direct impacts to waterways, especially major waterways, with appropriate water management measures to be implemented. No direct impacts are expected to occur to these aquatic values	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.	It is not considered that the amended project would result in significant environmental impacts to aquatic systems within the amended project footprint. Work within proximity of aquatic ecosystems would require stringent erosion and sediment controls to avoid increased run-off and pollutant loads. Subsurface work in or near TECs would be minimal. Controlled blasting would be limited to specific

Aquatic dependent entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
• *Tableland Basalt Forest* • *Montane Peatlands and Swamps* • *Alpine Sphagnum Bogs and Associated Fens.*		as part of finalisation of detailed design of the amended project, to minimise impacts where possible (i.e. selecting appropriate construction methodologies to minimise impacts/interaction to GDEs and supporting aquifers during activities such as transmission line structure piling). The extent of impact related to this issue is expected to be minor (minor direct impacts likely and sediment and erosion controls to mitigate potential indirect impacts).	of reliant terrestrial threatened species.		locations and may not occur if it is not determined to be the preferred construction method in an area. Where controlled blasting is required, a suitably qualified blasting specialist will conduct a detailed blasting assessment and trial blasts where necessary to delineate site-specific parameters and limits and ensure that impacts are highly localised. These findings will be used to inform site-specific Erosion and Sediment Control Plans (ESCPs) and Soil and Water Management Plans (SWMPs) (Table 14-1, B26). Through these mitigation measures, it is expected that impacts to groundwater quality and hydrology can be managed and minimised. (Aurecon 2023a, 2024). Micro-siting of infrastructure requiring sub surface and controlled blasting work, such as transmission line structures, within the amended project footprint would be undertaken as part of the detailed design stage of the amended project, to minimise prescribed impacts where possible (i.e. minimising impact to GDEs and supporting aquifers) (Table 14-1, B1). Given impacts on water quality, waterways, and hydrological processes are unlikely, no indirect

Aquatic dependent entities	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offsets
					offsets are required for associated TECs.

13.5.6 Impacts to non-native vegetation and human made structures for threatened species

It was determined in Chapter 8 that of the two types of features that may constitute prescribed impacts (human made structures or non-native vegetation) only non-native vegetation was identified as relevant to the amended project. The assessment of prescribed impacts to non-native vegetation and human made structures as a result of the amended project is detailed in Table 13-23. Further detailed discussion on associated impacts to potentially affected threatened species is presented in Table 13-24. Non-native vegetation mapped within the amended project footprint is shown in Figure 6-1.

Table 13-23: Assessment of prescribed Impacts (human made structures or non-native habitat)

Prescribed biodiversity impacts	Nature (ie. relevance to the amended project)	Extent	Duration	Consequences
(b) impacts of development on the habitat of threatened species or ecological communities associated with: (i) human made structures, or (ii) non-native vegetation.	**Human-made structures:** As detailed in Chapter 8 and Section 2.2 in Attachment 24, no impacts to human-made structures (i.e. culvert/ bridge demolition) are to occur as a result of the amended project. Therefore, impacts to human-made structure are not relevant to the amended project and have not been discussed further. **Non-native vegetation:** Some candidate threatened fauna recorded or assumed present are known to utilise non-native vegetation: Golden Sun Moth, Grey-headed Flying-fox, Southern Greater Glider, Southern Myotis, Yellow-spotted Tree Frog, Booroolong Frog, Sloane's Froglet, Key's Matchstick Grasshopper, Striped Legless Lizard and Pink-tailed Legless Lizard. Impacts to non-native vegetation on which they may depend is discussed in Table 13-24. Some areas of exotic-dominated vegetation would be impacted by the amended project. However,	Impacts would be negligible in most areas of non-native vegetation. The extent of impacts is variable – depending on the species (refer to Table 13-24, and Attachment 24, Section 2.2 and 2.5).	**Non-native vegetation:** Variable – depending on the species (see below)	Loss of potential low-quality/ marginal habitat for threatened species.

Prescribed biodiversity impacts	Nature (ie. relevance to the amended project)	Extent	Duration	Consequences
	this is of low ecological value and has not been identified as supporting threatened species.			

Table 13-24: Impacts of the amended project on threatened species that utilise non-native habitat

Candidate species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offset
Grey-headed Flying-fox	Resident populations of Grey-headed Flying-fox in human-modified landscapes (urban, peri-urban, and agricultural), have been documented utilising exotic vegetation, as an alternate food source throughout the year, as well as vegetation suitable for roosting (Parry-Jones & Augee, 2001; Timmiss *et al.*, 2020; Yabsley *et al.*, 2021). No known Grey-headed flying-fox camps occur within the amended project footprint. However, data received from NSW DCCEEW (dated 19/12/2022) indicate eight camps have been recorded within 37 km of the amended project footprint. Some areas of exotic-dominated vegetation impacted by the amended project may offer supplementary foraging resources for these populations.	Impacts would be negligible in most areas of exotic vegetation. Exotic vegetation to be removed is considered supplementary foraging habitat for the species and not considered important for the species survival.	The impacts to the exotic foraging habitats would be permanent, ranging from minor to moderate.	The species is highly adaptable and typically forages on a mosaic of urban food resources and natural foraging resources throughout its range. In peri-urban, and rural areas the species primarily forages on wet and dry sclerophyll forest, forested wetlands, and preferentially utilises high-quality foraging habitat (Yabsley *et al.*, 2021).	No known Grey-headed flying-fox camps occur within the amended project footprint, and any exotic vegetation would likely be supplementary foraging resources for the species. Given the impacts to non-native foraging resources for Grey-headed Flying-fox are considered relatively minor, no offsets or further mitigation measures are considered necessary.
Southern Greater Glider and Yellow-bellied Glider	A large portion of the Greenhills and Bago State Forest areas consists of commercial pine forests. These plantations occur adjacent to native montane and dry sclerophyll forests and may provide supplementary connectivity for species such as Southern Greater Glider and Yellow-bellied Glider (Kavanagh & Stanton, 1998; Lindenmayer *et al*., 2004; Taylor *et al*., 2007; FCNSW, 2013). Southern Greater Glider and Yellow-bellied Glider are known to these areas, and a review of BioNet records identified recent records of Southern Greater Glider on the eastern edge of the Greenhills State Forest (in 2023).	Impacts would be negligible. Exotic vegetation to be removed is considered supplementary dispersal/ connective habitats for glider species and not considered important for long-term survival (lacks den habitats and suitable foraging).	The impacts to the exotic dispersal habitats would be permanent, ranging from minor to moderate.	The consequence of the impacts to pine forests within the amended project footprint would be minor in nature, given both species are unlikely to rely on this habitat.	Development of a Connectivity Strategy (Table 14-1, B10) to mitigate impacts to gliding fauna species and use fauna sensitive design to facilitate fauna movement throughout the amended project footprint, and broader landscape (e.g., use of glider poles and other artificial connectivity structures in areas of high activity and where clearing is unavoidable) (refer to Figure 13-2 and Attachment 24).

Candidate species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offset
					In line with the mitigation measures (refer to Table 14 1, and Attachment 24; Section 2.3), fauna sensitive structures such as under transmission glider poles, vegetation steppingstones, or reduced clearing requirements would be recommended in several locations within the amended project footprint as outlined in the Glider Memo (Niche, 2023), where gliders have been observed. Recommended locations are also provided in Figure 13-2 and Attachment 24.
Golden Sun Moth and Key's Matchstick Grasshopper	**Golden Sun Moth:** Primary habitat is native grasslands (including derived grasslands) or grassy woodlands within the species geographical distribution. However, the species is also known to colonise exotic grasslands dominated by the exotic weed Chilean Needle Grass (*Nassella neesiana*) (DAWE, 2009). Chilean Needle Grass habitats haven't been identified in areas surveyed within the amended project footprint. However, there is potential for these low-quality habitats to occur within inaccessible lands. **Key's Matchstick Grasshopper:** Key's Matchstick Grasshopper is distributed in native grasslands, savannah woodland country and between this and the sclerophyllous forests (White, 1956), mainly in vegetation associations of kangaroo grass	Impacts would be negligible and localised in most areas of suitable exotic vegetation.	The impacts to the exotic vegetation foraging habitats would be permanent, ranging from minor to moderate.	The consequence of the impacts would be minor and non-significant to areas of known habitat where suitable avoidance measures can be adopted during finalisation of detailed design and as a part of micro-siting of infrastructure.	Avoidance measures would be prioritised during finalisation of detailed design including infrastructure micro-siting within Golden Sun Moth habitat including non-native vegetation (Table 14-1, B1, B9).

Candidate species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offset
	(*Themeda triandra*) that provides shelter and daisies (mostly Asteraceae) as source of food (White, 1956). However, the species is also known to colonise exotic grasslands.				
Pink-tailed Legless Lizard and Striped Legless Lizard	Occasionally, these reptile species been found in disturbed areas dominated by exotic species or subject to intensive land use practices (ie Category 1 lands). Approximately 40.85 ha of potential grassland habitat within the amended project footprint comprises non-native or degraded native grassland situated within Category 1 land. This included 5.45 ha of potential habitat for Pink-tailed Legless Lizard within the Inland Slopes and Murrumbateman IBRA subregions and 40.85 ha of potential habitat for Striped Legless Lizard within the Bondo, Crookwell, Inland Slopes and Murrumbateman IBRA subregions.	Where relevant, impacts are likely to be limited and localised.	The impacts to exotic grassland habitats would be permanent, ranging from minor to moderate.	The consequence of the impacts would be minor and non-significant to areas of known habitat where suitable avoidance measures can be adopted during finalisation of detailed design and as a part of micro-siting of infrastructure.	Avoidance measures would be prioritised during finalisation of detailed design phase and as a part of infrastructure micro-siting within known/potential habitat (Figure 13-2) (Table 14-1, B1). Where avoidance is not achievable, mitigation and adaptive management measures would be implemented to minimise impacts in accordance with the BMP (Table 14-1, B3).
Yellow-spotted Tree Frog, Booroolong Frog and Sloane's Froglet	Non-native vegetation habitats for Yellow-spotted Tree Frog include farm dams and creek lines (i.e. PCT 9997) within the Hawkesbury Nepean - South, Lachlan - East and Murrumbidgee - Mid East sub-catchment areas. Non-native vegetation habitat types for Sloane's Froglet includes farm dams and creek lines within the Hawkesbury Nepean - South, Lachlan - East and Murrumbidgee - Mid East sub-catchment areas. Non-native vegetation habitat types for Sloane's Froglet includes creek lines, and rivers (i.e. PCT 9997) within the Hawkesbury Nepean, and Murrumbidgee sub-catchment areas.	Where relevant, impacts are likely to be limited and localised.	The impacts to exotic riparian habitats, and waterways would be short-term, and minor (with appropriate mitigation of potential sedimentation and erosion).	Consequences will be localised and generally short-term. It is considered that the amended project would not result in substantial environmental impacts to aquatic systems within the amended project footprint (Section 13.7).	Avoidance measures would be prioritised during finalisation of detailed design phase and as a part of infrastructure micro-siting within Yellow-spotted Tree Frog, Booroolong Frog and Sloane's Froglet habitat including non-native vegetation (Figure 13-2) (Table 14 1, B1, B8).

Candidate species	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation/offset
Southern Myotis	Non-native vegetation habitats for Southern Myotis within the amended project footprint consist of small areas of exotic riparian vegetation (PCT 0) and waterways (PCT 9997)).	Where relevant, impacts are likely to be limited and localised.	The impacts to the exotic vegetation and foraging habitats would be permanent, however, minor.	The consequence of the impacts would be minor and non-significant to areas of known habitat where suitable avoidance measures can be adopted during finalisation of detailed design and as a part of micro-siting of infrastructure.	Avoidance measures would be prioritised during finalisation of e detailed design phase and as a part of infrastructure micro-siting within Southern Myotis habitat (Table 14-1, B1). Where avoidance is not achievable, mitigation and adaptive management measures would be implemented to minimise impacts in accordance with the BMP (Table 14-1, B3).

13.5.7 Vehicle strike impacts

The assessment of vehicle strike as a result of the amended project is detailed in Table 13-25. Further detailed discussion on associated impacts to threatened species in relation to vehicle strike is presented in Table 13-26.

Table 13-25: Assessment of Prescribed Impacts (vehicle strike)

Prescribed biodiversity impacts	Nature (ie relevance to the amended project)	Extent	Duration	Consequences
(f) the impact of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community	The amended project has the potential to impact on fauna through interactions with vehicles/machinery.	The extent of vehicular strike may occur throughout the amended project footprint where vehicles and machinery move through the landscape for construction and operation (maintenance).	The risk of vehicle strike risk is likely to be greatest during the construction phase of the amended project.	Injury/death.

Table 13-26: Impacts of the amended project associated with vehicle strike on threatened species

Candidate species potentially subject to vehicle strike	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation
The following candidate fauna species with vehicle strike listed as a Key Threatened Process to their conservation (under the BC Act), include: • Koala • Eastern Pygmy-possum • Squirrel Glider • Superb Parrot • Powerful Owl • Masked Owl. As per the species expert advice (Attachment 22), the	Collision with passenger vehicles and construction machinery	Throughout the amended project footprint where vehicles and machinery move through the landscape for construction and operation (maintenance) (see access tracks as part of the amended project footprint and updated indicative disturbance areas). The risk of mortality or injury from vehicle strike is likely to be higher at certain times of the year for terrestrial/ arboreal mammals when their mobility and home range sizes increase, particularly during the breeding season.	The risk of vehicle strike is likely to be greatest during the construction phase of the amended project where the number of vehicles and machinery would be greatest.	Injury/death.	The BMP would include the requirement for: education of construction teams regarding the presence of native fauna and risks of collision, particularly early in the morning and late in the afternoon/at night; implementation of speed limits on sealed and unsealed tracks and roads; and awareness of biodiversity "hotspot" areas along the amended project footprint during construction (Table 14-1, B3). The BMP will also include procedures for

Candidate species potentially subject to vehicle strike	Nature (relevance to the amended project)	Extent	Duration	Consequences	Mitigation
following species are also at risk of vehicle strike: • Little Eagle • Sooty Owl.		The clearing of vegetation in some areas within the amended project footprint may increase the risk of harm/death to local fauna through increased exposure to vehicle strike as they attempt to move to nearby habitats. Some bird species feed on carrion or seeds along road corridors, or easements, which may result in them being struck by or trampled by vehicles/machinery.			managing injured wildlife (Table 14-1, B3).

13.6 Serious and irreversible impacts

The BC Act and the LLS Act imposes various obligations on decision-makers in relation to impacts on biodiversity values that are at risk of Serious and Irreversible Impacts (SAII). These obligations require a decision-maker to determine whether the residual impacts of a proposed development on biodiversity values (that is, the impacts that would remain after any proposed avoid or mitigate measures have been taken) are serious and irreversible.

The BC Act and the BC Regulation provide a framework to guide the approval authority in making this determination. The framework consists of a series of principles defined in Section 6.7 of the BC Regulation and supporting guidance, provided for under section 6.5 of the BC Act, to interpret these principles. Criteria to interpret the principles is included in Table 1 of *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE, 2019).

13.6.1 SAII assessment

Table 13-27 identifies candidate species regarded as SAII entities. There are four TECs, 15 flora and five fauna candidate species in the assessment that are listed as candidate SAII.

The potential for SAII was determined by a conservative assessment of the likelihood of occurrence in the amended project footprint, based on the results of the field survey and candidate species assessment (refer to Threatened flora: Section 7.1; Threatened fauna: Section 7.3); combined with the likely extent of direct, prescribed and indirect impacts (Sections 13.3, 13.4 and 13.5). For inaccessible land, where potential habitat features occur a conservative approach has been adopted and the SAII entity has been assumed present, however the likelihood of occurrence of the species (based on adjoining field survey results and nearby records) has informed likelihood of the amended project resulting in an SAII.

Provision of additional information for the candidate SAII entities detailed in Table 13-27 are contained in Attachment 17 to assist the determining authority with evaluating the extent and severity of amended project impacts to each SAII entity. Avoidance and mitigation measures relevant to each SAII entity are outlined in Attachment 17 and further detailed in Chapters 12 and 14 of this report.

The outcome of the SAII assessments are summarised in Table 13-27 (with detailed assessments included in Attachment 17) and have been informed by a number of factors, including availability of data (some species have been determined by NSW DCCEEW to be data deficient), extent of survey, area of assumed presence, likelihood of occurrence in the amended project footprint and likelihood of impacts from the amended project. Based on the precautionary principle, the SAII assessment outcomes have taken a conservative approach and have been divided into two categories as follows:

- Likely SAII - species/TECs that are:
  - known or considered highly likely to occur in the amended project footprint, and
  - where impacts from the amended project may result in a risk of extinction or reduced viability and it is unable to be determined at this stage of the project whether these impacts can be sufficiently avoided or minimised through detailed design/construction.
- Unlikely SAII - species/TECs that are:
  - considered unlikely to occur in the amended project footprint or
  - species known or considered likely to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability.

Where avoidance through micro-siting is not achievable, mitigation would be required to minimise SAII risk for likely SAII species (as detailed in Table 13-27). Mitigation measures are detailed in Chapter 14 and Table 14.1, and include supplementary surveys to reduce area of assumed presence (mitigation measure B5, Table 14-1), pre-clearance surveys (mitigation measure B20, Table 14-1), sedimentation and erosion control (mitigation measure B26, Table 14-1), establishment of biodiversity exclusion zones (mitigation measure B13, Table 14-1), vegetation clearing methods (mitigation measure B1, B3, Table 14-1), biosecurity and hygiene protocols to minimise risk of disease and weed spread (mitigation measure B22 and B23, Table 14-1) and compensatory measures where an SAII is unavoidable (mitigation measure B7, Table 14-1).

13.6.2 SAII recorded and assumed present in the amended project footprint

As noted above, there are a total of 24 candidate SAII entities that are relevant to the assessment (four TECs, 15 flora and five fauna) (see Table 13-27).

Seven of the SAII entities were recorded in the amended project footprint including four TECs and three flora species (Table 13-27):

- White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland
- Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions
- Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions
- Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion
- *Pimelea bracteata*
- *Prasophyllum bagoense*
- *Prasophyllum keltonii.*

A further 17 SAII entities were assumed present or have been historically recorded within or adjacent to the amended project footprint, as detailed in Table 13-27.

Table 13-27 details the candidate SAII relevant to the amended project, the likelihood that they occur in the amended project footprint, the potential impact of the amended project on those candidate SAII, a summary of the SAII assessment (also detailed in Attachment 17), the outcome of the SAII assessment (likelihood of SAII) and further avoidance/mitigation that should be considered to reduce the potential SAII risk. The outcomes of the SAII assessment are as follows:

- One TEC, one flora and one fauna (assumed present) considered likely to have a SAII as a result of the project
- Three TECs and 14 flora and four fauna considered unlikely to result in a SAII as a result of the project.

A range of mitigation opportunities will be taken to reduce impacts to SAII candidate species and their habitats, however the scale of impact avoidance and minimisation for many species cannot be determined at this stage of the project. Therefore, the SAII assessment outcome detailed in Table 13-27 is based on a conservative assessment/precautionary approach and does not take into account potential for avoidance/minimisation where this has not been confirmed at the time of the assessment.

Please note, Category 1 lands have been included in the assessment of SAII for species with habitats mapped as occurring in Category 1 lands, to ensure consideration of prescribed impacts in the assessment.

Table 13-27: Candidate SAII TECs and threatened species assessment summary

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
Threatened biodiversity SAII candidates where the amended project would result in a Likely SAII					
White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland	-	Known	Approximately 3,311.30 ha of *White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland* TEC (BC Act) occurs in the amended project footprint (Figure 6-1). The majority (82%) of this TEC in the amended project footprint is in a low to very low condition, 7% is in moderate condition and 11% is in high to very high condition. A total of 457.18 ha would be directly impacted by the amended project. Of the area that is likely to be directly impacted, 11% (52.57 ha) is in high to very high condition, and the majority is in low to very low condition.	This TEC is known to occur in the amended project footprint. Impacts to the TEC trigger two SAII principles: **Principle 1:** The amended project may cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline. **Principle 2:** The impact 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. However, where impacts were further limited to poorer condition remnants, the potential for a likely SAII would be reduced. This would be due to extensive areas of the community remaining post-construction and consolidation of impacts within poorer condition remnants.	The design and construction methodology for the amended project will identify additional avoidance and minimisation measures to further reduce impacts to entities which are likely to have a serious and irreversible impact to the greatest extent practicable, prioritizing intact and/ or higher condition remnants for avoidance and incorporating consideration of connectivity between retained remnants within and adjacent to the amended project footprint (mitigation measures B6, Table 14-1). Where avoidance through micro-siting is not achievable, mitigation would be required to minimise SAII risk, including pre-clearance surveys (mitigation measures B20, Table 14-1) sedimentation and erosion control (mitigation measure B26, Table 14-1), establishment of biodiversity exclusion zones (mitigation measures B13, Table 14-1), vegetation clearing methods (mitigation measures B1, B3, Table 14-1), biosecurity and hygiene protocols to minimise risk of disease and weed spread (mitigation measures B22, B23, Table 14-1) and compensatory measures (mitigation measure B7, Table 14-1) where an SAII is unavoidable.
Pimelea bracteata	-	Known	The amended project would impact 4.66 ha of high to very high condition habitat, 0.27 ha of which is known habitat.	The species is known in limited locations and assumed present in remaining suitable habitat within the amended project footprint. Impacts to the species trigger SAII **Principle 1:** The amended project may	Potential SAII risks could be further minimised through micro-siting (mitigation measure B1) or further survey to confirmed presence/absence of the species within areas of assumed presence. The design and construction methodology for the amended project must identify additional

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
				cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline (precautionary finding due to limited data available on rate of decline). .	avoidance and minimisation measures to further reduce impacts to entities which are likely to have a serious and irreversible impact to the greatest extent practicable, prioritizing intact and/ or higher condition habitats for avoidance and incorporating consideration of connectivity between retained remnants within and adjacent to the amended project footprint (mitigation measures B6, Table 14-1). Where avoidance through micro-siting is not achievable, mitigation would be required to minimise SAII risk, including pre-clearance surveys (mitigation measures B20, Table 14-1) sedimentation and erosion control (mitigation measure B26, Table 14-1), establishment of biodiversity exclusion zones (mitigation measures B13, Table 14-1), vegetation clearing methods (mitigation measures B1, B3, Table 14-1), biosecurity and hygiene protocols to minimise risk of disease and weed spread (mitigation measures B22, B23, Table 14-1) and compensatory measures (mitigation measure B7, Table 14-1) where an SAII is unavoidable.
Tyto tenebricosa	Sooty Owl	High	Sooty Owl was not recorded in the amended project footprint, however the species has been assumed present over a portion of the amended project footprint due to survey limitations outlined in Section 4.9. Potential breeding habitat for the species would be impacted by the amended project. No individuals or nesting habitat (caves or hollow bearing trees) were identified within the amended project footprint	The species is assumed present, however is considered highly likely to occur. Impacts to the species trigger **Principle 4:** 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.	Supplementary surveys would assist in reducing the area of assumed presence. Where active roosts are recorded within the indicative disturbance area, it is likely that these could be avoided through design measures such as increased transmission line structure heights and micro-siting, which would reduce the risk of SAII. The design and construction methodology for the amended project must identify additional avoidance and minimisation measures to further reduce impacts to entities which are likely to have a

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			during targeted survey efforts. There are nine nearby records (10 estimated individuals) on BioNet (NSW DCCEEW, 2024a). All records are outside the amended project footprint, with the closest record 650 m from the amended project footprint. Records are focused around the southern extent of the amended project footprint. It is known to occur in Bondo, Bungonia and Snowy IBRA subregions. Associated PCTs and habitat occurs within the amended project footprint. This species may utilise habitats within the amended project footprint for foraging. The amended project would impact on 63.08 ha of potential habitat for Sooty Owl. About 11.94 ha (19%) of impacted habitats are situated within the HTZ.		SAII risk to the greatest extent practicable, prioritizing intact and/ or higher condition habitats for avoidance and incorporating consideration of connectivity between retained remnants within and adjacent to the amended project footprint (mitigation measures B6, Table 14-1). Where avoidance through micro-siting is not achievable, mitigation would be required to minimise SAII risk, including pre-clearance surveys (mitigation measures B20, Table 14-1) sedimentation and erosion control (mitigation measure B26, Table 14-1), establishment of biodiversity exclusion zones (mitigation measures B13, Table 14-1), vegetation clearing methods (mitigation measures B1, B3, Table 14-1), biosecurity and hygiene protocols to minimise risk of disease and weed spread (mitigation measures B22, B23, Table 14-1) and compensatory measures (mitigation measure B7, Table 14-1) where an SAII is unavoidable.
Threatened biodiversity SAII candidates where the amended project would result in an Unlikely SAII					
Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	-	Known	Approximately 53.62 ha of Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions TEC occurs in the amended project footprint (Figure 6-1). Approximately 71% of this TEC in the amended project footprint is in low to very low condition, 24% is in moderate condition and 5% is in a high to very high condition. Of that, a total of 6.62 ha is likely to be directly impacted by the amended project, 77% (5.08 ha) of which is in low to very low condition.	Given the limited extent of impacts and the fact that the vast majority (77%) of impacted areas are in low to very low condition, it is considered unlikely that the amended project would be considered as contributing significantly towards the risk of extinction to the community. The TEC is known to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability.	Where avoidance through micro-siting is not achievable, mitigation would be required to minimise SAII risk, including pre-clearance surveys (mitigation measures B20, Table 14-1) sedimentation and erosion control (mitigation measure B26, Table 14-1), establishment of biodiversity exclusion zones (mitigation measures B13, Table 14-1), vegetation clearing methods (mitigation measures B1, B3, Table 14-1) and biosecurity and hygiene protocols to minimise risk of disease and weed spread (mitigation measures B22, B23, Table 14-1).

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	**Common name**				
				Additional avoidance of better condition areas would reduce the likelihood of an SAII even further.	
Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South-Western Slopes and South-Eastern Highlands Bioregions	-	Known	Approximately 34.36 ha of Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South Western Slopes and South Eastern Highlands Bioregions TEC occurs in the amended project footprint (Figure 6-1). The majority (45%) of this TEC in the amended project footprint is in a very low or low condition, 19% is in a moderate condition and 36% is in high condition. The amended project would result in direct impacts to a total of 3.38 ha of Coolac-Tumut Serpentinite Shrubby Woodland in the NSW South Western Slopes and South Eastern Highlands Bioregions, 61% (2.06 ha) of which is in low to very low condition.	Given the limited and sporadic extent of impacts it is considered unlikely that the amended project would be considered as contributing significantly towards the risk of extinction to the community. The TEC is known to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability. Any reductions to the extent of occurrence or area of occupation of this community (the relevant SAII principle for assessment) as a result of the amended project are considered to be minor.	
Monaro Tableland Cool Temperate Grassy Woodland in the South-Eastern Highlands Bioregion	-	Known	Approximately 23.35 ha of *Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion* TEC occurs in the amended project footprint (Figure 6-1). The majority (54%) of this TEC in the amended project footprint is in low or very low condition, 14% is in moderate condition and 32% is in high condition. A total of 1.92 ha is likely to be directly impacted by the amended project.	Given the limited extent of impacts and the retention of some values in areas to be cleared (no areas expected to be totally cleared) it is considered unlikely that the amended project would be considered as contributing significantly towards the risk of extinction to the community. The TEC is known to occur but the extent, nature or likelihood of impacts as a result of the amended project are not considered likely to pose a risk of extinction or reduced viability.	

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
				Additional avoidance of better condition areas would reduce the likelihood of an SAII even further.	
Bossiaea fragrans	-	Low	*Bossiaea fragrans* was not recorded in the amended project footprint, however the species has been assumed present over a portion of the amended project footprint due to survey limitations outlined in Section 4.9. The species is only known from the Abercrombie Karst Conservation Reserve and within the adjacent Travelling Stock Reserve, south of Bathurst on the NSW central tablelands. It has a highly restricted distribution, with only a small number of discreet known sub-populations. There are no records within 20 km of the amended project (NSW DCCEEW, 2024a). Given this, the species is considered unlikely to occur within the amended project footprint. The total extent of potential habitat that would be directly impacted by the amended project is 6.23 ha.	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is considered unlikely to occur.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.
Caladenia concolor	Crimson Spider Orchid	Low	*Caladenia concolor* was not recorded in the amended project footprint, however the species has been assumed present over a portion of the amended project footprint due to survey limitations outlined in Section 4.9. There are 7 records near the amended project (43 individuals), and the closest is 4 km from	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			the amended project footprint (NSW DCCEEW, 2024a). The species has a low likelihood of occurrence. Known populations are limited to a property near Bethungra and within Burrinjuck Nature Reserve. Requires woodland with a high diversity of plant species. The amended project would result in the direct impact to 31.88 ha of potential habitat for Crimson Spider Orchid in the amended project footprint.		
Calotis glandulosa	Mauve Burr-daisy	Low	*Calotis glandulosa* was not recorded in the amended project footprint, however the species has been assumed present over a portion of the amended project footprint due to survey limitations outlined in Section 4.9. The species is known from three sites in the upper Shoalhaven catchment. Whilst it is a coloniser of disturbed lands it does not tolerate heavy grazing. There are no BioNet records within 20 km of the amended project footprint (NSW DCCEEW, 2024a). The species has a low likelihood of occurring within the amended project footprint. The total area of this species habitat to be directly impacted by the amended project is 4.52 ha of non-native habitats (prescribed impacts).	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur. Further the extent of impacts are limited and are restricted to non-native habitats.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	**Common name**				
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	Low	*Eucalyptus robertsonii* subsp. *hemisphaerica* was not recorded in the amended project footprint, however the species has been assumed present over a portion (4.53 ha) of the amended project footprint due to survey limitations outlined in Section 4.9. The species is known only from the central tablelands of NSW north of Orange to Burraga. The species has a low likelihood of occurring within the amended project footprint. The amended project would result in the direct impact to 0.77 ha of potential habitat for *Eucalyptus robertsonii* subsp. *hemisphaerica* in the Crookwell IBRA subregion.	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur. Further the extent of impacts are limited and restricted to areas of assumed presence.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.
Genoplesium superbum	Superb Midge Orchid	Low	Suitable habitat for *Genoplesium superbum* occurs within the amended project footprint within the Bungonia IBRA subregion. Targeted flora surveys within the amended project footprint did not locate the species. Where survey effort was not adequate, species presence has been assumed within suitable habitat (total of 42.20 ha of assumed presence habitat). The species is only known from two locations near Nerriga and Morton National Park in NSW. Nearest known location is approximately 71 km from the amended project footprint. The species has a low likelihood of occurring within the amended project footprint.	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			The total area of potential habitat to be directly impacted by the amended project is 9.42 ha.		
Grevillea iaspicula	Wee Jasper Grevillea	Low	Suitable habitat for Wee Jasper Grevillea occurs within the amended project footprint in the Murrumbateman IBRA subregion. There are 24 nearby records of this species (1080 estimated individuals), the closest record is 11 km outside the amended project footprint (NSW DCCEEW, 2024a). It is known to be present in the Bondo and Murrumbateman IBRA subregions. Targeted flora surveys within the amended project footprint did not locate the species. Where survey effort was not adequate, species presence has been assumed within potential habitat (total of 31.16 ha of assumed presence habitat). The species is only known to occur on the shores of Lake Burrinjuck. The species has a low likelihood of occurring within the amended project footprint. The amended project would result in the direct impact to 5.04 ha of potential habitat (assumed presence) for this species within the amended project footprint.	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is considered unlikely to occur.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.
Grevillea wilkinsonii	Tumut Grevillea	Low	Suitable habitat for *Grevillea wilkinsonii* occurs within the amended project footprint within PCTs 266, 278 and 301 in the Inland Slopes IBRA subregion. Targeted flora surveys within the	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			amended project footprint did not locate the species. Where survey effort was not adequate, species presence has been assumed within suitable habitat (151.50 ha of assumed presence habitat). There are 17 records near the amended project, and the closest is 14 km from the amended project footprint (NSW DCCEEW, 2024a). The species is only known from two locations in NSW: Goobarragandra River and overlapping two properties at Gundagai. The species has a low likelihood of occurring within the amended project footprint. The total area of potential habitat that would be directly impacted by the amended project is 21.00 ha (28.46 ha including Category 1 exempt land).	viability of a local population as the species is considered unlikely to occur.	
Pomaderris delicata	Delicate Pomaderris	Low	Potential habitat for *Pomaderris delicata* occurs within the amended project footprint within the Bungonia IBRA subregion. Targeted flora surveys within the amended project footprint did not locate the species. Where survey effort was not adequate, species presence has been assumed within potential habitat (total of 3.89 ha of assumed presence habitat). There are no records within 20 km of the amended project (NSW DCCEEW, 2024a). Known from only two sites: between Goulburn and Bungonia and south of Windellama. The species has a low	The amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population as the species is not considered likely to occur and direct impacts to potential habitat would be limited in extent.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			likelihood of occurring within the amended project footprint. The total area of this species habitat to be directly impacted by the amended project is 1.37 ha.		
Pomaderris pallida	Pale Pomaderris	Low	Potential habitat for *Pomaderris pallida* occurs within the amended project footprint within the Murrumbateman IBRA subregion. Targeted flora surveys within the amended project footprint did not locate the species. Where survey effort was not adequate, species presence has been assumed within potential habitat (total of 6.45 ha of assumed presence habitat). There are no records within 20 km of the amended project (NSW DCCEEW, 2024a). The species is considered to have a low likelihood of occurring within the amended project footprint. The total area of this species habitat to be directly impacted by the amended project is 1.16 ha.	The amended project is considered unlikely to lead to extinction of the species or lead to reduced viability of a local population given it is not considered likely to be present within the amended project footprint.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.
Prasophyllum bagoense	Bago Leek-orchid	Known	*Prasophyllum bagoense* was recorded in the amended project footprint (NSW DCCEEW recorded one individual of the species within the amended project footprint in the McPherson's Plain area on 12 December 2023, 0.28 ha of known habitat). The species has been assumed present over an additional 0.32 ha of the amended project footprint due to survey limitations outlined in Section 4.9. A population has been previously recorded	The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution. However, given the limited extent of potential impacts associated with the project (only 0.04 ha of known habitat and direct clearing of individuals would	Potential SAII risk could be further minimised micro-siting to incorporate buffers to transmission line structure locations to minimise indirect impacts to the species habitat, clearing methods minimising ground disturbance and sedimentation controls.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			130 m to the west of the amended project footprint in Bago State Forest. Known habitat for the species would be impacted by the amended project in the McPherson's Plain area. The amended project would impact on 0.04 ha of known habitat, which may equate with up to 0.01% of the species known range.	not occur), it is unlikely this would result in an SAII.	
Prasophyllum innubum	Brandy Marys Leek-orchid	High	About 5.12 ha of potential suitable habitat for Brandy Marys Leek-orchid occurs within the amended project footprint within the Snowy Mountains IBRA subregion. There are four nearby records of the Brandy Marys Leek-orchid (recorded by NSW DCCEEW in December 2023), with the historic records that are about 250 m outside the amended project footprint (NSW DCCEEW, 2024a). The species has also historically been recorded approximately 80 m west of the amended project footprint by Canberra Orchid Society. All records are located in proximity to the southern extent of the amended project footprint in PCT 1124 paddocks (NSW DCCEEW, 2024a). The impact would be limited to 0.02 ha of high condition habitat, which equates to approximately 0.005% of the species known range. Potential habitat cannot be entirely avoided, as ECZ clearing would be required within the mapped area of habitat.	The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution (SAII principle 3). However, given the limited extent of potential impacts associated with the project (only 0.02 ha of potential habitat), it is unlikely this would result in an SAII.	Potential SAII risk could be further minimised through additional survey to confirm species presence/ absence and inform suitable management measures, including biodiversity exclusions zones, sensitive clearing methods and sediment control measures, to address the risks of direct and indirect impacts during construction.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	**Common name**				
Prasophyllum keltonii	Kelton's Leek-orchid	Known	Suitable habitat for *Prasopyllum keltonii* occurs within the amended project footprint in the Snowy Mountains IBRA subregion. *Prasophyllum keltonii* was recorded in the amended project footprint. Two individuals recorded by NSW DCCEEW in the amended project footprint (but outside the indicative disturbance area) may be impacted by the amended project. A population has also been previously recorded adjacent to the amended project footprint. Direct impacts would largely be avoided (0.03 ha of the 30 m buffer to the two known individuals would be directly impacted).	The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution. However, given the limited extent of potential impacts associated with the project (only 0.03 ha of known habitat and direct clearing of individuals would not occur), it is unlikely this would result in an SAII.	Potential SAII risks could be further minimised through mitigation of indirect impacts during finalisation of detailed design (mitigation measures detailed in Table 14-1), including micro-siting to incorporate buffers to transmission line structure locations to minimise indirect impacts to the species habitat, clearing methods minimising ground disturbance and sedimentation controls.
Pterostylis oreophila	Blue-tongued Greenhood	High	*Pterostylis oreophila* was not recorded in the amended project footprint, however the species has been assumed present over a portion (2.24 ha) of the amended project footprint due to survey limitations outlined in Section 4.9. Potential habitat for the species would be impacted by the amended project. There are five nearby records of the Blue-tongued Greenhood, with the closest record 300 m from the amended project footprint boundary (NSW DCCEEW, 2024a). All BioNet records were located in the southern extent of the amended project footprint (NSW DCCEEW, 2024a).	Impacts to the species trigger two SAII principles: Principle 2: The impact 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. Principle 3: The project would result in an impact on the habitat of a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution and small population size. However, it is unlikely this would result in an SAII given the limited extent of potential impacts associated with the	Given that the species occupies the ground layer and prefers treeless habitats, there is potential for impact avoidance through sensitive design and the micro-siting of transmission line structures and access tracks. Avoidance measures would be fully explored during finalisation of detailed design, though potential habitat cannot be entirely avoided, as ECZ clearing would be required within the mapped area of habitat. Potential SAII risks could be further minimised through additional survey to confirm species presence/ absence and inform suitable management measures, including biodiversity exclusions zones, sensitive clearing methods to minimise ground disturbance and sediment control measures, to address the risks of direct and indirect impacts during construction.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	**Common name**				
			The amended project would impact 0.56 ha of high condition habitat.	amended project (only 0.56 ha of potential habitat). Given the species was not recorded and is only assumed present, and the limited information available on the total population of the species, it is not possible to determine the number of individuals (mature and immature) that would be impacted by the amended project. However, given the limited extent of proposed clearing and opportunity for sensitive design and micro-siting of transmission line structures and access tracks within preferred treeless habitats, it is unlikely that individuals would be directly impacted.	
Solanum armourense	-	Moderate	*Solanum armourense* was not recorded in the amended project footprint, however the species has been assumed present within 1.6 ha of potential habitat within the amended project footprint due to survey limitations outlined in Section 4.9. There are two nearby records of *Solanum armourense,* with the closest record 6.5 km from the amended project footprint boundary (NSW DCCEEW, 2024a). BioNet records were focused on the eastern extent of the amended project footprint (NSW DCCEEW, 2024a). It is known to occur within the Bungonia IBRA subregion. Potential habitat for the species would be impacted by the amended project.	Given the limited extent of impact on assumed presence habitat, the amended project is unlikely to be deemed a significant risk to the species becoming extinct or lead to reduced viability of a local population.	Potential SAII risks could be further minimised through micro-siting (mitigation measure B1, Table 14-1) or further survey (mitigation measure B5, Table 14-1) to confirmed presence/absence of the species within areas of assumed presence.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			The amended project would impact 0.35 ha of high condition habitat.		
Chalinolobus dwyeri	Large-eared Pied Bat	Moderate	According to BioNet, there are 15 nearby records (31 estimated individuals) of this species within 20 km of the subject land. All records are outside the amended project footprint and the closest record is 8 km from the amended project footprint (NSW DCCEEW, 2024a). Connectivity of escarpment, boulders, crevices and other rock habitat is good in the area. It is known to occur within the Bungonia and Inland Slopes IBRA subregions where the amended project is partially located. The species was not recorded within the amended project footprint during targeted survey efforts and no maternity caves were identified during targeted surveys, however not all lands were accessed during surveys. Approximately 10.57 ha of potential habitat occurs in the amended project footprint. The amended project would result in the removal of up to 2.42 ha of potential foraging habitat in the form of associated PCTs for this species. No breeding habitat for the species would be impacted.	Confinement of impacts away from potential breeding habitat and no observations of the species from targeted survey suggests an SAII outcome is unlikely.	Additional inspections for cave habitat or survey for the species would aid in confirming no impacts to habitat within 2 km of breeding habitat and confirm unlikely SAII. This additional survey would be undertaken as part of the supplementary biodiversity surveys where possible (see mitigation measure B5 in Table 14-1).
Litoria castanea	Yellow-spotted Tree Frog	Moderate	Yellow-spotted Tree Frog was not recorded in the amended project footprint. The species has a moderate likelihood of occurrence within the Murrumbateman IBRA subregion where suitable permanent streams occur and historic records are known. There are 2	A low likelihood of direct impacts to potential breeding habitat and the limited extent of impact on surrounding foraging habitats mean an SAII outcome is considered unlikely for this species, particularly given mitigation measures to avoid and	Avoidance/minimise measures to reduce impacts to threatened frog habitat are included in Chapter 14 (see Table 14-1, B8), such as avoidance of installation of waterway crossings and avoiding disturbance within 50 m of the top of bank of a waterway (where practicable).

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	**Common name**				
			nearby records of the Yellow-spotted Tree Frog (400 estimated individuals) (NSW DCCEEW, 2024a). All records are outside the amended project footprint, with the closest record 9 km from the amended project footprint. No habitats within Murrumbateman would be impacted. Species presence has been assumed within some IBRA subregions predicted by the BAM-C due to survey limitations outlined in Section 4.9. Approximately 1.17 ha of potential habitat would be impacted within Crookwell and the Snowy Mountains. The amended project would have direct impacts on 1.17 ha of potential habitat (1.33 ha including Category 1 exempt land) for Yellow-spotted Tree Frog typically constituting trees or other woody vegetation fringing farm dams or other waterbodies with limited habitat potential. No breeding habitat is expected to be directly impacted for the species. About 0.67 ha (57%) of the potential habitat (0.82 ha (62%) including Category 1 exempt land) to be directly impacted occurs within the TCZ and would be subject to permanent loss. The remaining habitat areas occur within the ECZ and HTZ and would be subject to partial clearing.	mitigate impacts to waterbodies (refer to Table 14-1).	If enacted, these avoidance/minimisation measures in mitigation measure B8 (Table 14-1) to reduce clearing within potential habitat would confirm the risk of SAII to this species to be unlikely.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
Mixophyes balbus	Stuttering Frog	Low	Suitable habitat for Stuttering Frog occurs within the amended project footprint within PCTs 1107 and 1150 in the Bungonia IBRA subregion. The species was not recorded in the amended project footprint during targeted surveys and is assumed present. There are no nearby records of the Stuttering Frog (NSW DCCEEW, 2024a). The closest records are near Ruby Creek in the Blue Mountains (about 40 km north of the amended project footprint). Approximately 58.85 ha of potential habitat occurs in the amended project footprint. About 13.87 ha of potential habitat would be directly impacted as a result of the amended project.	Based on a low likelihood of the species occurrence and low likelihood of direct impacts to breeding habitat and considering appropriate mitigation measures with regard to stream protection (refer to Table 14.1), it is considered that the impacts from the amended project are unlikely to result in a SAII.	Reduced area of assumed presence through targeted survey (mitigation measures B4, B5, Table 14-1) would confirm unlikely SAII.
Pseudomys fumeus	Smoky Mouse	Moderate	Smoky Mouse was not recorded in the amended project footprint; however, the species has been assumed present in 13.17 ha of potential habitat within the amended project footprint due to survey limitations outlined in Section 4.9. The total area of this species habitat that would be impacted by the amended project is 5.78 ha in the Bondo IBRA subregion. The amended project would impact on 5.78 ha of high condition potential habitat, 1.10 ha (19%) of this habitat would be subject to some selective thinning of large trees only (i.e. HTZ). Given this, microhabitat features	It is considered that the impacts from the amended project are unlikely to result in a SAII, given the limited impacts to low condition habitat.	Additional survey (see mitigation measures B4, B5 in Table 14-1) and/or expert advice is likely to assist in confirmation of the species presence/ absence within the amended project footprint and therefore the considered level of unlikely risk for an SAII to occur.

Candidate SAII TEC/threatened species		Likelihood of occurrence	Potential impacts	SAII Assessment summary	Mitigation measures to reduce SAII likelihood
Scientific name	Common name				
			are expected to be retained within these areas. Impacts to 5.78 ha of habitat potentially equates to 0.02% of the species known range.		

13.7 Aquatic impacts

The typical design of the transmission line includes a transmission line structure on either side of each major river crossing and avoiding minor waterways. Conductors would then be pulled and strung in line, structure to structure, avoiding contact with waterways. No permanent stream crossing structures would be required for the transmission line structures on either side of major river crossings and waterways. Temporary construction works are likely to be required at the transmission line structure on each side of the crossing, however these would be at least 40 metres from the waterway bank (subject to detailed design). Appropriate environmental controls would be implemented to mitigate any indirect impacts (sediment and erosion) during construction of the transmission line structures. No underground work for laying cables across waterways (under boring/trenching) is proposed.

The construction of waterway crossings to support construction and maintenance for the amended project has been identified as the primary pathway of potential impacts to aquatic habitats as this could result in direct disturbance to aquatic ecosystems. Potential impacts to aquatic systems that may occur as a result of the amended project include:

- installation of waterway crossings directly impacting aquatic habitat and resulting in alterations to habitat and stream flow conditions
- removal of riparian vegetation, aquatic vegetation and coarse woody debris to facilitate access track and waterway crossing construction
- disturbance to, or excavation of waterway banks
- impacts to water quality resulting from construction activities (ie excess runoff, sedimentation, bank erosion, spill incidents from the operation of plant and equipment).

Waterway crossings have been assessed as being permanent, maintained, structures. However, some of these crossings may be removed where work is no longer required. This would be determined as the design is finalised.

Direct and indirect impacts associated with the construction of waterway crossings to support the amended project are addressed in the following sections.

13.7.1 Direct aquatic impacts

The potential for direct impacts to waterways associated with the amended project is primarily from waterway crossing construction to support the amended project. Access track construction is required to accommodate safe access of construction machinery and materials to each transmission line structure and substation site, which in places requires the construction of waterway crossings. Waterway crossings would only be established where waterways cannot be crossed under normal weather conditions and where alternatives are impractical. As noted in Section 10.2, numerous existing access tracks and informal waterway crossings occur within the amended project footprint.

The design and construction of waterway crossings would follow the process outlined in *Transmission Line Construction Manual – Major New Build* (Transgrid, 2020a). The design of the waterway crossings would preference bed-level fords and causeways. Culverts may be installed where all weather crossings are required, or the stream has a deep cross section that would otherwise require bank excavation. Construction would follow the typical methodology outlined below (Transgrid, 2020a):

- All loose material would be removed from the waterway at the point to be crossed, forming a depression with firm base and sides.

- The depression would then be filled with graded layers of rock. The rock layers would be placed so as to produce an interlocked bed of rock, sloped and dished, to allow water to drain freely through and flow over the causeway (minimum thickness of around 450 millimetres but not higher than the bed of the watercourse). In some circumstances the entire rock surface may be covered with reinforced concrete.
- If required as part of a water crossing, culverts may also be installed in accordance with required standards (such as AS/NZS 4058 Precast concrete pipes (pressure and non-pressure)). The diameter of the pipe would be sufficient to carry the normal flow of water and/or runoff water after heavy rain. All culverts would include the construction of head and/or tailwalls.

All waterway crossings would be designed and installed in accordance with the relevant guidelines for waterway crossings including:

- *Policy and guidelines for fish habitat conservation and management* (Fairfull, 2013)
- *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI, 2004)
- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge, 2003)
- *Guidelines for riparian corridors on waterfront land* (DPE Water, 2022a).

Consideration of the investigation procedures and design planning elements outlined in the *Best Practice Erosion and Sediment Contro*l guidelines (Attachment I – Instream work) (IECA, 2012), *Fish passage in streams: Fisheries guidelines for design of stream crossings* (Cotterell, 1998), and Chapter 5 of *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom, 2004) (the 'Blue Book') are also recommended. A range of mitigation measures for the design and construction of waterway crossings are detailed in Section 14.2.

Excavation and disturbance to vegetation would be minimised as far as practicable and any disturbed areas will be protected against erosion and reseeded (Transgrid, 2020a). Detailed recommendations to guide the design and siting of indicative waterway crossings to avoid sensitive aquatic habitat features (coarse woody debris, macrophyte beds, riparian vegetation), with recommended measures to mitigate any impacts to sensitive aquatic habitat features detailed in Chapter 14.

The construction of waterway crossings has the potential to impact fish passage at the indicative crossing locations. However, bed level fords and culverts are identified by Fairfull (2013) as the recommended and/or preferred waterway crossing methods for CLASS 2-4 streams, with causeways also included as one of the minimum crossing types for CLASS 4 streams. As such the proposed methods would be generally in accordance with that identified in Fairfull (2013) and Fairfull and Witheridge (2003), as detailed in Table 13-28.

A total of 115 indicative waterway crossings have been identified as located in streams that are assessed as CLASS 1 KFH (Table 13 29), 35 of these have been identified as indicative new or upgraded tracks. The minimum recommended crossing design for CLASS 1 streams is a bridge, arch structure or tunnel. CLASS 1 KFH streams require greater consideration and have been the focus of an additional set of mitigation measures (B33, Table 14 1).

It is also noted that consultation with NSW DPI Fisheries is generally required for the design and construction of any waterway crossing. In many cases, informal crossings already exist and the establishment of formal crossing structures would have some benefits such as reducing the potential for erosion and sedimentation on the bed and banks of streams. A suite of mitigation measures are detailed in Section 14.2 to minimise the potential for impacts to fish passage through detailed design and construction. Key among these are:

- Where crossings are required, any existing crossings should be re-used or upgraded in preference to establishing new crossings where practicable.
- Crossing structures should be designed so that the existing nominal flow velocity, low flow conditions and fish passage are maintained wherever possible.
  - Following Fairfull (2013), for waterway crossings incorporating culverts, a minimum of 300 mm of water should pool through the structure, with a centrally placed low-flow cell being preferable.
  - In line with Cotterell (1998), it is recommended that flow over or through instream crossing structures are designed such that they maintain water velocity of 0.3 m/s or less any instream structure, which is likely to facilitate passage for native species of fish (velocities exceeding 1 m/s, are likely to prevent upstream migration of native fish).
- Any temporary stream crossings should be removed and rehabilitated at the completion of their operational use.

Table 13-28 DPI CLASS classification and recommended crossing type (adapted from Fairfull, 2013)

CLASS	Description	Minimum recommended crossing type	Additional design information
CLASS 1	Major Key Fish Habitat – Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (eg river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.	Bridge, arch structure or tunnel.	Bridges are preferred to arch structures.
CLASS 2	Moderate Key Fish Habitat – Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present.	Bridge, arch structure, culvert or ford.	Bridges are preferred to arch structures, box culverts and fords (in that order).
CLASS 3	Minimal Key Fish Habitat – Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (e.g. fish, yabbies). Semi- permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other.	Culvert or ford.	Box culverts are preferred to fords and pipe culverts (in that order).
CLASS 4	Unlikely Key Fish Habitat – Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free standing water or pools post rain events (eg dry gullies or shallow floodplain depressions with no aquatic flora present).	Culvert, causeway or ford.	Culverts and fords are preferred to causeways (in that order).

An assessment of the aquatic ecological condition of indicative waterway crossings is presented in Section 10.2. The assessment found that majority of these streams are typically in poor condition as a result of land clearing, online dam construction, grazing and existing informal access tracks. All of which have resulted in deleterious processes such as bank erosion and channel incision and contribute to an overall picture of degraded aquatic habitats. This poor condition is also typically reflected in the larger streams within the amended project indicative disturbance area and frequently also those mapped as being KFH (DPI, 2023a) (Section 10.2).

CLASS 1 KFH include larger streams likely to support more sensitive aquatic habitats with more important function within the landscape, and potential habitat for threatened aquatic species. Any stream considered likely to support potential habitat for threatened aquatic species is considered a CLASS 1 KFH Stream. A total of 115 indicative waterway crossings have been identified as located in streams that are assessed as CLASS 1 KFH (Table 13-29) during the assessment (Section 10.2). Of these, existing crossings and tracks are at 80 sites (70%), whereas upgrades may be required at 15 sites (13%) and new tracks may be required to be constructed at 20 (17%) sites. Of the 20 new waterway crossings, the desktop assessment identified existing crossings in some form (eg informal farm trails) that are evident in aerial imagery at 10 of these locations. These findings are suggestive of the levels of modification already present and reflect the preference to re-use and upgrade existing tracks rather than constructing new tracks as a primary way of reducing the potential for impacts to aquatic environments. The findings detailed in Section 10.2 indicate that these KFH streams are also generally subject to degradation and are in a relatively poor condition. Where available, these streams that have received freshwater fish community grades are described as "Very Poor".

A total of 100 of these CLASS 1 KFH waterway crossings occur at sites assessed as potential habitat for threatened aquatic species. The majority of these (86%) are Riek's Crayfish, reflecting the more broadscale nature of predicted habitat mapping for this species and less defined habitat requirements. A total of 28 new or upgraded waterway crossings are in CLASS 1 KFH that have the potential to support threatened aquatic species (Table 13-29).

It is anticipated that any upgraded waterway crossings associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than any existing informal crossings and would not result in any additional deleterious processes. The establishment of new tracks would be necessary in a minority of cases. While this would result in impacts through vegetation clearing and direct modification to establish crossings, this would occur within the context of similar modifications through the locality and would be small scale and localized in the context of surrounding available habitat.

Any impacts that may occur are anticipated to be localised and temporary in nature (eg disturbance to instream habitats during the construction of waterway crossings for access tracks or trimming of riparian trees to facilitate transmission line installation).

The need for and location of waterway crossings would be confirmed during detailed design. It is recommended that, if crossings are required at these locations, crossing methods are reviewed during detailed design to establish the most suitable crossing method given the size of the streams, sensitivity of habitats and permanence of flow, this should include consultation with DPI Fisheries.

Pre-construction survey should be undertaken at indicative crossing locations for new tracks or upgraded tracks, identified as potentially supporting threatened aquatic species (Table 13-29) to resolve the presence or absence of the species or re-determine likelihood of occurrence, as relevant. This should be completed in consultation with DPI Fisheries which hold information on known populations, to refine the sites requiring survey. If the species presence is confirmed/known/considered likely to occur, construction timing should be planned to avoid instream works at the crossing location to avoid the breeding season and thereby avoid the potential for significant impacts to populations present. While waterway crossing upgrades may be required at access tracks identified as using 'Existing tracks/roads' these access trails include well-established unsealed local roads, forest roads and trails maintained by FCNSW or unsealed property access tracks, generally of suitable gradient for all construction vehicles. As such, they are unlikely to require major upgrades or more substantial works anticipated for new and upgraded tracks, and therefore present a lower degree of risk to aquatic habitats or threatened aquatic species.

CLASS 1 KFH streams require greater consideration and have been the focus of an additional set of mitigation measures (B33, Table 14-1), described below. The following additional mitigation measures have been recommended to minimise and manage potential impacts to these CLASS 1 KFH:

- The need for and location of waterway crossings at identified CLASS 1 locations should be confirmed during detailed design by the construction contractors.
- Crossing design should preference a single span bridge structure where practicable (or aligning with the recommended crossing types identified by NSW DPI Fisheries for CLASS 1 streams) to avoid instream impacts, particularly within threatened species potential distributions as identified in Table 13-29.
- Consultation should be undertaken with NSW DPI Fisheries (and Commonwealth DCCEEW for Riek's Crayfish, as required) as to the suitability of crossing designs for the CLASS 1 streams (Table 13-29) and the potential occurrence of threatened species to inform detailed design and survey, as relevant.
- Pre-construction survey should be completed at those CLASS 1 streams identified as supporting potential habitats for threatened aquatic species (Table 13-29) at the site of indicative new tracks or upgraded tracks to determine:
  - the presence/absence or likelihood of threated aquatic species occurring
  - completion of an updated 7-part test or SIA assessment, as relevant
  - any additional mitigation measures e.g. timing of works outside the breeding season where present
  - recommendations as to micro-siting and design in order to minimise potential impacts to threatened aquatic species.
- The outcomes of consultation and survey should be incorporated into the BMP (Table 14-1, B3).

In the event that any further or alternative waterway crossings are required in areas mapped as KFH, or indicative threatened species distribution mapping (DPI, 2023a) or predicted habitat for Riek's Crayfish (Commonwealth DCCEEW, 2023a), in additional to those already assessed in Section 10.3, an aquatic ecological assessment should be undertaken. This assessment should be in line with that undertaken in this assessment and should address any potential impacts to threatened aquatic species or KFH. This assessment may be desktop based if suitable levels of information are available. However, a field inspection is recommended if threatened aquatic species or sensitive aquatic habitat features are considered to have a moderate or higher likelihood of occurring, in order to guide micro siting and design/mitigation measures to minimise potential impacts to aquatic environments.

Table 13-29: Indicative crossing sites in CLASS 1 KFH streams

Site code	Stream name	Stream order	Potential habitat for threatened species (desktop assessment)	Fish community status	Indicative track construction description	Existing crossing/track present (desktop assessment)
V13.2-170	Derringullen Creek	5	-	Very Poor	New tracks	Yes
V13.2-178	Three Waterholes Cree	3	Southern Pygmy Perch	-	New tracks	Yes
V13.2-182	Felled Timber Creek	3	Southern Pygmy Perch	-	New tracks	No
V13.2-188	Merrill Creek	4	Southern Pygmy Perch	Very Poor	New tracks	Yes
V13.2-190	-	3	Southern Pygmy Perch	-	New tracks	Yes
V13.2-191	Humes Creek	4	Southern Pygmy Perch	Very Poor	New tracks	Yes
V13.2-197	Stockmans Creek	3	Riek's Crayfish	Very Poor	New tracks	No
V13.2-48	-	2	Riek's Crayfish	-	New tracks	No
V13.2-144	Brungle Creek	5	Murray Crayfish	Very Poor	New tracks	Yes
V13.2-5	Middle Creek	5	-	Very Poor	New tracks	Yes
V13.2-25	Kerrawary Creek	4	-	Very Poor	New tracks	No
V13.2-127	Tooles Creek	5	-	-	New tracks	Yes
V13.2-136	Gocup Creek	4	Murray Crayfish	Very Poor	New tracks	Yes
V13.2-164	Oak Creek	4	-	-	New tracks	Yes
V13.2-314	-	1	Riek's Crayfish	-	New tracks	No
V13.2-331	-	1	Riek's Crayfish	-	New tracks	No
V13.2-332	Stockmans Creek	3	Riek's Crayfish	-	New tracks	No
V13.2-333	Stockmans Creek	3	Riek's Crayfish	-	New tracks	No
V13.2-334	-	3	Riek's Crayfish	-	New tracks	No
V13.2-335	-	1	Riek's Crayfish	-	New tracks	No
V13.2-175	-	3	Southern Pygmy Perch	-	Upgraded tracks	Yes
V13.2-181	Catherines Creek	3	Southern Pygmy Perch	-	Upgraded tracks	Yes
V13.2-189	Merrill Creek	4	Southern Pygmy Perch	Very Poor	Upgraded tracks	Yes
V13.2-36	Long Creek	4	Riek's Crayfish	Very Poor	Upgraded tracks	Yes
V13.2-52	-	4	Riek's Crayfish	-	Upgraded tracks	Yes

Site code	Stream name	Stream order	Potential habitat for threatened species (desktop assessment)	Fish community status	Indicative track construction description	Existing crossing/track present (desktop assessment)
V13.2-54	Gilmore Creek	4	Riek's Crayfish	Very Poor	Upgraded tracks	Yes
V13.2-110	Tarcutta Creek	6	Flathead Galaxias, Murray Crayfish	Very Poor	Upgraded tracks	Yes
V13.2-111	-	1	-	-	Upgraded tracks	Yes
V13.2-128	Tooles Creek	6	-	Very Poor	Upgraded tracks	Yes
V13.2-301	-	1	Riek's Crayfish	-	Upgraded tracks	No
V13.2-302	-	1	Riek's Crayfish	-	Upgraded tracks	No
V13.2-359	-	1	Riek's Crayfish	-	Upgraded tracks	Yes
V13.2-360	-	1	Riek's Crayfish	-	Upgraded tracks	Yes
V13.2-362	Walker Creek	2	Riek's Crayfish	-	Upgraded tracks	Yes
V13.2-364	-	1	Riek's Crayfish	-	Upgraded tracks	Yes
V13.2-206	Merrill Creek	4	Southern Pygmy Perch	Very Poor	Existing tracks/roads	Yes
V13.2-31	-	3	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-32	Plain Creek	3	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-33	-	3	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-34	-	3	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-35	Long Creek	4	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-37	-	3	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-39	Long Creek	4	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-40	-	3	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-41	Honeysuckle Creek	4	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-43	Buddong Creek	5	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-47	Sheepyard Creek	4	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-50	Yellowin Creek	3	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-51	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-56	Snubba Creek	4	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-57	Gilmore Creek	5	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes

Site code	Stream name	Stream order	Potential habitat for threatened species (desktop assessment)	Fish community status	Indicative track construction description	Existing crossing/track present (desktop assessment)
V13.2-60	Snubba Creek	4	Riek's Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-204	Gocup Creek	4	Murray Crayfish	Very Poor	Existing tracks/roads	Yes
V13.2-130	O'Briens Creek	6	Flathead Galaxias	Very Poor	Existing tracks/roads	Yes
V13.2-63	Gilmore Creek	5	-	Very Poor	Existing tracks/roads	Yes
V13.2-66	Bago Creek	4	-	Very Poor	Existing tracks/roads	Yes
V13.2-86	Nacki Nacki Creek	4	-	Very Poor	Existing tracks/roads	Yes
V13.2-118	Keajura Creek	6	-	Very Poor	Existing tracks/roads	Yes
V13.2-134	-	4	-	-	Existing tracks/roads	Yes
V13.2-138	Killimicat Creek	5	-	Very Poor	Existing tracks/roads	Yes
V13.2-152	O'Briens Creek	4	-	Very Poor	Existing tracks/roads	Yes
V13.2-172	Derringullen Creek	5	-	Very Poor	Existing tracks/roads	Yes
V13.2-300	Yorkers Creek	2	Riek's Crayfish	-	Existing tracks/roads	No
V13.2-303	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-304	-	1	Riek's Crayfish	-	Existing tracks/roads	No
V13.2-305	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-306	-	1	Riek's Crayfish	-	Existing tracks/roads	No
V13.2-307	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-308	-	1	Riek's Crayfish	-	Existing tracks/roads	No
V13.2-309	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-310	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-311	-	1	Riek's Crayfish	-	Existing tracks/roads	No
V13.2-312	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-313	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-315	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-316	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-317	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes

Site code	Stream name	Stream order	Potential habitat for threatened species (desktop assessment)	Fish community status	Indicative track construction description	Existing crossing/track present (desktop assessment)
V13.2-318	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-319	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-320	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-321	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-322	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-323	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-324	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-325	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-326	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-327	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-328	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-329	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-330	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-336	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-337	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-338	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-339	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-340	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-341	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-342	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-343	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-344	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-345	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-346	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-347	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-348	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes

Site code	Stream name	Stream order	Potential habitat for threatened species (desktop assessment)	Fish community status	Indicative track construction description	Existing crossing/track present (desktop assessment)
V13.2-349	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-350	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-351	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-352	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-353	-	2	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-354	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-355	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-356	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-357	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-358	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-361	-	1	Riek's Crayfish	-	Existing tracks/roads	Yes
V13.2-363	Walker Creek	2	Riek's Crayfish	-	Existing tracks/roads	Yes

Note to table: sites highlighted bold indicate potential habitat for threatened aquatic species proposed as new tracks or upgraded tracks. The desktop assessment of existing crossings/tracks includes the presence of informal farm trails that may require the construction of new tracks according to the access track description of works.

13.7.2 Indirect aquatic impacts

The amended project has the potential to result in the following types of indirect impacts:

- erosion and sedimentation impacts (pulse events)
- removal/reduction in riparian vegetation (reduced habitat features e.g. large woody debris, organic matter, stream shading, bank stabilisation)
- introduced pests and diseases.

These potential indirect impacts are addressed in the following section, with riparian impacts discussed in Section 13.7.4.

The primary pathway of potential indirect impacts is the construction of new access tracks within riparian zones and waterway crossings. The potential for indirect impacts associated with general construction work (erosion and sedimentation) is also addressed within this section.

New access tracks that are established as part of the amended project would have a trafficable surface of generally between three and six metres wide (although this may increase subject to cut and fill requirements) and generally follow the natural contour of the land as far as practicable to minimise the amount of cut and fill and soil disturbance. Access tracks would also include drainage control features such as table drains or cross banks to minimise erosion.

Waterway crossings would be approximately 3.5 metres wide. Waterway crossing construction would be carried out so as to cause minimum disturbance to soil and vegetation both on and adjacent to the crossing. There are potential residual risks to aquatic habitats through the construction of access tracks and waterway crossings. These include:

- the clearing of native riparian vegetation to facilitate work and establish access tracks
- erosion and sedimentation associated with cleared areas, earthworks / stockpiles.

Most indirect impacts associated with the proposed construction would be localised erosion or sedimentation pulse events (abrupt changes in ecological parameters) that are temporary in nature. The works have the potential to impact upon downstream receiving aquatic environments; however, it is expected that mitigation measures to prevent the occurrence of erosion and sedimentation pulse events would reduce this risk to downstream receiving environments during construction and operation.

Erosion and sedimentation

Any sedimentation or erosion events would be considered to be temporary pulse events. Sedimentation or erosion events could occur as a result of access track construction, waterway crossings and maintenance work and as such are anticipated to be limited in scale and localised. Nevertheless, these events have the potential to results in a loss of habitat through eroded complex habitat features (e.g. bank collapse),or smothering in sediment (e.g. infilling of interstitial spaces in riffle habitats).

A number of recommended design, management and mitigation measures are outlined in Chapter 14 to mitigate potential risks as a result of erosion and sedimentation to aquatic habitats. The key measures proposed to avoid, manage and/or mitigate impacts to surface water, and groundwater and soils include (Table 14-1, B26):

- preparation of SWMPs as part of the CEMP to manage water quality impacts during construction of the amended project

- preparation of ESCPs and Water Quality Monitoring Program within the SWMPs, given erosion is identified as a key impact risk
- consideration of appropriately designed scour protection for stormwater.

Specific design, micro-siting and management measures relevant to the protection of aquatic environments associated with the waterway crossings and access tracks are detailed in Section 14.2 (Table 14-1). With the proposed management measures in place, any indirect impacts are expected to be minor to negligible.

Pest and diseases

There is a low potential for any instream plant or machinery used in crossing construction to transport the Epizootic Haematopoietic Necrosis Virus (EHNV) is known to occur within the Murrumbidgee catchment and is associated with the invasive Redfin Perch (*Perca fluviatilis*) (DPI, N.D.c). EHNV is known to infect introduced wild populations of Redfin Perch and farmed Rainbow Trout *Oncorhynchus mykiss* (stocked at a number of locations within the locality), although it may also infect a number of native fish species listed under the FM Act and EPBC Act known to be susceptible to the virus (DPI, N.D.c). It is recommended that this risk be managed through the use of wash down procedures for any plant used in-stream between crossing locations (Table 14-1, B22).

13.7.3 Ongoing aquatic impacts

Potential impacts to aquatic environments have been identified as primarily associated with construction of the amended project, as addressed in Sections 13.7.1 and 13.7.2.

No direct operational impacts to waterways are expected to occur as a result of the amended project.

Potential indirect impacts to aquatic environments during the operation would generally be limited to:

- changes to flow conditions or geomorphology from waterway crossings for permanent access tracks resulting in modified aquatic habitats
- disruption to fish passage from waterway crossings for permanent access tracks
- water quality impacts from sedimentation or accidental spills.

Permanent waterway crossings have the potential to alter flow conditions and bank stability, consequently affecting the geomorphology of waterways, aquatic habitats and/or interrupting fish passage. Notwithstanding, provided waterway crossings are constructed in accordance with mitigation measures included in Chapter 14, it is expected that any ongoing changes to waterway geomorphology during operation would be limited. Furthermore, the design and installation of waterway crossings would be in accordance with the relevant guidelines for waterway crossings (Section 13.7.1), and as such this is expected to minimise the risk of interrupting fish passage. The complete suite of mitigation measures in relation to managing risk to stream connectivity throughout the design refinement, construction and operational stages of the amended project are presented in Section 14.2 (Table 14 1).

Water quality impacts associated with sedimentation or accidental spills have the potential to impact aquatic environments. However, with the implementation of the mitigation measures listed in Chapter 14, water quality impacts from operational activities would be minimised and adequately addressed. Specific erosion and sediment control measures relevant to waterway crossings and work around waterways are specified in Table 14 1.

13.7.4 Threatened aquatic biota

A total of seven threatened aquatic species and one threatened aquatic ecological community listed under the FM Act and/or EPBC Act have been identified as potentially occurring within the amended project indicative disturbance area. 7--part tests under the FM Act (Attachment 26) and Commonwealth Assessments of Significance under the EPBC Act (Section 13.8, Attachment 3) have been completed for these species, concluding that they are unlikely to be significantly impacted by the amended project.

A summary of the assessments of significance completed under the FM Act are provided in Table 13-30. The outcomes of Commonwealth Assessments of Significance under the EPBC Act are described in Section 13.8.4.

Table 13-30: FM Act threatened aquatic biota summary of assessment of significance

Scientific name	Common name	FM Act	Habitats/distribution	Impact summary	Significant impact?
Aquatic Ecological Community in the Natural Drainage System of the Lower Murray River Catchment	Lowland Murray River EEC	EEC	The indicative disturbance area intersects with the extent of the lower Murray River aquatic ecological community.	Any indirect impacts that may occur are anticipated be relatively small scale, localised and temporary in nature eg disturbance to instream habitats during the construction of waterway crossings for access tracks or trimming of riparian trees to facilitate transmission line installation. It is anticipated that any constructed crossing upgrades (replacing any existing informal crossings) associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than existing informal crossings and would not result in any additional deleterious processes. While the amended project does include new waterway crossings, any modifications associated with these would be small scale and localised, occurring within the range of disturbances and landscape modifications currently in these localities. While waterway crossings for access tracks are proposed, mitigation measures to prevent as far as practical the creation of any barriers to fish passage have been recommended, with crossings designs aligning with relevant guidelines (Fairfull, 2013). Additional mitigation measures have been proposed to focus on the minimisation of potential impacts to CLASS 1 KFH streams that may support threatened aquatic species (B33, Table 14 1), including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 KFH.	No
Bidyanus bidyanus	Silver Perch	V	None of the waterways that have been mapped as within the species indicative distribution would be crossed by any indicative access tracks by waterway crossings. However, given the potential for disturbance and residual indirect impacts to potential habitats a 7-part test under the FM Act has been completed.		No
Euastacus armatus	Murray Crayfish	V	The species has the potential to occur within the amended project indicative disturbance area, with indicative distribution mapping for the species (DPI, 2023a) including several waterways within the amended project indicative disturbance area (Section 10.2.1).		No
Galaxias rostratus	Flatheaded Galaxias	CE	The species is considered overall unlikely to occur within the amended project indicative disturbance area. However, the species has been formally assessed a as part of a precautionary approach given the amended project indicative disturbance area intersects with indicative distribution mapping (DPI, 2023a).		No
Nannoperca australis	Southern Pygmy Perch	E	None of the known remaining known populations of Southern Pygmy Perch would be impacted by the amended project. It is		No

Scientific name	Common name	FM Act	Habitats/distribution	Impact summary	Significant impact?
			overall unlikely that the Southern Pygmy Perch would occur within the amended project indicative disturbance area based upon the known distribution and habitat requirements of the species. Despite this, a precautionary approach has been adopted and a 7-part test under the FM Act has been completed for the species.		
Maccullochella macquariensis	Trout Cod	E	While the potential distribution and suitable habitats for the species are limited within the amended project indicative disturbance area, the species cannot be ruled out as occurring and has been formally assessed.		No
Macquaria australasica	Macquarie Perch	E	Within the amended project indicative disturbance area, the species has the potential to occur within the Lachlan River and Adjungbilly Creek.		No

13.7.5 Worker accommodation facilities and construction compounds

Worker accommodation facilities and construction compounds to support the amended project are considered unlikely to result in significant impacts to KFH or threatened aquatic species based on a desktop assessment of respective habitats present within the updated indicative disturbance area. A summary of the findings include:

- The Yass accommodation facility and compound (AC05) is sited adjacent to the fifth order Bango Creek. While the updated indicative disturbance area of this facility does not intersect with Bango Creek directly, it does intersect with the KFH buffer of this Creek. Bango Creek is included in the habitat mapping for the Southern Pygmy Perch (Endangered: FM Act). It is noted that the updated indicative disturbance area has been entirely cleared, and is severely modified. As such, no direct impacts to aquatic habitats are anticipated. Indirect impacts such as erosion or sedimentation during establishment or use of the facility are possible given the proximity to the stream. There is also risk associated with chemical/fuel spills or runoff from impervious surfaces (e.g., concrete) concrete or material stockpiles that could negatively impact water quality conditions. It is anticipated that this risk would be managed through site construction methodologies and site water management plans (Table 14-1, B26).
- The updated indicative disturbance area for the Crookwell accommodation facility and compound (AC06) includes first and second order streams, with a small part of the KFH buffer associated with the downstream reach intersected by the updated indicative disturbance area. However, as this is a second order stream on a gaining stream network (as it is not habitat for a threatened species, it would not be considered KFH (Fairfull, 2013). This notwithstanding, wetted areas, and dams are present along parts of the mapped stream lengths within the updated indicative disturbance area. Although the landscape has been significantly modified by clearing activities and construction of online dams.

- First and second order streams occur within the Gadara Road compound (C19) updated indicative disturbance area, however the land has been severely cleared and modified, with a large online dam present. It is unlikely that these mapped waterways function as natural streams any longer, and are not mapped as KFH.
- Two first order streams occur within the Maragle 500 kV substation compound (C05) updated indicative disturbance area, however these are not KFH and do not occur within threatened aquatic species distribution mapping. Existing disturbances include the existing cleared easement and major road (Elliot Way) that occurs adjacent to the updated indicative disturbance area.
- The Ellerslie Road compound (C21) updated indicative disturbance area runs parallel to an unnamed third order stream and intersects with the KFH buffer associated with this stream. Riparian vegetation along this reach has been entirely cleared, with the whole updated indicative disturbance area significantly modified, although instream macrophytes may be present within the channel zone. Indirect impacts such as erosion or sedimentation during construction or operation of the facility are possible given the proximity to the stream. There is also risk associated with chemical/fuel spills or runoff from impervious surfaces (eg concrete) concrete or material stockpiles that could negatively impact water quality conditions. It is anticipated that this risk would be managed through site construction methodologies and SWMPs (Table 14-1, B26).
- Extensive clearing and modification have occurred within the Tarcutta accommodation facility and compound (AC03) updated indicative disturbance area. Five first order streams are mapped within the updated indicative disturbance area, however these are not mapped as KFH and do not occur within threatened aquatic species distribution mapping.
- Two first order streams occur within the Adjungbilly accommodation facility and compound (AC04) updated indicative disturbance area, however the land has been severely cleared and modified. A portion of one of these streams is mapped as KFH and is intersected by the updated indicative disturbance area. However, as this is a second order stream on a gaining stream network (and is not habitat for a threatened species), it would not be considered KFH (Fairfull, 2013).
- Key Fish Habitat (DPI, 2023a) is mapped within a portion of the Wagga 330 kV substation compound (C01). A review of aerial imagery does not identify any waterway or waterbody within this area of mapping, with the landscape having been developed into existing energy infrastructure. As this does not constitute KFH, no impacts to KFH would occur in this section of the updated indicative disturbance area.
- The updated indicative disturbance area for the Bannaby 500 kV substation includes a number of mapped first and second order streams. Inspection of aerial imagery however reveals that these have been replaced by dams and existing energy infrastructure. The updated indicative disturbance area is greater than 40 metres from other surrounding waterways, including an unnamed third order stream.

13.7.6 Riparian corridors and clearing of native riparian vegetation

The amended project requires work to be completed in riparian zones primarily to facilitate the construction and operation of waterway crossings where required. While the construction of the transmission lines and transmission line structures themselves would avoid direct impacts to waterways, clearing or trimming of riparian vegetation may also be required for the maintenance of transmission lines.

DPI Fisheries generally requires riparian buffer zones to be established and maintained for developments or activities in or adjacent to TYPE 1 or 2 KFH or CLASS 1-3 waterways, following Fairfull (2013). The riparian buffer distances recommended in Fairfull (2013) of between 50 to 100 metres for CLASS 1 – 3 streams would be commonly in excess of the existing riparian vegetation presence along streams within the amended project footprint. Riparian zones within the amended project footprint are frequently diminished in extent and degraded in condition, and occasionally absent. Although some areas of remnant riparian vegetation, woodland or native grasslands surrounding streams do persist in places within the amended project footprint (Figure 13-15).

Vegetated riparian zones (VRZs) have been identified (Figure 13-15) according to the buffer distances based upon stream order, as stipulated by DPE Water (2022a). Riparian corridor VRZ widths adopted for this assessment are those detailed in the *Guidelines for riparian corridors on waterfront land* (DPE Water, 2022a), as these are required to be addressed by the project SEARs. The VRZs specified in DPE Water (2022a) are also essentially equivalent to those outlined in Attachment E of the BAM (DPIE, 2020a) (Table 4 20) that also must be considered as part of the assessment. Therefore, these buffer distances are considered to be most appropriate to existing landscape condition and scope of the assessment (Section 4.8.4).

The total area of VRZs within the amended project footprint is 828.31 hectares. Three areas of assessment have been considered in addressing impacts to riparian vegetation within this:

- *Area A – Amended project footprint*. Refers to the total area of vegetation within the amended project footprint.
- *Area B - VRZs within amended project footprint.* Refers to the total area of vegetation within mapped VRZs (riparian buffers) that are also within the amended project footprint.
- *Area C - Updated indicative disturbance area*. Refers to the total area of vegetation within Area B, that is also within the updated indicative disturbance area (including TCZ, ECZ and HTZ).

The total extent of native vegetation within the mapped VRZs (Figure 13-15) is 516.83 hectares (Area B: Table 13-31). A total of 72.41 hectares of native vegetation is located within the updated indicative disturbance area and mapped VRZs (Area C: Table 13-31), equating to 14% of the native vegetation mapped within the VRZs. A total of 187.65 hectares of non-native vegetation also occurs within the VRZs (Area B: Table 13-31). Non-native vegetation comprises 42% of the total vegetation within the updated indicative disturbance area and mapped VRZs (Area C: Table 13-31).

Nine PCTs identified as being primarily formed by riparian vegetation occur within the amended project footprint, combining to a total area of 204.56 hectares (Area A: Table 13-31). The extent of riparian PCTs within the identified VRZs (Figure 13-15) within the amended project footprint are shown in Table 13-31 (Area B: Table 13-31), combining to total 58.65 hectares. The amended project would impact upon 16.42 hectares of riparian PCTs (Area C: Table 13-31).

Table 13-31: Total area (ha) of VRZs and riparian PCTs within the amended project footprint and updated indicative disturbance area

PCT	Area A: Amended project footprint (ha)	Area B: VRZs within amended project footprint (ha)	Area C: Updated indicative disturbance area (ha)
Summary			
Total area non-native vegetation	3062.36	187.65	51.42
Total area native vegetation PCT's	5786.28	516.83	72.41
Riparian PCT's			
5: River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.	8.79	4.80	1.83
278: Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion	89.63	18.15	1.91
299: Riparian Ribbon Gum - Robertson's Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	59.49	17.83	6.87
356: Blakely's Red Gum x Dirty Gum - White Cypress Pine tall riparian woodland, NSW South Western Slopes Bioregion	0.15	0.15	0.00
335: Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion	3.38	2.60	0.16
285: Broad-leaved Sally grass - sedge woodland on valley flats and swamps in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	29.62	7.53	4.88
939: Montane wet heath and bog of the eastern tablelands, South Eastern Highlands Bioregion	2.54	1.38	0.49
1107: River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes, Sydney Basin Bioregion and South East Corner Bioregion	2.94	2.45	0.03
1256; Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion	8.02	3.78	0.25
Total riparian PCT area	**204.56**	**58.65**	**16.42**

Desktop assessment identified that riparian zones across the updated indicative disturbance area, and in particular at the site of indicative access tracks, are commonly highly diminished both in extent and condition. The overall proportion of native vegetation disturbance within VRZs is low in comparison to that within the overall amended project footprint. In light of the above, it is concluded that the amended project is unlikely to result in significant impacts to vegetated riparian corridors within the updated indicative disturbance area. Details of the offset requirements necessary to address any residual biodiversity impacts associated with impacts to riparian PCTs as a result of the amended project are detailed in Chapter 15 (Table 15-1).

Avoidance and mitigation of impacts to vegetated riparian corridors

Transmission line structures would be located and constructed to minimise impacts to vegetated riparian corridors, as presented in Figure 13-15. Key avoidance and impact minimisation measures include (Table 14-1, B27, B17, B28):

- Transmission line structures would be located and constructed to minimise impact to riparian zones to the greatest extent practicable.
- The transmission line easement would target narrow crossing points of waterways and riparian areas clear of vegetation to the greatest extent practicable.
- The clearing or trimming of riparian vegetation would be avoided and minimised wherever practicable.
- Tree stumps would not be removed in Protected Riparian Land (PRL). Defined as land within 20 m of the bed or bank of a prescribed stream. Generally, named watercourses are classed as PRL; however, some unnamed watercourses may be classed as protected riparian land.

Additional design refinement and construction mitigation measures that would be considered to further minimise and mitigate potential impacts to riparian or aquatic environments are detailed in Table 14-1.

13.8 Impacts to Matters of National Environmental Significance

Chapter 11 outlines the MNES considered relevant to the amended project.

The assessment for MNES species was undertaken in four tiers –

1. Likelihood of Occurrence of the species occurring in the project footprint
2. Likelihood of Impact to the species by the amended project
3. Significant Impact Assessment
4. Assessed under the NSW Bilaterial Agreement to show how the NSW Offsets Scheme can address impacts or meets the EPBC Offsets Policy provision to offset under NSW BOS.

NSW DCCEEW conduct the review and assessment of MNES assessment information provided, including proposed avoidance, mitigation measures and, where required, offsets proposed. Information provided by the proponent must be sufficient for NSW DCCEEW to make their assessment. The proponent is required to recommend an outcome, but determination as to whether the impact is significant must be provided by NSW DCCEEW. NSW DCCEEW are also required to confirm that the NSW BOS will provide suitable avoidance, minimisation and offsetting to address the Commonwealth Offsets Policy. Due to survey limitations (including inaccessible land and seasonal constraints) a number of species remain in a 'potential significant impact' category as a precaution.

The following species/entities are likely to be significantly impacted by the project (full list of all entities detailed in the sections below):

- Box Gum Woodland
- Yass Daisy (*Ammobium craspedioides*)
- Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor*)
- *Pimelea bracteata*
- Swamp Everlasting (*Xerochrysum palustre*)
- Koala (*Phascolarctos cinereus*)
- Pink-tailed Legless Lizard (*Aprasia parapulchella*)

There are a number of species (listed below) that are not dual listed (under BC and EPBC Acts) that will require offsets under the EPBC Offsets Policy. This falls outside the bilateral agreement, however offsets under the NSW BOS are provisioned for these species in the EPBC Offsets Policy. For the species credit species which have been added to the BAM-C (added specifically for this purpose, though not under BC Act protection), a credit liability has been applied. For ecosystem credit species it has been concluded that avoidance and mitigation plus ecosystem credit species liability are sufficient to offset impacts to the species.

The following offset mechanisms are proposed for EPBC listed only species:

- Swamp Everlasting (*Xerochrysum palustre*) – species credits generated under the BOS
- Southern Whiteface – ecosystem credits generated under the BOS
- Pilotbird – ecosystem credits generated under the BOS
- Fork-tailed Swift – ecosystem credits generated under the BOS
- Sharp-tailed Sandpiper – ecosystem credits generated under the BOS
- Red-necked Stint – ecosystem credits generated under the BOS
- Latham's Snipe – ecosystem credits generated under the BOS
- Common Greenshank – ecosystem credits generated under the BOS
- Marsh Sandpiper – ecosystem credits generated under the BOS.

Concurrence will be sought with Commonwealth DCCEEW by NSW DCCEEW through their review process.

As described above, an assessment of impacts was completed for each MNES in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DoE, 2013a) and the Commonwealth requirements (Bilateral Assessment) outlined within the project SEARs (refer to Attachment 3). A summary of the assessment outcomes is provided below.

The outcomes of the Significant Impact Assessments (SIAs) are summarised in Table 13-32 and have been informed by a number of factors, including availability of data, extent of survey, area of assumed presence, likelihood of occurrence in the amended project footprint and likelihood of impacts from the amended project. Based on the precautionary principle, the SIA assessment outcomes have taken a conservative approach (this being largely for data-deficient species) and have been divided into four categories based on likelihood and severity of impact:

- likely significant impact - species/TECs known or considered highly likely to occur in the amended project footprint, where impacts from the amended project are likely to occur and cannot be sufficiently avoided or minimised through finalisation of detailed design.
- potential significant impact - species/TECs considered highly likely to occur, where impacts from the amended project are likely to occur, but are moderate in extent or could be sufficiently avoided/minimised through finalisation of detailed design and further survey
- potential significant impact (precautionary) - species/TECs considered moderately likely to occur, where impacts from the amended project are moderate in extent or could sufficiently avoided/minimised through finalisation of detailed design and further survey and assessed as potential significant as a precautionary approach
- significant impact unlikely - species/TECs where extent of impacts are limited as a result of the amended project, but have been assessed as a conservative measure.

Where a likely significant impact is predicted to occur, avoidance and mitigation measures to reduce impacts on MNES during the design, construction and operation phase are proposed (refer to Chapters 12 and 14).

For example, the SIA for Koala has shown that the impact is likely to be significant and the impacts are able to be offset under the NSW BOS. Field surveys undertaken for Koala did not detect the species. However, the species has been assumed present within potential habitats within the amended project footprint due to survey limitations. The majority of suitable habitat for Koala is within the southern section of the alignment amended project footprint in the Inland Slopes and Snowy IBRA regions. The transmission line in these locations has been located to parallel existing lines and disturbance areas and intersect State Forest pine plantation which does not provide contiguous koala habitat.

Mitigation measures to reduce impacts to Koala include:

- connectivity corridors and fauna sensitive design to facilitate fauna movement
- establishment of exclusion zones and management of construction impacts such light, noise and vibration to ensure disturbance of retained habitats is avoided and minimised
- pre-clearance surveys to ensure no individuals will be impacted by construction. Individuals will be encouraged to move on or be relocated in accordance with BMP Fauna Handling Procedures.

13.8.1 Impacts on threatened ecological communities listed under the EPBC Act

The amended project would impact two TECs listed under the EPBC Act White Box Yellow Box Blakely's Red Gum Woodland and Alpine Sphagnum Bogs and Associated Fens (refer to Table 13-32, Figure 13-16). The significance assessments and address of the Commonwealth requirements of the SEARs for TECs are provided in detail in Attachment 3.

For some of the TECs nominated as potentially significantly impacted, this conclusion is made due to the requirement to take a precautionary approach based on an element of uncertainly, especially where incomplete survey coverage occurs.

A summary of the outcomes of these assessments in provided in Table 13-32. Proposed avoidance and mitigation measures are outlined in Chapter 12 and 14 of the BDAR.

Table 13-32: EPBC Act threatened ecological community summary of significance of impact

Threatened ecological community	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland)	CE	CE	Yes - present	The direct impacts of the amended project on Box Gum Woodland includes the removal of approximately 117.15 ha of habitat. The national extent of Box Gum Woodland is approximately 416,326 ha and 250,729 ha occurs within NSW (DECCW, 2010a). The amended project would impact 0.03% of extant Box Gum Woodland on a national scale, and 0.05% of extant Box Gum Woodland in NSW. Box-Gum Woodland TEC within the amended project footprint has been extensively cleared and is severely fragmented. Many of these remaining patches occur on road reserves, the edges of house paddocks, or beside steep slopes on the edges of cleared land. Despite this, the proposed clearing work would result in further loss and fragmentation of TEC remnants within the amended project footprint.	Likely significant impact
Alpine Sphagnum Bogs and Associated Fens	E	E	Yes - present	This TEC was recorded within the Snowy Mountains IBRA subregion in association with PCTs 637 and 939. The potential direct impacts of the amended project footprint on Alpine Sphagnum Bogs and Associated Fens include removal of approximately 0.58 ha of habitat. The national extent of the TEC covers 8,000 ha (TSSC, 2009b). The amended project proposes to directly impact 0.007% of extant Alpine Sphagnum Bogs on a national scale. As relatively small areas of this TEC could be subject to clearing, impacts associated with habitat fragmentation are unlikely.	Significant impact unlikely

13.8.2 Impacts on threatened flora listed under the EPBC Act

The amended project would potentially impact on 14 threatened flora species listed under the EPBC Act (Table 13-33, Figure 13-16), constituting species deemed as having a moderate or higher potential to occur within the amended project footprint and potentially impacted by the amended project. The significance assessments and address of the Commonwealth requirements of the SEARs (Bilateral Assessment) for threatened flora likely to be significantly impacted are provided in Attachment 3. A summary of the outcomes of these assessments are provided in Table 13-33 and proposed avoidance and mitigation measures are outlined in Chapters 12 and 14 of the BDAR. For many species, conclusions of potentially significant impacts are driven by a precautionary approach given incomplete survey coverage and without being able to state with certainty that impacts could be avoided during finalisation of detailed design for the amended project. Once additional survey is completed and avoidance measures undertaken, the risk of a significant impact would be substantially reduced.

Calculations in the impacts to threatened flora listed as MNES may vary from Section 13.3 where direct impacts within Category 1 exempt lands are documented for relevant species, as these impacts are required to be addressed under the EPBC Act, but are excluded from assessment under the BC Act. More detail regarding clearing impacts within Category 1 exempt lands is presented in Attachment 24 for relevant species.

Table 13-33: EPBC Act threatened flora summary of significance of impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
Acacia bynoeana	Bynoe's Wattle	E	V	Yes – assumed present	No individuals of *Acacia bynoeana* have been recorded within the amended project footprint however there is approximately 3.90 ha of potential habitat for the species which would be cleared as a result of the amended project. The amended project is considered unlikely to lead to a long-term decrease in the species or a population of the species. This is on the consideration that direct impacts to the mapped indicative habitat of the species and any indirect impacts that may occur would be localised and threatened targeted flora surveys did not verify the species presence. Impacts to this species have been considered under a precautionary approach.	Potential significant impact (precautionary)
Ammobium craspedioides	Yass Daisy	V	V	Yes - present	Yass Daisy was recorded within and immediately adjacent to the amended project footprint: in PCT 731 and 1093 in the Crookwell IBRA-subregion, PCT 266, 280 and non-native vegetation in the Inland Slopes IBRA subregion, PCT 280, 1330 and non-native vegetation in the Murrumbateman IBRA subregion, PCT 679, 953 and 1196 in the Snowy Mountains IBRA subregion and in PCTs 295 and 299 in the Bondo IBRA subregion. Approximately 310.12 ha of potential habitat is located within the updated indicative disturbance area. No important populations for Yass Daisy have been defined. Despite this, the amended project has the potential to significantly impact Yass Daisy through the modification, destruction, removal and isolation of habitats within the amended project footprint.	Likely significant impact
Diuris aequalis	Buttercup Doubletail	E	E	Yes – assumed present	The Buttercup Doubletail is considered to have a moderate likelihood of occurrence in the Crookwell IBRA subregions based on the presence of suitable habitat and associated PCTs. The amended project would result in the clearing of approximately 42.43 ha of potential habitat in the updated indicative disturbance area. Approximately 278.13 ha of potential habitat for Buttercup Doubletail occurs in the amended project footprint. There are 44 previous records in the Crookwell IBRA subregion, 34 of these occur within 20 km of the amended project footprint and 20 of these occur within 5 km of the amended project footprint. There are also two previous records in the Bungonia IBRA subregion, however these records do not occur within 20 km of the amended project footprint.	Potential significant impact (precautionary)
Eucalyptus aggregata	Black Gum	V	V	Yes – assumed present	A small area of potential habitat for the species would be impacted: approximately 0.65 ha in the Crookwell and 0.12 ha in the Inland Slopes IBRA subregions. The species was not recorded during field surveys carried out within potential habitats. The total impact to Black Gum habitat is 0.77 ha.	Significant impact unlikely

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					The current 'Important Population' listed for the Black Gum is the Wingecarribee LGA subpopulation in NSW. The amended project would not impact this important population. Impacts to potential habitat are not considered to result in further species decline or reduce the area of occupancy where appropriate mitigation measures are implemented, including pre-clearing surveys to confirm species absence within potential habitats.	
Kunzea cambagei	Cambage Kunzea	V	V	Yes – assumed present	The species has not been verified as known in the amended project footprint but is considered likely to occur based on indicative mapping and habitat assessments. With reference to associated PCTs present in the amended project footprint, 39.68 ha of potential habitat is mapped within PCT 1150 in the Bungonia subregion, of which 7.58 ha would be cleared as a result of the amended project. The amended project is considered to have the potential to lead to a long-term decrease in the species or a population of the species. This is based on a precautionary approach as direct impacts to the mapped indicative habitat of the species are relatively large and general flora surveys occurred outside of the ideal time for its identification.	Potential significant impact (precautionary)
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	E	E	Yes - present	The species has been recorded in the amended project footprint. A total of 29,631 individuals were recorded in the Crookwell IBRA-subregion within PCTs 280, 679, 727, 731, 952, 1093, 1151, 1330 and non-native vegetation. A total of 113,920 individuals were recorded in the Murrumbateman IBRA subregion within PCT 280, 322, 349, 1093, 1330 and non-native vegetation. The species was recorded in grasslands, in areas with existing or past disturbance, or on the edges of existing easement. In total there is 1,272.59 ha of potential and known habitat for the Hoary Sunray, of which, 195.74 ha would be impacted by the amended project. Populations recorded within the amended project footprint were large and could be necessary for maintaining genetic diversity or dispersal across the region. As such, any individuals or population of this species recorded within the amended project footprint are considered to form part of an important population. Hoary Sunray and associated habitats would be subject to direct and indirect impacts as a result of the amended project. Given this, there is potential for the amended project to result in a significant impact to the species through a reduction in the area of occupancy and population size of any population. Habitats critical for survival would be adversely affected and subjected to increased fragmentation such that the species could decline further.	Likely significant impact
Pimelea bracteata	-	CE	CE	Yes - present	*Pimelea bracteata* is known within the amended project footprint in the Snowy Mountains with numerous individuals recorded along drainage lines, which the amended project intersects. It also has a high likelihood of occurrence within the amended project footprint in the Bondo IBRA subregion, in which three records of the species occur within 5 km of the amended project footprint and potential habitat occurs within. As targeted surveys were not conducted within all of the mapped potential habitat for the species, the presence of *Pimelea bracteata* within the amended project footprint in the Bondo IBRA subregion could not be ruled out. Under the	Likely significant impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					precautionary principle, the species is therefore assumed to have the potential to occur in all areas of potential habitat. A total of 4.66 ha of habitat within the amended project footprint (equating to 29.7% of habitat mapped within the amended project footprint) would be directly impacted due to the amended project with the potential to cause associated indirect impacts including edge effects and weed incursion.	
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	Yes – assumed present	The species has not been recorded in the amended project footprint but is considered likely to occur based on indicative mapping and habitat assessments. The area of potential habitat is located through the eastern portion of the amended project footprint, particularly in the vicinity of Tumut and Goulburn. Within the amended project footprint, potential habitat for this species comprises 37.17 ha of PCT 1150 in the Bungonia subregion, of which 8.08 ha is likely to be impacted by the amended project. The amended project is considered unlikely to lead to a long-term decrease in the species or a population of the species. This is based on the consideration that direct impacts to the mapped indicative habitat of the species and any indirect impacts that may occur would be localised and threatened targeted flora surveys did not verify the species presence. However, as targeted surveys were not completed in all potential habitat, a precautionary approach has been applied with the assumption that the amended project has the potential to cause a significant impact to this species through the removal of 8.08 ha of potential habitat.	Potential significant impact (precautionary)
Prasophyllum bagoense	Bago Leek-orchid	CE	CE	Yes – present	The Bago Leek-Orchid is known from a single population at McPhersons Plain, east of Tumbarumba in the Southern Tablelands of New South Wales (DSEWPC, 2012b). Preferred habitats are treeless plains and swamps. *Prasophyllum bagoense* was recorded within (1 individual recorded by NSW DCCEEW on 12 December 2023) and adjacent (130 m to the west) of the amended project footprint within PCTs 1196 and 1224. Whilst the amended project would not directly clear any recorded individuals, approximately 0.04 ha of potential habitat would be impacted. There is a high probability that undetected individuals occupy these habitats. The amended project has the potential to significantly impact the species through the clearing and fragmentation of suitable habitats. This may result in a reduction in the species' population size and area of occupancy. Habitats may be adversely affected by means of clearing, proposed earthworks and changed hydrology which may lead to further decline of the species. Given that the species occupies the ground layer and prefers treeless habitats, there is considerable potential for impact avoidance through sensitive design and the micro-siting of transmission line structures and access tracks. Avoidance measures would be fully explored during finalisation of detailed design.	Potential significant impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
Prasophyllum innubum	Brandy Marys Leek-orchid	CE	CE	Yes – assumed present	Brandy Mary's Leek-orchid occurs east of Tumbarumba in the Southern Tablelands in Bago State Forest, on Crown leases and on adjacent private land (DoE, 2014a). It has an extent of occurrence of 45 km^2 and an area of occupancy of 1.5 ha (0.015 km^2). Brandy Marys Leek-orchid was not recorded within the amended project footprint during targeted surveys, however has previously been recorded within 80 m of the amended project footprint. The species is predicted to occur within PCT 1224. Approximately 0.02 ha of potential habitat for the Brandy Marys Leek-orchid would be impacted. Where present, proposed clearing, earthworks and changes hydrology are likely to reduce the area of occupancy of the species and adversely affect habitat of the type critical to its survival. Given that the species occupies the ground layer and prefers treeless habitats, there is potential for impact avoidance and/or minimisation through sensitive design and the micro-siting of transmission line structures and access tracks. Avoidance and minimisation measures would be fully explored during finalisation of detailed design, though potential habitat cannot be entirely avoided, as ECZ clearing would be required within the mapped area of habitat. Clearing methods minimising ground disturbance would be used when working in the area supporting potential habitat for this species. Supplementary biodiversity surveys would be undertaken to reduce the area of assumed presence for this species and assist with targeted mitigation measures to minimise impacts in the event that the species is recorded, such as erosion and sedimentation controls, on-site delineation of clearing areas prior to disturbance, weed and biosecurity management (Table 14-1, B3, B5, B22, B26).	Potential significant impact
Prasophyllum keltonii	Kelton's Leek-orchid	CE	CE	Yes – assumed present	Several small populations of Kelton's Leek-orchid were observed on McPhersons Plains and Modder Creek Plain. These areas are treeless plains and swamps. *Prasophyllum keltonii* was recorded immediately adjacent to the amended project footprint within PCT 1196. Further NSW DCCEEW recorded this species within the amended project footprint (but outside the updated indicative disturbance area) in December 2023. Suitable habitats for the species extent into the amended project footprint and approximately 0.03 ha of this habitat would be impacted. Where present, proposed clearing, earthworks and hydrology changes are likely to reduce the area of occupancy of the species and adversely affect habitat critical to its survival. Given that the species occupies the ground layer and prefers treeless habitats, there is considerable potential for impact avoidance through sensitive design and the micro-siting of transmission line structures and access tracks. Avoidance measures would be continued to be fully explored during finalisation of detailed design.	Potential significant impact
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	Yes – assumed present	The Blue-tongued Greenhood was not recorded within the amended project footprint during targeted surveys. However, it has been predicted to occur within PCT 939 as a precautionary approach. Impacts to this species would	Potential significant impact (precautionary)

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					include clearing of potential habitat. A total of approximately 0.56 ha of potential habitat for the Blue-tongued Greenhood could be impacted by the amended project footprint. Where present, proposed clearing and earthworks are likely to reduce the area of occupancy of the species and adversely affect habitat of the type critical to its survival. Given the species occupies the ground layer and prefers treeless habitats, there is considerable potential for impact avoidance through sensitive design and the micro-siting of transmission line structures and access tracks. Avoidance measures would be continued to be fully explored during finalisation of detailed design. Further survey to reduce area of assumed presence for this species post consent would assist to minimise potential impacts and assist with targeted mitigation measures to minimise impacts in the event that the species is recorded, such as erosion and sedimentation controls, on-site delineation of clearing areas prior to disturbance, weed and biosecurity management.	
Thesium australe	Austral Toadflax	V	V	Yes – assumed present	The species has not recorded within the amended project footprint but is considered likely to occur within the Snowy Mountains IBRA subregion based on indicative mapping and habitat assessments. Approximately 1,013.72 ha of potential habitat is located within the amended project footprint. A total of 141.96 ha of this habitat would be subject to clearing. Proposed clearing and earthworks are likely to reduce the area of occupancy of the species and adversely affect habitat of the type critical to its survival. Avoidance measures would be continued to be fully explored during finalisation of detailed design.	Potential significant impact (precautionary)
Xerochrysum palustre	Swamp Everlasting	-	V	Yes – present	The Swamp Everlasting has a wide but scattered distribution, with a population estimate of about 10,000 plants. The species grows in specific habitat of wetlands including Sphagnum moss bogs at higher altitudes. Six individuals were recorded within the amended project footprint. Habitat comprised PCTs 637, 679, 939 and 1196 within the Snowy Mountains IBRA subregion. Approximately 0.68 ha of known and potential habitat would be directly impacted as a result of the amended project. The updated indicative disturbance area overlaps with known habitat for the species, leading to a likely significant impact conclusion. Construction contractors have been provided the biodiversity constraints layer and are refining the design to avoid and/or minimise impacts to this species.	Likely significant impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					No important populations for Swamp Everlasting have been defined. Despite this, the amended project has the potential to significantly impact Swamp Everlasting through the modification, destruction, removal and isolation of habitats within the amended project footprint.	

13.8.3 Impacts on threatened fauna listed under the EPBC Act

The amended project would potentially impact on 29 threatened fauna species listed under the EPBC Act (Table 13-34, Figure 13-17, Figure 13-18), constituting species deemed as having a moderate or higher potential to occur within the amended project footprint and be impacted. The significance assessments and a summary of how the Commonwealth requirements of the SEARs for threatened fauna have been addressed are provided in detail in Attachment 3. Indirect impacts to threatened fauna are assessed in Attachment 24 and presented in Attachment 3 where relevant to the MNES assessment. A summary of the outcomes of the significance assessments is provided in Table 13-34 and proposed avoidance and mitigation measures are outlined in Chapter 12 and 14 of the BDAR. For many species, conclusions of potentially significant impacts are driven by a precautionary approach given incomplete survey coverage and without being able to state with certainty that impacts could be avoided during detailed design for the amended project. Once additional surveys are completed and avoidance measures undertaken, the risk of a significant impact would be substantially reduced.

Calculations in the impacts to threatened fauna listed as MNES may vary from Section 13.3 for the following reasons (refer to Attachment 3):

- Direct impacts within Category 1 exempt lands are documented where relevant. More detail regarding clearing impacts within Category 1 exempt lands is presented in Attachment 24 for relevant species.
- Impacts to both breeding and foraging habitats for dual credit species are presented within this section for relevant dual credit species.

Table 13-34: EPBC Act threatened fauna summary of significance of impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
Frogs						
Crinia sloanei	Sloane's Froglet	V	E	Yes– assumed present	Sloane's Froglet has not been recorded in the amended project footprint but is considered likely to occur based on indicative mapping and habitat assessments. The area of potential habitat is located throughout the amended project footprint as various waterbodies. Potential habitat to be cleared includes 0.66 ha of PCTs associated with the Sloane's Froglet (PCT 5) (with an additional 2.13 ha of impacts on non-native habitats for Sloane's Froglet (prescribed impacts)). Therefore, the total impact to Sloane's Froglet habitat, including prescribed impacts, is 2.80 ha. The construction process for the transmission line structures would avoid direct impacts to major waterways and none of the waterways that have been mapped as within the species indicative distribution (Commonwealth DCCEEW, 2022d) are crossed by any indicative access tracks with indicative waterway crossings. As such, this assessment of significance focusses on the potential for residual indirect impacts to potential habitats following the implementation of avoidance and mitigation measures, to the species (i.e., the removal of native riparian vegetation, erosion, and sedimentation risk) during construction.	Significant impact unlikely
Litoria booroolongensis	Booroolong Frog	E	E	Yes– assumed present	Booroolong Frog has not been recorded in the amended project footprint but is considered likely to occur based on indicative mapping and habitat assessments. The area of potential habitat is located throughout the amended project footprint at various waterbodies. Potential habitat to be cleared includes 0.05 ha within the Inland Slopes IBRA subregion (PCT 280) and 0.01 ha within the Crookwell IBRA subregion (PCT 1330). An additional 0.25 ha of impacts on non-native habitats would also occur (prescribed impacts). The construction process for the transmission line structures would avoid direct impacts to major waterways and none of the waterways that have been mapped as within the species indicative distribution (Commonwealth DCCEEW, 2022e) are crossed by any indicative access tracks with indicative waterway crossings.	Significant impact unlikely
Litoria castanea	Yellow-spotted Tree Frog	CE	CE	Yes– assumed present	Yellow-spotted Tree Frog has not been recorded in the amended project footprint but is considered likely to occur based on indicative mapping and habitat assessments. The area of potential habitat is located throughout the amended project footprint as various waterbodies. Potential habitat to be cleared includes 1.17 ha (1.33 ha including prescribed impacts) of PCTs associated with the Yellow-spotted Tree Frog. The construction process for the transmission line structures would avoid direct impacts to major waterways and none of the waterways that have been mapped as within the species indicative distribution (Commonwealth DCCEEW, 2022f) are crossed by any indicative access tracks with indicative waterway crossings.	Significant impact unlikely

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
Birds						
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes – assumed present	Within the amended project footprint, the Regent Honeyeater has a moderate likelihood of occurrence as a nomadic forager in all IBRA subregions impacted by the amended project due to the presence of suitable myrtaceous and lerp foraging resources. The amended project footprint would result in the loss of approximately 188.31 ha (14%) of potential foraging habitat for the species, which is widespread across the species range. No breeding habitat or important mapped habitat would be impacted by the amended project.	Potential significant impact (precautionary)
Aphelocephala leucopsis	Southern Whiteface	V	V	Yes – assumed present	Within the amended project footprint, the Southern Whiteface has a moderate likelihood of occurrence in Snowy Mountains and Bungonia and a high likelihood of occurrence in Crookwell, Murrumbateman and Inland Slopes IBRA regions. The amended project footprint would result in the loss of 292.98 ha (19%) of potential foraging and breeding habitat, including habitat critical to the survival of the species.	Potential significant impact (precautionary)
Calidris acuminata	Sharp-tailed Sandpiper	-	V, M	Yes – assumed present	The Sharp-tailed Sandpiper has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Inland Slopes. The amended project has the potential to impact 2.32 ha of riparian foraging habitat within the Inland Slopes portion of the amended project footprint. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	Yes– present	The Gang-gang Cockatoo is known to occur within the amended project footprint in all IBRA subregions impacted, with multiple species sightings and suitable foraging and potential nesting habitat recorded. Breeding pairs were also identified in Bungonia, with breeding habitat likely nearby. The amended project would result in the removal of approximately 49.92 (16%) of known foraging habitat and 430.10 ha (21%) of potential breeding habitat used by this species. This includes habitat critical to the survival of the species. The amended project also has the potential to cause direct impacts to the species via injury or mortality during clearing and construction work.	Potential significant impact
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	V	Yes– present	The Glossy Black-Cockatoo is known to occur in the amended project footprint in Bungonia and has a high likelihood of occurrence in Inland Slopes. The amended project would result in the removal of approximately 99.17 ha (15%) of known and highly likely foraging habitat and 40.82 ha (19%) of	Potential significant impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					known and potential breeding habitat for the species. This includes habitat critical to the survival of the species.	
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	V	Yes – present	The Brown Treecreeper (south-eastern) is known to occur within the amended project footprint in the Inland Slopes, Snowy Mountains and Murrumbateman IBRA subregions. The subspecies also has a high likelihood of occurrence in the Bondo and Crookwell IBRA subregions and a moderate likelihood of occurrence in Bungonia. The amended project would result in the removal 375.74 ha (19%) of known, highly likely and moderately likely foraging and breeding habitat. This includes habitat critical to the survival of the species.	Potential significant impact
Gallinago hardwickii	Latham's Snipe	-	V, M	Yes – assumed present	The Latham's Snipe has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Inland Slopes and Snowy Mountains, and a moderate likelihood of occurrence in Bungonia and Murrumbateman. The amended project has the potential to impact 2.90 ha of riparian habitat within the Inland Slopes portion of the amended project footprint. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)
Grantiella picta	Painted Honeyeater	V	V	Yes– assumed present	The Painted Honeyeater has a high likelihood of occurrence in the Inland Slopes IBRA subregion portion of the amended project footprint. There is potentially suitable foraging and nesting habitat within open woodland habitats, but no individuals were sighted during targeted surveys. The amended project would result in the clearing of approximately 203.74 ha (15%) ha of suitable foraging and nesting habitat. This includes habitat critical to the survival of the species.	Potential significant impact
Hirundapus caudacutus	White-throated Needletail	-	V	Yes– assumed present	The White-throated Needletail was not recorded during the field surveys for the amended project and there are no previous records within the amended project footprint, and no recent records in the broader locality. Potential foraging habitat is present in the amended project footprint in the form of associated PCTs. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species, as well as suitable hollow bearing trees used as roosting habitat by the White-throated Needletail. Potential direct impacts include species injury or mortality during clearing and construction. An area of approximately 481.19 ha (including 1.78 ha of prescribed impacts) of potential habitat for this species would be impacted by the amended project. Extensive areas of potential foraging habitat for this species are also present within the locality and would be retained.	Significant impact unlikely

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
Lathamus discolor	Swift Parrot	E	CE	Yes–assumed present	Within the amended project footprint, the Swift Parrot has a moderate likelihood of occurrence as a nomadic forager in the Bungonia and Murrumbateman IBRA subregions due to the presence of suitable myrtaceous and lerp foraging resources. In the Inland Slopes IBRA subregion, it has a high likelihood of occurrence due to both the presence of suitable myrtaceous and lerp foraging resources and the amended project footprint intersecting a Priority Management Area for the species under the NSW Save our Species (SoS) program. The amended project footprint would result in the loss of approximately 248.51 ha (16%) of potential foraging habitat, including vegetation within a Priority Management Area for the species.	Potential significant impact
Melanodryas cucullata cucullata	South-Eastern Hooded Robin	E	E	Yes – assumed present	The Hooded Robin has a moderate and high likelihood of occurrence in Bungonia and Murrumbateman, respectively. With suitable foraging and potential nesting habitat occurring in grassy box woodland, however, no species sightings during targeted surveys. The amended project would result in the clearing of 629.21 ha (14%) of potential habitat in the amended project footprint.	Potential significant impact
Polytelis swainsonii	Superb Parrot	V	V	Yes–present	The Superb Parrot is known to occur within the amended project footprint in the Murrumbateman and Inland Slopes IBRA subregions, with suitable foraging and potential nesting habitat occurring in grassy box woodland. It also has a high and moderate likelihood of occurrence in Crookwell and Bondo, respectively, in which suitable open woodland habitats occur but no individuals were observed during targeted surveys. The amended project would result in the removal of 240.23 ha (32%) of foraging and 113.61 ha (15%) of potential breeding habitat within the amended project footprint. This includes habitat critical to the survival of the species.	Potential significant impact
Pycnoptilus floccosus	Pilotbird	-	V	Yes–assumed present	The Pilotbird has a high likelihood of occurrence in the Bondo, Inland Slopes, and Snowy Mountains IBRA subregions within the amended project footprint. These areas contain wet sclerophyll and dry sclerophyll vegetation formations in high condition, which are suitable habitats for the species foraging and breeding. Although the Pilotbird was not sighted during targeted surveys, there are 324 Pilotbird records within 20 km of the amended project footprint (DPE, 2023b). The amended project would result in the clearing of 203.47 ha (30%) of potential foraging and breeding habitat. This includes potential habitat critical to the survival of the species.	Potential significant impact (precautionary)
Stagonopleura guttata	Diamond Firetail	V	V	Yes - present	The Diamond Firetail has been recorded in the amended project footprint within the Murrumbateman (14), Snowy mountains (1) and Inland Slopes (2) IBRA subregions. The species has been assumed present and has a moderate likelihood of occurrence in the Bondo and Crookwell IBRA subregions, and a high likelihood of occurrence in the Bungonia IBRA subregion, due to the presence of known and potential foraging and breeding habitat. The amended project would result	Potential significant impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					in the loss of approximately 59.62 ha of potential foraging and breeding habitat for the Diamond Firetail.	
Invertebrates						
Keyacris scurra	Key's Matchstick Grasshopper	E	E	Yes– assumed present	Key's Matchstick Grasshopper was opportunistically recorded during the field survey in the Murrumbateman IBRA subregion, however no targeted survey for the species was performed as it was listed as a threatened species with credit status after the majority of field surveys were conducted. It assumed present as it has moderate likelihood of occurrence within at least the Inland Slopes IBRA subregion due to the presence of suitable grassland habitat and Atlas records within the vicinity of the amended project footprint. The amended project would result in the loss of approximately 170.71 ha of potential habitat (including 5.78 ha of prescribed impacts) where the species is considered likely to occur, however as the species occurrence is poorly known this is likely to significantly inflate the potential impact area.	Potential significant impact
Synemon plana	Golden Sun Moth	V	CE	Yes– assumed present	The Golden Sun Moth was not detected during field surveys, however it assumed present as it has a high likelihood of occurrence and is known to occur in the Murrumbateman and Inland Slopes IBRA subregions due to the presence of suitable grassland habitat and with multiple sightings across records within 5 km the amended project footprint in suitable grassland habitat. The amended project would result in the loss of approximately 30.54 ha of foraging and breeding habitat for the Golden Sun Moth (including 3.06 ha of prescribed impacts on non-native habitat).	Potential significant impact
Mammals						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Yes– assumed present	No individuals or roosting sites were recorded within the amended project footprint during targeted surveys. The Large-eared Pied Bat has a medium likelihood of occurrence in the Bungonia IBRA subregion portion of the amended project footprint. The species is considered likely to occur based on the presence of suitable cliffline roosting and foraging habitats within the amended project footprint and multiple species records in the broader subregion. The species is considered to have a low likelihood of occurrence in the Inland Slopes IBRA subregion portion of the amended project footprint, based on a low number of species records in the locality, and lack of suitable habitat components to support the species. The amended project footprint is likely to result in the direct loss of approximately 2.42 ha of potential habitat within the Inland Slopes IBRA subregion (PCTs 277 and 731) portion of the amended project footprint. Indirect impacts resulting from the amended project include increased edge effects and reduced connectivity. It has been acknowledged that new forest edges may act as barriers because they interrupt existing linear flyways, or because some species avoid lit, or open areas (Threlfall *et al.*, 2011; Altringham & Kerth, 2016; Haddock *et al.*, 2019). The maximum gap between new forest edges within the amended project footprint is likely to be 70 – 80 m. Despite	Significant impact unlikely

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
					this, the lattice transmission line structures proposed as a part of the development are highly permeable structures, and a Connectivity Strategy would be implemented to mitigate any impacts of habitat fragmentation on this species.	
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Yes – assumed present	The Spotted-tailed Quoll has not been recorded in the amended project footprint but is considered likely to occur in all IBRA subregions, with a high likelihood of occurrence in Bondo, Inland Slopes and Snowy Mountains and a moderate likelihood of occurrence in Bungonia, Crookwell and Murrumbateman. The amended project would result in the removal of 470.67 ha (including 1.78 ha of prescribed impacts) of foraging and denning habitat potentially used by this species.	Potential significant impact
Mastacomys fuscus	Broad-toothed Rat	V	V	Yes– assumed present	The Broad-toothed Rat has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Snowy Mountains. The proposed amended project footprint will result in the loss of approximately 0.03 ha of potential habitat in the Snowy Mountains IBRA subregion.	Significant impact unlikely
Petauroides volans	Greater Glider	E	E	Yes– present	The Greater Glider is known to occur within the amended project footprint in the Bondo, Bungonia and Snowy Mountains IBRA subregions in high condition, mature remnants. It also has a moderate likelihood of occurrence in the Crookwell, Inland Slopes and Murrumbateman IBRA subregions in intact remnants, with moderate to high connectivity. The proposed amended project footprint would result in the loss of approximately 142.58 ha of known and potential habitat. The long, linear transmission line would result in a >70m easement clearing within these habitats which the species is unlikely to be able to glide across and the species has little ability to safely traverse cleared landscapes without the ability to glide.	Potential significant impact
Petaurus australis	Yellow-bellied Glider	E	V	Yes– present	The Yellow-bellied Glider is known to occur in the amended project footprint in Bondo, Inland Slopes and Snowy Mountains and is considered to have a high likelihood of occurrence in Bungonia. The amended project footprint would result in the loss of approximately 308.98 ha (including 0.96 ha of prescribed impacts) of potential habitat.	Potential significant impact
Phascolarctos cinereus	Koala	E	E	Yes– assumed present	The species was not recorded during field surveys but is considered likely to occur based on the high number of local records and the occurrence of Koala feed tree species. Habitat to be removed within the amended project footprint is subject to varying degrees of disturbance and varied conditions. About 441.09 ha of potential habitat in the form of native vegetation (including Koala use trees), including 6.19 ha of high potential foraging and shelter habitat in the Bungonia IBRA subregion, and 434.90 ha of moderate potential foraging and shelter habitat in the Bondo, Crookwell, Inland Slopes, Murrumbateman and Snowy Mountains IBRA subregions, are estimated to occur within the amended project footprint and would be directly impacted.	Likely significant impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary	Significant impact?
Pseudomys fumeus	Smoky Mouse	CE	E	Yes– assumed present	The Smoky Mouse has not been recorded in the amended project footprint but is considered to have a moderate likelihood of occurrence in Bondo and Snowy Mountains. The amended project footprint would result in the loss of approximately 5.78 ha of potential habitat in the Bondo IBRA subregion.	Significant impact unlikely
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Yes– present	During field surveys, no breeding or roosting habitat (camps) were observed and no Nationally Important Flying Fox Camps occur within the amended project footprint (Commonwealth DCCEEW, 2022f). However, the Grey-headed Flying Fox has a medium likelihood of occurrence in Bungonia, Murrumbateman, Crookwell, and Inland Slopes IBRA subregion portion of the amended project footprint, which contains a variety of suitable forage habitats (comprising of native and non-native vegetation). There are eight known Grey-headed Flying-fox camps within foraging range (within 20 km) of the amended project footprint. Where field surveys have been undertaken, no Grey-headed Flying-fox camps have been identified. The potential habitat within the amended project footprint is assumed to be foraging purposes only. Approximately 203.69 ha (including 5.67 ha of prescribed impacts) of potential foraging habitat for the Grey-headed Flying Fox will be directly impacted by the amended project footprint. Given that the species is nomadic and has a wide variety of native and non-native foraging resources that it relies on, it is difficult to quantify the scale of impact this loss of vegetation would incur on local populations. The Bungonia, Crookwell, Inland Slopes and Murrumbateman IBRA subregions, consist of extensive areas that have been historically cleared for grazing and agricultural land practices. Native remnants primarily persist in the landscape as reserves and vegetation corridors, with varying degrees of fragmentation. Grey-headed Flying-fox in these regions are likely to rely on a combination of native flowering myrtaceous species, and non-native vegetation (eg, crops and planted gardens) within the locality. Indirect impacts resulting from the amended project include increased risk of entanglement and collision. In Mo et al. (2020), a broad range of factors were involved in flying-fox mortality or injury, the main ones being entanglements and electrocutions. Upon review of BioNet records (NSW DCCEEW, 2024a), there have been numerous Grey-headed Flying-fox individuals that have experienced electrocution (resulting in injury or mortality from existing transmission lines), particularly within proximity to the Tumut River Island and Wagga Wagga flying-fox camps (more urbanised areas). Based on the known distribution of Grey-headed Flying-fox camps within the region, the increased risk of entanglement and collision from the amended project and the scale of vegetation loss within the region, it is considered likely that the amended project will lead to the long-term decrease in the size of an important population of the Grey-headed Flying Fox.	Potential significant impact (foraging habitats only)

Scientific name	**Common name**	**BC Act**	**EPBC Act**	**Assessment required?**	**Impact summary**	**Significant impact?**
Reptiles						
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	Yes– present	Pink-tailed Legless Lizard was recorded (5 individuals) in the Murrumbateman IBRA subregion. The species was commonly identified in open woodland areas with rocky outcrops or scattered, partially buried rocks. Vegetation clearing for the installation of transmission lines and associated infrastructure is likely to reduce the availability of grassland habitat containing foraging resources potentially used by the species and may disturb rock boulder fields potentially used as foraging and shelter habitat by the species. Potential direct impacts include species injury or mortality during clearing and construction work. An area of approximately 39.56 ha of potential foraging and shelter habitat (including 5.44 ha of prescribed impacts) for the Pink-tailed Legless Lizard would be impacted by the amended project.	Likely significant impact
Delma impar	Striped Legless Lizard	V	V	Yes– assumed present	Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of grassland habitat containing foraging resources potentially used by this species and may disturb rock boulder fields potentially used as foraging and shelter habitat by these species. Potential direct impacts include species injury or mortality during clearing and construction work. An area of approximately 125.47 ha of potential foraging and shelter habitat (including 35.40 ha prescribed impacts to non-native habitats) for the Striped Legless Lizard would be impacted by the amended project.	Potential significant impact

13.8.4 Impacts on aquatic species listed under the EPBC Act

The amended project has the potential to impact on seven threatened aquatic species listed under the EPBC Act (refer to Table 13-35).

The significance assessments for threatened aquatic species are addressed in detail in Attachment 3.

The construction process for the transmission line structures and associated transmission lines would avoid direct impacts to streams. As such, these significance assessments focus on the potential for disturbance and residual indirect impacts to potential habitats following the implementation of avoidance and mitigation measures, to the species (ie the removal of native riparian vegetation, erosion and sedimentation risk) during access track and waterway crossing construction.

Construction of waterway crossings to support access for the amended project has been identified as the primary pathway of potential impact to aquatic habitats as this would result in the direct disturbance to aquatic ecosystems. A total of 809 indicative waterway crossings are in the updated indicative disturbance area. A total of 82 per cent of streams intersecting indicative access track locations are stream order one or two, reflecting the dominance of smaller streams within the amended project footprint. The majority of these streams appear to be in poor condition as a result of land clearing, online dam construction, grazing and cropping, as well as existing informal access track and waterway crossing construction. The existing impacts have resulted in deleterious processes such as bank erosion and channel incision and contribute to an overall picture of degraded aquatic habitats within the amended project footprint.

Detailed consideration of access track locations that intersect with mapped KFH or indicative distribution mapping for threatened aquatic species (DPI, 2023a), have been made in Chapter 10. The findings indicate that these KFH streams are also generally subject to degradation and in a relatively poor condition. Where available, these streams that have received freshwater fish community grades that are described as “Very Poor”.

It is anticipated that any constructed waterway crossings upgrades associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than any existing informal crossings and would not result in any additional deleterious processes. The establishment of new tracks would be necessary in a minority of cases. While this would result in impacts through vegetation clearing and direct modification to establish crossings, this would occur within the context of similar modifications through the locality and would be small scale and localised in the context of surrounding available habitat.

Any impacts that may occur are anticipated be localised and temporary in nature (eg disturbance to instream habitats during the construction of waterway crossings for access tracks or trimming of riparian trees to facilitate transmission line installation).

Avoiding and minimising impacts on aquatic habitats would be priority during finalisation of the detailed design (Chapter 12). Detailed mitigation measures to guide the final design, construction and operational phase of these waterway crossing locations have been made in Chapter 14 to control and reduce the potential for any residual indirect impacts to aquatic ecosystems.

Where waterway crossings for access tracks are indicated, a specific suite of mitigation measures to prevent as far as practical the creation of any barriers to fish passage have been recommended, with crossings designs aligning with relevant guidelines (Fairfull, 2013). Additional mitigation measures have been proposed to focus on the minimisation of potential impacts to CLASS 1 KFH streams that may support threatened aquatic species (B33, Table 14 1), including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 KFH.

The significance assessments have concluded that no significant impacts to threatened aquatic species listed under the EPBC Act would be likely to occur due to the amended project.

Table 13-35: EPBC Act threatened aquatic species summary of significance of impact

Scientific name	Common name	EPBC Act	Assessment required	Impact summary	Significant impact?
Bidyanus bidyanus	Silver Perch	CE	Yes	None of the waterways that have been mapped as within the species indicative distribution (DPI, 2022a) would be crossed by any updated indicative waterway crossings associated with access tracks. Any indirect impacts that may occur are anticipated be localised and temporary in nature eg disturbance to instream habitats during the construction of waterway crossings for access tracks or trimming of riparian trees to facilitate transmission line installation. While waterway crossings for access tracks are proposed, mitigation measures to prevent as far as practical the creation of any barriers to fish passage have been recommended, with crossings designs aligning with relevant guidelines (Fairfull, 2013).	Significant impact unlikely
Maccullochella macquariensis	Trout Cod	E	Yes		Significant impact unlikely
Macquaria australasica	Macquarie Perch	E	Yes		Significant impact unlikely
Galaxias rostratus	Flatheaded Galaxias	CE	Yes	Two streams (Tarcutta Creek and O'Brien's Creek) that are intersected by indicative waterway crossings within the updated indicative disturbance area have been identified as being within the indicative species distribution. A total of two waterway crossings are indicated. These waterways both have a fish community status of "very poor" and of the two waterway crossings, both have an existing crossing in some form present. In other words, the amended project would not result in any additional crossings in these areas of indicative habitat. It is anticipated that any constructed waterway crossings upgrades associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than existing informal crossings and would not result in any additional deleterious processes. While waterway crossings for access tracks are indicated, mitigation measures to prevent as far as practical the creation of any barriers to fish passage have been recommended, with crossings designs aligning with relevant guidelines (Fairfull, 2013). Additional mitigation measures have been proposed to focus on the minimisation of potential impacts to CLASS 1 KFH streams that may support threatened aquatic species (B33, Table 14 1), including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 KFH.	Significant impact unlikely
Nannoperca australis	Southern Pygmy Perch	V	Yes	Twelve streams within the indicative access track footprint have been identified as being within the indicative distribution for this species. These do not include distributions of any known populations of the species. Fish community status mapping is available for four of the indicative crossings indicating "very poor" conditions	Significant impact unlikely

Scientific name	Common name	EPBC Act	Assessment required	Impact summary	Significant impact?
				where available. There are a total of nine crossings between the six streams with Merrill Creek (4) and Three Waterholes Creek (3) crossed multiple times. Existing crossings in some form are present at all but one of these locations. It is anticipated that any constructed waterway crossings upgrades associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than existing informal crossings and would not result in any additional deleterious processes. While waterway crossings for access tracks are proposed, mitigation measures to prevent as far as practical the creation of any barriers to fish passage have been recommended, with crossings designs aligning with relevant guidelines (Fairfull, 2013). Additional mitigation measures have been proposed to focus on the minimisation of potential impacts to CLASS 1 KFH streams that may support threatened aquatic species (B33, Table 14 1), including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 KFH. If a waterway crossing at Oolong Creek is required, the waterway crossing will incorporate a fish passage barrier to prevent the upstream incursion of carp and redfin to protect the endangered Southern Pygmy Perch population. If the design cannot incorporate an appropriate fish passage barrier, further engagement will be undertaken with DPI Fisheries to confirm alternate measures for implementation. Any impacts that may occur are anticipated to be localised and temporary in nature e.g. disturbance to instream habitats during the construction of waterway crossings for access tracks or trimming of riparian trees to facilitate transmission line installation.	

Scientific name	Common name	EPBC Act	Assessment required	Impact summary	Significant impact?
Euastacus rieki	*Riek's Crayfish*	E	Yes	Out of the small to moderate sized streams (stream order three or below) identified within the broadscale mapping of the species predicted distribution, 86 are intersected by the indicative access track footprint. The majority (71) of these indicative waterway crossings coincide with existing crossings in some form, with 15 requiring entirely new crossings. Generally, these access tracks occur within or adjacent to the cleared existing easement or existing access trails, reflecting a managed and modified landscape at the site of the majority of the indicative waterway crossings. Although a minority are proposed for the establishment of new tracks (9) or upgraded tracks (9) crossings at a total of 18 locations. While this will result in impacts through vegetation clearing and direct modification to establish crossings, this would occur within the context of similar modifications through the locality and would be small scale and localised in the context of surrounding available habitat. It is anticipated that any constructed waterway crossings upgrades associated with the amended project would contribute to overall improvements to aquatic conditions and be more sensitive than existing informal crossings and would not result in any additional deleterious processes. While waterway crossings for access tracks are proposed, mitigation measures to prevent as far as practical the creation of any barriers to fish passage have been recommended, with crossings designs aligning with relevant guidelines (Fairfull, 2013). Additional mitigation measures have been proposed to focus on the minimisation of potential impacts to CLASS 1 KFH streams that may support threatened aquatic species (B33, Table 14 1), including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 KFH. Any impacts that may occur are anticipated to be localised and temporary in nature e.g. disturbance to instream habitats during the construction of waterway crossings for access tracks or trimming of riparian trees to facilitate transmission line installation.	Significant impact unlikely

Scientific name	Common name	EPBC Act	Assessment required	Impact summary	Significant impact?
Maccullochella peelii	Murray Cod	V	No	The Murray Cod has the potential to occur within the amended project footprint in larger streams, particularly the Murrumbidgee River. However, any population present within these streams intersecting with the amended project footprint would not constitute part of any important population identified in the recovery plan for the species (National Murray Cod Recovery Team, 2010) and it is considered unlikely that any population that may occur within the amended project footprint would represent a key source population for breeding or necessary for maintaining the genetic diversity of the species. As no important populations would be impacted by the amended project, the species has not been subject to a formal assessment. However, it is anticipated that the findings would be in line with other large-bodied native fish species (Trout Cod and Macquarie Perch) assessed. It is also noted that the avoidance and mitigation measures presented within this BDAR would apply to any Murray Cod individuals that may occur within the amended project footprint.	Not assessed

13.8.5 Impacts on migratory species listed under the EPBC Act

The amended project could impact on 10 migratory listed under the EPBC Act (Table 13-36, Figure 13-18). For some of the species nominated as potentially significantly impacted, this conclusion is made due to the requirement to take a precautionary approach based on an element of uncertainty, especially where incomplete survey coverage occurs. The significance assessments and address of the Commonwealth requirements of the SEARs for migratory species are provided in detail in Attachment 3. The proposed avoidance and mitigation measures are outlined in Chapters 12 and 14 of the BDAR.

Table 13-36: EPBC Act migratory species summary of significance of impact

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary (ha)	Significant impact?
Apus pacificus	Fork-tailed Swift	-	M	Yes - present	The Fork-tailed Swift is known to occur in the amended project footprint in the Inland Slopes IBRA subregion. The amended project has the potential to remove approximately 81.64 ha of opportunistic non-breeding habitat suitable for this species. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)
Calidris acuminata	Sharp-tailed Sandpiper	-	M	Yes – assumed present	The Sharp-tailed Sandpiper has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Inland Slopes IBRA subregion. The amended project has the potential to impact 2.32 ha of riparian foraging habitat within the Inland Slopes IBRA subregion portion of the amended project footprint. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)
Calidris ruficollis	Red-necked Stint	-	M	Yes – assumed present	The Red-necked Stint has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Inland Slopes IBRA subregion. The amended project has the potential to impact 2.32 ha of riparian foraging habitat within the Inland Slopes IBRA subregion portion of the amended project footprint. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)
Gallinago hardwickii	Latham's Snipe	-	M	Yes – assumed present	The Latham's Snipe has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Inland Slopes and Snowy Mountains IBRA subregions, and a moderate likelihood of occurrence in Bungonia and Murrumbateman IBRA subregions. The amended project has the potential to impact 2.90 ha of riparian habitat within the Inland Slopes IBRA subregion portion of the amended project footprint. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work.	Potential significant impact (precautionary)

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary (ha)	Significant impact?
					The potential collision related impacts to these species have been considered further in Section 13.5.4.	
Hirundapus caudacutus	White-throated Needletail	-	V, M	Yes	The White-throated Needletail was not recorded during the field surveys for the amended project and there are no previous records within the amended project footprint, and no recent records in the broader locality. Potential foraging habitat is present in the amended project footprint in the form of associated PCTs. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species, as well as suitable hollow bearing trees used as roosting habitat by the White-throated Needletail. Potential direct impacts include species injury or mortality during clearing and construction work. An area of approximately 481.19 ha of potential habitat for this species would be impacted by the amended project. Extensive areas of potential foraging habitat for this species are also present within the locality and would be retained.	Significant impact unlikely
Monarcha melanopsis	Black-faced Monarch	-	M	No	The Black-faced Monarch has not been recorded in the amended project footprint and is considered to have a low likelihood of occurrence in all IBRA subregions, however as it was identified in SEARs further was assessment required. A total of 1,045.16 ha of potential habitat for Black-faced Monarch is mapped as occurring within the amended project footprint. The amended project has the potential to remove approximately 271.11 ha of potential migratory habitat. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species. Extensive areas of potential habitat for these species are also present within the locality. The habitat within the amended project footprint to be impacted is therefore not considered important habitat for these species. The removal of the potential habitat as a result of the amended project is unlikely to disrupt the lifecycle of an ecologically significant proportion of these species.	Significant impact unlikely
Myiagra cyanoleuca	Satin Flycatcher	-	M	No	The Satin Flycatcher is known to occur in the amended project footprint in Murrumbateman IBRA subregion. The amended project has the potential to remove approximately 39.83 ha of potential foraging habitat for this species. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species. Extensive areas of potential habitat for these species are also present within the locality. The habitat within the amended project footprint to be impacted is therefore not considered important habitat for these species. The removal of the potential habitat as a result of the amended project is unlikely to disrupt the lifecycle of an ecologically significant proportion of these species.	Significant impact unlikely

Scientific name	Common name	BC Act	EPBC Act	Assessment required?	Impact summary (ha)	Significant impact?
Rhipidura rufifrons	Rufous Fantail	-	M	No	The Rufous Fantail is known to occur in the amended project footprint in Bondo IBRA subregion. The amended project has the potential to remove approximately 30.63 ha of opportunistic non-breeding habitat. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species. Extensive areas of potential habitat for these species are also present within the locality. The habitat within the amended project footprint to be impacted is therefore not considered important habitat for these species. The removal of the potential habitat as a result of the amended project is unlikely to disrupt the lifecycle of an ecologically significant proportion of these species.	Significant impact unlikely
Tringa nebularia	Common Greenshank	-	M	Yes	The Common Greenshank has not been recorded in the amended project footprint but is considered to have a high likelihood of occurrence in Inland Slopes IBRA subregion. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species. The amended project has the potential to impact 29.62 ha of habitat. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)
Tringa stagnatilis	Marsh Sandpiper	-	M	Yes	The Marsh Sandpiper has not been recorded in the amended project footprint but is considered to have a moderate likelihood of occurrence in Inland Slopes IBRA subregion. The amended project would result in the installation of transmission lines which may intersect the flight path of these migratory birds. Potential direct impacts include species injury or mortality from strikes with the new transmission lines, or during clearing and construction work. Vegetation clearing for the installation of transmission lines and associated infrastructure may reduce the availability of foraging resources for these species. The proposed transmission line has the potential to impact 29.62 ha of riparian habitat within the Inland Slopes IBRA subregion portion of the amended project footprint. The potential collision related impacts to these species have been considered further in Section 13.5.4.	Potential significant impact (precautionary)

13.8.6 Impacts on Bogong Moth

Key summer aestivation sites are generally found in the caves, boulder fields and tors of the Australian Alps (Green, 2010). These sites are scattered across the south-eastern Australian alpine areas (limited to areas of the amended project footprint occurring the Snowy Mountains IBRA subregion) (Keaney, 2016).

Over the past decade, there has been a rapid decline in Bogong Moth numbers within the Australian Alps, and this likely due to several factors. In Green *et al*.'s 2020 study, they reported a 99.5 per cent decline in Bogong Moth numbers at alpine summer aestivation sites. It is possible that severe drought and warmer temperatures had impacted cave microclimates (maximum temperature for aestivation is 16°C) used by the species, restricting aestivation sites to higher altitudes. Further, larvae of Bogong Moth are susceptible to ingesting arsenate from agricultural sprays, used against their weedy food plants amongst crops, and the developing migrant adults transport this to high altitudes. Analysis of soils washed out of aestivation sites revealed high levels of arsenic (Green *et al.*, 2001), possibly accumulated from larval food, and later released from the bodies of dead adult moths in the new environment. Other secondary threats include increased artificial light hampering migration efforts (Warrant & Dacke, 2016), and changes in agricultural practices; this includes the replacement of traditional agricultural land with cotton and rice monocultures that do not provide suitable larval host plants (Green *et al.*, 2020).

Within the amended project footprint, the Bogong Moth has a moderate likelihood of occurrence during spring migration to summer aestivation sites in the Bogong Ranges. Adult moths are likely to forage on myrtaceous and proteaceous shrubs and trees, and agricultural crops (Warrant *et al.*, 2016) during this period. A single Bogong Moth was opportunistically observed in the Bungonia IBRA subregion during field surveys. The amended project would result in the loss of approximately 619.66 ha of potential foraging habitat for the species. There is also likely to be an increase in artificial lighting during construction of the amended project, however, the consequences of this would be relatively minor given work would mostly be carried out during daylight hours (refer to Chapter 4) and mitigation measures to reduce light spill (Table 14-1, B24).

The summary of the requirements of the Commonwealth SEARs for Bogong Moth are provided in detail in Section 2.3.16 of Attachment 3. The proposed avoidance and mitigation measures are outlined in Chapters 12 and 14 of the BDAR.

13.9 Key Threatening Processes

There are currently 19 Key Threatening Processes (KTPs) listed under the EPBC Act and Schedule 4 of the BC Act that are relevant to the amended project (Table 13-37). Three KTPs listed under Schedule 6 of the FM Act are also considered relevant.

Table 13-37: Key Threatening Processes relevant to the amended project

Key Threatening Process	Assessment of likelihood	Proposed mitigation	Relevant mitigation measure (Table 14-1)
Environment Protection and Biodiversity Conservation Act 1999/ Biodiversity Conservation Act 2016			
Bushrock removal	High; Rocky habitats within the amended project footprint would be impacted where they are situated within the Total Clearing Zone and Easement Clearing Zone. Bushrock serves many purposes in the natural environment. It provides habitat for many plants and animals, some of which are threatened. Many animals use rocks and rock environments for shelter, to hide from predators, find food, avoid extreme weather conditions and escape bushfires. Bushrock is also known to provide egg-laying sites for reptiles. Bushrock removal may impact reptiles including the Pink-tailed Legless Lizard and Striped Legless Lizard, where intersecting with habitat for these threatened species.	The following mitigation measures would reduce the impacts on the amended project on the KTP: • Avoid bushrock removal where possible (as per BMP, B1, B3, B27, B28). • If bushrock removal is required, assess areas where threatened biodiversity is likely to be present and redesign activity to minimise impact to area, or move to lesser condition habitat (micro-siting undertaken as part of detailed design, B1, B3, B20). • Salvage bushrock and return to area after activity or return to land near activity (NSW TSSC, 1999a) (as per BMP, B3).	B1, B3, B20, B27, B28
Clearing of native vegetation	High; 866.16 ha of native vegetation (937.32 ha including Category 1 exempt land) would be cleared as a result of the amended project. There is a risk of disturbance and/ or destruction of adjacent habitats and vegetation through accidental clearing and unauthorised vehicle movements during the construction stage.	The following mitigation measures would reduce the impacts on the amended project on the KTP: • Micro-siting to place infrastructure in areas of low biodiversity value as far as practicable (B1). • Clearing extent to be pegged out by surveyor on-site prior to disturbance (Transgrid 2023b, B20). • Clearing methods that reduce the need for mid and ground-storey disturbance to be used such as reach arms on machinery for tree removal (Transgrid 2023b).	B1, B3, B26, B10, B18, B20, B26

Key Threatening Process	Assessment of likelihood	Proposed mitigation	Relevant mitigation measure (Table 14-1)
		• Hand clearing to be conducted where machine access is limited and where sensitive biodiversity values are to be protected (Transgrid 2023b). • Revegetation to be considered for areas where temporary disturbance is required (as per BMP, B3, B18). • Implementation of connectivity strategy to minimise impacts of fragmentation (Connectivity Strategy B10). • Minimise disturbing soils as to not disrupt ecological function (NSW TSSC, 2001b), (as per Soil and Water Management Plans (SWMPs) and Erosion and Sediment Control Plans (ESCPs), B26).	
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	Low; Fire regimes within the locality are already subject to considerable alteration as a result of the agricultural and forestry land uses which dominate the landscape. Climate change may result in further change. There would be an increased risk of bushfire during construction due to several potential ignition sources, eg hot works, equipment or services failure, or accidental ignitions (refer to *Technical Report 13 – Bushfire Risk Assessment* (Aurecon, 2023d) and *Technical Report 13 – Bushfire Risk Assessment Addendum* (Aurecon, 2024b) for further discussion). However, these risks are low with appropriate controls in place. There would be an increased risk of bushfire during operation where the transmission lines become damaged from storm activity or fallen vegetation. However, these risks are low with appropriate maintenance.	During construction and operation, the amended project would implement the required bushfire management measures, including a Bush Fire Emergency Management and Evacuation Plan, to manage any increased risk of bushfire. Design specifications would be adopted to ensure conductor clearance heights adhere to recommended levels to minimise any risk of arcing or potential fire events. Vegetation maintenance would occur in accordance with HumeLink operational procedures.	N/A Refer to *Technical Report 13 – Bushfire Risk Assessment* (Aurecon 2023d) and *Technical Report 13 – Bushfire Risk Assessment Addendum* (Aurecon 2024b) for further detail regarding bushfire mitigation.
Infection of frogs by amphibian chytrid causing the disease *chytridiomycosis*	Low; There is the potential for the introduction or spread of pathogens by means of imported materials, machinery	Given the likelihood is low, mitigation can be implemented via hygiene protocols, as per the Biosecurity Management Plan (B22). This may include	B22

Key Threatening Process	Assessment of likelihood	Proposed mitigation	Relevant mitigation measure (Table 14-1)
Infection of native plants by *Phytophthora cinnamomi* Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family *Myrtaceae*	movements and increased foot traffic during the construction phase. No evidence of pathogens such as Root Rot *Phytophthora cinnamomi*, Myrtle Rust *Austropuccinia psidii* and Chytrid Fungus *Batrachochytrium dendrobatidis* was recorded within the amended project footprint. However, these have potential to occur.	washing down vehicles and keeping up to date the current or known locations of infestations (DEE, 2016a).	
Invasion and establishment of exotic vines and scramblers Invasion of native plant communities by exotic perennial grasses Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Low/Moderate; There is the potential for the introduction or spread of weeds by means of imported materials, machinery movements and increased foot traffic during the construction phase. Weeds recorded as a part of field survey activities are detailed in Section 6.4 of this BDAR relative to each vegetation zone and IBRA subregion. Vegetated fragments remaining within the landscape are generally small, isolated and already likely to be subject to considerable edge effects such as weed invasion and altered floristic composition and structure. Despite this, increased clearing and fragmentation as a result of the amended project may further intensify these pressures within remaining fragments and has the potential to impact habitat viability for some threatened flora and fauna species generally reliant on the availability of larger contiguous habitats.	Mitigation can be implemented via hygiene protocols, ensuring no foreign materials are on tyres or shoes prior to entering site, as per the Biosecurity Management Plan (B22). Develop a weed management plan and weed control strategy (B23), including species-specific targets to avoid and minimise establishment (Commonwealth DCCEEW, 2013), as per the BMP (B3) and Biosecurity Management Plan (B22, B20).	B3, B22, B23
Loss of hollow-bearing trees	Low/ Moderate; The loss of habitat such as, hollows, stick nests, drays, dead trees and fallen timber has the potential to affect native animals such as:	Develop and implement a Supplementary Hollow and Nest Strategy (B12) to provide alternative roosting and/or nesting habitat for threatened fauna displaced during clearing. The strategy should address measures such as nest boxes, hollow re-use / creation, re-use of timber/logs as habitat within the transmission line easement where practicable.	B12

Key Threatening Process	Assessment of likelihood	Proposed mitigation	Relevant mitigation measure (Table 14-1)
Removal of dead wood and dead trees	▪ hollow-dependent bats ▪ hollow-nesting and canopy-nesting birds ▪ arboreal mammals ▪ reptiles. The loss of habitats is unlikely to extend beyond the updated disturbance area, however loss of hollow-bearing trees, dead wood and dead trees providing habitat in the disturbance area is likely to be high and would be greatest where the amended project impacts relatively intact habitats such as those in Bondo and Snowy Mountains IBRA subregions. Impacts beyond this area would be avoided through mitigation and management measures.	Avoidance of removal of habitat features such as dead wood and logs (B1), where these features are determined by a suitably qualified ecologist to be providing important habitat identified as part of pre-clearing surveys (B20). Retention of habitat features such as dead wood, dead trees and logs, wherever practicable, as per BMP (B3)	B1, B3, B20
Predation and hybridisation by feral dogs, *Canis lupus familiaris* Predation by the European red fox *Vulpes vulpes* Predation by feral cat *Felis catus* Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners *Manorina melanocephala.* Competition and grazing by the feral European rabbit Competition and habitat degradation by feral goats, *Capra hircus Linnaeus* 1758	Low/Moderate; Feral dogs; 0 records European red foxes; 24 records Feral cats; 4 records Noisy Miners; 37 records European rabbits; 12 records Feral goats; 3 records Feral deer; 3 records Feral pigs; 7 records Section 7.5 identifies pest animals known or likely to occur within the amended project footprint. It is unlikely that work associated with the amended project would result in the introduction or spread of pest species within the amended project footprint. Despite this, it is possible that native fauna may be more susceptible to predation as a	Transgrid would consult with relevant agencies and groups involved with pest management in order to participate in existing or future monitoring and management programs, as part of the Biosecurity Management Plan to be prepared for the amended project (B22).	B22

Key Threatening Process	Assessment of likelihood	Proposed mitigation	Relevant mitigation measure (Table 14-1)
Herbivory and environmental degradation caused by feral deer	result of vegetation clearing and increased levels of fragmentation within the locality.		
Predation, habitat degradation, competition and disease transmission by feral pigs *Sus scrofa*			
Fisheries Management Act 1994			
Degradation of native riparian vegetation along New South Wales water courses.	The amended project would require activities that would align with these KTPs. However, it is considered unlikely that the amended project would significantly increase the operation of any of these KTPs beyond those levels encountered in the existing landscape. These KTPs have been observed within the existing aquatic environments at significant levels. It is considered unlikely that the amended project would significantly increase the operation of any of these KTPs beyond those levels encountered in the existing landscape. A standard construction methodology for access tracks and waterway crossings has developed, aligning with the relevant guidelines, to construct the crossings in an environmentally sensitive manner and detail relevant mitigation measures. Recommended avoidance (Section 12.1) and mitigation measures (Section 14) have been detailed to reduce potential risk to aquatic habitats associated with these KTPs.	Avoid and minimise disturbances around riparian zones. Monitor waterway banks for changes pre and post impact activities and effectiveness of mitigation strategies (Table 14-1, B17, B31, B32). Revegetate areas disturbed or with little to no vegetation in accordance with construction requirements e.g. *Transmission Line Construction Manual – Major New Build*, *Managing Urban Stormwater – Soils and Construction*, Volume 1 (Landcom, 2004) and Volumes 2A (DECC, 2008a) and Volume 2C (DECC, 2008b), commonly referred to as the 'Blue Book', Best Practice Erosion and Sediment Control (IECA, 2008), Erosion and Sediment Control Plans (ESCPs) and relevant mitigation measures (Table 14-1, B26, B31, B32). Control stock access to streams around work sites where practicable and appropriate. Manage exotic vegetation along riparian zones (DPI, 2005a) (Table 14-1, B22, B23).	B17, B22, B23, B26, B31, B32
Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.		Avoid installing instream structures where practicable (Table 1401, B8). Remove redundant structures at the closure of the impact activity. Minimise the impact of essential instream structures by mimicking natural flows and constructing fishways/crossings (DPI, 2005b) (Table 14-1, B31).	B8, B31-
Removal of large woody debris from New South Wales rivers and streams.		Large woody debris (LWD) should be retained in streams to the extent practicable (Table 14-1, B30).	B3, B30, B35

Key Threatening Process	Assessment of likelihood	Proposed mitigation	Relevant mitigation measure (Table 14-1)
		Lopping/trimming LWD, realign LWD within stream, or relocate LWD instead of removal from waterway (DPI, 2005c) (Table 14-1, B3, B35).	

13.10 Cumulative impacts

The overarching aim in considering cumulative impacts is to describe the scale and nature of the potential impacts of the amended project and other relevant past, present or future projects on biodiversity matters. Consideration of the amended project in this context ensures that potential impacts are not considered in isolation.

The consideration of cumulative impacts has been prepared with reference to the *Cumulative Impact Assessment for State Significant Projects guideline* (DPE, 2022d), which identifies six key questions to inform the assessment, which are summarised in Table 13-38.

Table 13-38: Cumulative Impact Assessment six key questions (DPE, 2022d)

Question	Detail
1. What to assess?	The assessment has focussed upon biodiversity matters (threatened species and ecological communities) that are most at risk of serious harm from the project.
2. What study area?	Due to the scale of the project, the cumulative assessment has considered similar projects within the broader region which, for the purposes of this assessment includes, overlapping and/or adjacent IBRA subregions to the project.
3. Over what time period?	Based upon the availability of information, the assessment focuses on similar major projects that have occurred in recent times and can be predicted to occur within the life of the project.
4. What other projects to include?	The assessment focuses on the predicted impacts of similar major projects. The following projects have been considered in the cumulative impact assessment for biodiversity matters: • EnergyConnect (NSW – Eastern Section) • Gregadoo Solar Farm • Jeremiah Wind Farm • Rye Park Wind Farm • Victoria to NSW Interconnector West (VNI West) • Snowy 2.0 - Transmission Connection • Snowy 2.0 - Main Works • Inland Rail – Albury to Illabo • Crookwell 3 Wind Farm • Belhaven Battery Energy Storage System • Yass Solar Farm.
5. What is the proposed approach to assessment?	Information relating to key biodiversity matters relevant to the project and to the predicted and/or recorded impacts to biodiversity associated with similar projects from the available project documentation have been summarised in Table 13-39. Consideration of potential cumulative impacts is also summarised in Table 13-39. Avoidance and mitigation measures undertaken to date and proposed to be employed have been described in Chapter 12 and Chapter 14.
6. What are the key uncertainties?	The assessment is based upon the accuracy and level of information contained in the available documentation and it is possible that not all relevant documents may be publicly available. Impacts have not been yet ground-truthed for similar major projects, therefore evidence to show actual impact versus predicted impact have not been quantified in published literature or approved plans. Therefore, uncertainties or limitations in the assessment occur where biodiversity impacts have not been yet ground-truthed for certain projects. This may occur in particular for projects at the scoping stage where assessments of impacts are largely based on desktop assessment.

A range of mitigation measures have been detailed in Section 14.2 to further mitigate residual impacts associated with the amended project. In addition, biodiversity offsets would be provided for the amended project, where removal of habitat and vegetation is unavoidable (detailed in Chapter 15). Nevertheless, the biodiversity impacts associated with impacts to native vegetation and habitat required as part of the amended project have the potential to result in cumulative impacts beyond the construction stage of the amended project. To assist in the consideration of cumulative impacts, a review of large-scale projects that may be predicted to occur within the life of the amended project in the region has been made. A number of developments (refer to Table 13-38) planned within the region have the potential to interact with and/or compound the amended project's biodiversity impacts. Further detail on each of these projects is and potential for cumulative biodiversity are described in Table 13-39.

Table 13-39: Potential cumulative impacts associated with planned projects

Project	IBRA subregions	Details	Timing	Cumulative impacts
EnergyConnect (NSW – Eastern Section) EIS approved 2022	Murray Darling Depression region: • South Olary Plain subregion Riverina: • Lachlan subregion • Murrumbidgee subregion NSW South-Western Slopes region: • Lower slopes subregion • Inland slopes subregion.	The project includes a new transmission line connecting the existing Buronga substation and existing Wagga 330 kV substation, and construction of the new Dinawan substation (170 km west of Wagga Wagga). The project also involves associated infrastructure (optical repeater structures), construction of new and/or upgrades to access tracks as required, as well as ancillary work to support construction.	Early 2023 to late 2024	Both HumeLink and EnergyConnect (NSW – Eastern Section) require upgrades of the existing Wagga 330 kV substation. However, the rest of the developments would be in distinct areas. In light of this, the projects are unlikely to significantly contribute to cumulative biodiversity impacts at the regional scale.
Gregadoo Solar Farm EIS approved 2018 Modification 2 approved 2021	NSW South-Western Slopes region: • Inland slopes subregion.	The Gregadoo Solar Farm project involves the construction and operation of a proposed 47 Megawatt (MW) photovoltaic (PV) solar farm at Gregadoo, Wagga Wagga. The Gregadoo Solar Farm development site covers about 150 ha of land. The Gregadoo Solar Farm project site is located on land adjacent the existing Wagga 330 kV substation and is proposed to connect to the existing Wagga 330 kV substation on the northern side of substation.	9 months of construction expected to commence mid-2023	The majority of the Gregadoo Solar Farm development site (98%) is formed by cleared and highly modified agricultural land, with the development site designed to minimise impacts to native vegetation communities. While both developments occur in proximity to the Wagga 330 kV substation, the rest of the developments would be in distinct areas. Significant cumulative impacts to biodiversity are considered to be unlikely. This is given the existing levels of modification to the Gregadoo Solar Farm development site, primarily distinct development areas, along with the avoidance and minimisation measures, in addition to the mitigation measures for residual impacts detailed in this BDAR.
Jeremiah Wind Farm EIS in preparation	NSW South-Western Slopes region: • Upper Slopes subregion NSW South-Eastern Highlands region: • Bondo subregion	The project is located approximately 29 km east of Gundagai around the Adjungbilly area. The project proposes a 65-turbine wind farm with a maximum tip height of 300 m, battery energy storage system and associated ancillary infrastructure. There is likely to be a high level of interaction between the projects as transmission lines between the proposed	Construction expected to be 24 to 30 months and take place early 2023 to 2025	The majority of the Jeremiah Wind Farm development area is modified or degraded, predominantly consisting of exotic pasture. Two PCTs mapped correspond with a Critically Endangered Ecological Community (CEEC) listed under the BC Act. However, no TECs listed under the EPBC Act have been mapped within the development area due to the disturbed and degraded nature of the vegetation present. A number of threatened flora and fauna species have been identified as having the potential to occur within the proposed Jeremiah Wind Farm development area.

Project	IBRA subregions	Details	Timing	Cumulative impacts
		Gugaa 500 kV substation and Bannaby 500 kV substation, and future Maragle 500 kV substation and Bannaby 500 kV substation go through the Jeremiah Wind Farm development area.		Impact avoidance, mitigation and offset obligations in relation to biodiversity will be provided in the BDAR and EIS. Given the overlap in development area, there is the potential for biodiversity impacts within the locality to be compounded by the projects, despite the predominantly modified or degraded landscape. The avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR, along with similar provisions in the Jeremiah Wind Farm impact assessment are considered likely to control the risk of potentially significant cumulative biodiversity impacts in the locality.
Rye Park Wind Farm EIS approved 2017 Modification 1 approved 2021 Modification 2 in preparation 2022	NSW South-Western Slopes region: • Northern Inland Slopes subregion South-Eastern Highlands region: • Murrumbateman subregion	The project is located to the west of Rye Park, north-west of Yass and south-east of Boorowa. The modified project involved the construction and operation of up to 80 wind turbines. The project also includes construction of associated infrastructure (substations, operation and maintenance facilities) and upgrades to local roads. In addition to this, a 330 kV switching station is proposed to the north of the HumeLink transmission line at Bango. There are likely to be moderate to high levels of interaction between the projects, as transmission lines for HumeLink between the proposed Gugaa 500 kV substation and Bannaby 500 kV substation, and future Maragle 500 kV substation and Bannaby 500 kV substation, go through the southern end of the wind farm project boundary at Bango. HumeLink would also require the connection of optical ground wire (OPGW) from the HumeLink 500 kV transmission line into the Rye Park 330 kV switching station auxiliary services building (the Rye Park Wind Farm substation).	Under construction since December 2021 with commissioning scheduled for June 2023	Modification 2 has reduced the overall biodiversity impacts of the approved project. Prior to the wind farm development, the project area had been subject to past land clearing and agricultural development. The ecological assessment for the project concluded that impacts arising from the wind farm to EECs and threatened species known or likely to occur in the project area were unlikely to be significant. Given the overlap in development area, there is the potential for biodiversity impacts within the locality to be compounded by the projects, despite the predominantly modified landscape of the Rye Park Wind Farm development area. The avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR, along with similar provisions in the Rye Park Wind Farm impact assessment are considered likely to control the risk of potentially significant cumulative biodiversity impacts in the locality.

Project	IBRA subregions	Details	Timing	Cumulative impacts
Victoria to NSW Interconnector West (VNI West) Scoping/market modelling phase	The Victoria to NSW Interconnector West (VNI West) would be likely to extend across multiple IBRA subregions along eastern, south-eastern, and southern NSW.	The project involves targeted interconnector expansion between Victoria and NSW to address transmission network limitations and improve supply reliability. VNI West is still in scoping/market modelling phase to assess the technical and economic viability of expanding transmission interconnector capacity between Victoria and NSW. Several options have been developed with new interconnector corridors (VNI 6 – 8) connecting to the existing Wagga 330 kV substation. VNI West may require connection at the existing Wagga 330 kV substation (depending on preferred option).	Construction scheduled to commence in 2026 with commissioning by 2030	The current scope that interfaces with HumeLink includes a new double circuit transmission line between Wagga 330 kV substation and the proposed Gugaa 500 kV substation to extend the EnergyConnect lines. As the VNI West project is at the scoping stage, it is difficult to predict the nature and magnitude of potential cumulative biodiversity impacts at the regional scale. However, the avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR would assist in reducing the likelihood of potential cumulative impacts. Similar provisions would be anticipated to be adopted as part of the VNI West project.
Snowy 2.0 - Transmission Connection EIS approved 2022	South-Eastern Highlands region: • Bondo subregion Australian Alps region: • Snowy Mountains subregion.	The project involves a new transmission connection between the proposed Snowy 2.0 pumped hydro and generation project to the existing high voltage transmission network. Including construction of access tracks to the transmission structures, and upgrade to existing tracks where required. An Amendment Report for the project has resulted in less disturbance than that originally described in the EIS. However, a wider asset protection zone and substation footprint is provided for the future 500 kV Maragle substation. HumeLink would connect to the future Maragle 500 kV substation being constructed as part of the Snowy 2.0 - Transmission Connection project.	Mid 2022 to 2026 with a 55 month construction program	Given both projects would involve work associated with the new Maragle substation development, there is the potential for biodiversity impacts within the locality to be compounded by the projects. The linear nature of both developments in the region may somewhat reduce the potential for cumulative biodiversity impacts, given they primarily occur in distinct areas, except at the new Maragle substation development area. The avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR, along with similar provisions in the Snowy 2.0 - Transmission Connection BDAR are considered likely to control the risk of potentially significant cumulative biodiversity impacts in the locality.
Snowy 2.0 - Main Works EIS approved 2020	NSW South-Eastern Highlands region: • Bondo subregion • Monaro subregion	The project includes an underground pumped hydro power station and ancillary infrastructure. The main work at the Talbingo Reservoir site include excavated rock placement,	Construction was to commence in mid-2020 and	The project areas do not overlap, with approximately 5 km distance between the southern end of the HumeLink footprint and the western end of the Snowy 2.0 - Main Works footprint, at the southern end of the Talbingo Reservoir. The linear nature of both developments in the region may

Project	IBRA subregions	Details	Timing	Cumulative impacts
Modification 1 approved 2022	NSW South-Western Slopes IBRA region: • Inland slopes subregion Australian Alps region: • Snowy Mountains subregion.	portal construction and tunnelling, access roads and ancillary facilities for emplacement activities and tunnelling support.	be completed by mid-2025	somewhat reduce the potential for cumulative biodiversity impacts. The avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR, along with similar provisions in the Snowy 2.0 - Main Works BDAR are considered likely to control the risk of potentially significant cumulative biodiversity impacts in the locality. In light of these factors, no significant cumulative biodiversity impacts are considered likely to occur at the regional scale.
Inland Rail – Albury to Illabo EIS exhibited, responding to submissions.	NSW South-Western Slopes region: • Lower slopes • Inland slopes.	The Australian Rail Track Corporation (ARTC) is proposing to upgrade the Albury to Illabo Section of Inland Rail, along the 185 km of existing operational narrow-gauge railway from the Victorian/New South Wales border to Illabo in regional NSW. The project will involve Upgrades to 185 km of rail track from Albury to Illabo. Subject to planning approval, construction is expected to commence in 2024 and expected to be completed in mid-2025, with operations to commence in 2025. The project would primarily use the existing rail line, but additional areas for enhancements and modifications would be impacted in order to provide sufficient height and width to support the safe running of double-stacked freight trains.	Construction is proposed to commence in early 2024 and expected to take about 16 months. Construction expected to be completed in mid-2025.	The Inland Rail – Albury to Illabo project is considered unlikely to lead to a significant impact on any threatened species or ecological community listed under the EPBC Act, or on threatened aquatic species, ecological communities or their habitats. Impacts to biodiversity from the Inland Rail – Albury to Illabo project have been minimised, with impacts typically confined to edge areas along the existing railway. The predicted level of impacts are not considered likely to substantially contribute to cumulative impacts in relation to the potential impacts from HumeLink in a regional context. The linear nature of both developments in the region may somewhat reduce the potential for cumulative biodiversity impacts, given they primarily occur in distinct areas. The avoidance and minimisation measures, along with mitigation measures for residual impacts detailed in this BDAR and the Inland Rail BDAR would assist in reducing the likelihood of potential cumulative impacts.
Crookwell 3 Wind Farm Addendum EIS approved 2019	NSW South-Eastern Highlands region: • Crookwell subregion	The project involves the proposed energy facility known as the Crookwell 3 Wind Farm, which will involve the construction and operation of 16 wind turbines, connected to the grid via the 330 kV transmission line and ancillary infrastructure.	Construction to commence in 2022 and is likely to take 18 months to complete.	The ecological assessment for the project concluded that the Crookwell Wind Farm is unlikely to have a significant impact on any communities, populations or threatened species. The project is consistent with the principles of “improve or maintain” in relation to ecological impacts and although no offset is required, an offset of 60 ha is being proposed. Given the overlap in development area, there is the potential for biodiversity impacts within the locality to be compounded

Project	IBRA subregions	Details	Timing	Cumulative impacts
		The project site is beneath a portion of the HumeLink amended project footprint.		by the projects. However, this is unlikely, given the avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR. Especially when this is considered that the Crookwell Wind Farm is consistent with the principles of “improve or maintain”.
Belhaven Battery Energy Storage System	NSW South-Western Slopes region: • Inland slopes subregion	Construction and operation of a 400 MW / 800 MWh Battery Energy Storage System including transmission connection and associated infrastructure.	EIS being prepared. SEARs issued on 18/05/2023	The EIS is currently being prepared, however the Belhaven Battery Energy Storage System scoping report prepared for the project identified that “The woodland patches within the site, whilst degraded, contain numerous mature trees that provide breeding habitat for species such as the Superb Parrot“ (which was recorded within the site). “The trees identified as containing nests or as suitable habitat trees have been excluded from the potential developable area”. Areas of the CEEC White Box Yellow Box Blakely’s Red Gum Woodland are located north of the existing transmissions easement and would be avoided by project. Given the proximity of development area, there is the potential for biodiversity impacts within the locality to be compounded by the projects. However, this is unlikely, given the avoidance and minimisation measures, along with the mitigation measures for residual impacts detailed in this BDAR and proposed for the Belhaven Battery Energy Storage System.
Yass Solar Farm	NSW South-Eastern Highlands region: • Murrumbateman subregion	The construction, operation and decommissioning of a 100 MW solar photovoltaic energy generating facility with an associated battery energy storage system.	EIS being prepared. SEARs issued on 22/12/2023	The EIS is currently being prepared, however the Yass Solar Farm scoping report identified that four PCTs are potentially present within the study area, including one TEC (Southern Tableland Grassy Box Woodland). Detailed investigations for the Golden Sun Moth (*Synemon plana*) and Striped Legless Lizard (*Delma impar*) would be undertaken as part of the EIS assessment, as these threatened fauna are considered to have potential to occur and be impacted by the project. Given the overlap in development area, there is the potential for biodiversity impacts within the locality to be compounded by the projects. However, this is unlikely, given the avoidance and minimisation measures, along with the mitigation

Project	IBRA subregions	Details	Timing	Cumulative impacts
				measures for residual impacts detailed in this BDAR and those that would be required for the Yass Solar Farm.

14. Mitigation and management measures

This chapter addresses the mitigation and management measures to be implemented during construction and operation of the amended project.

14.1 Approach to impact mitigation and management

Environmental management strategies to mitigate and manage biodiversity impacts have been developed for the following stages of the amended project:

- detailed design
- construction
- operation.

These are discussed further in the following sections.

14.1.1 Detailed design phase

Impacts to matters of biodiversity conservation significance would be avoided to the greatest extent practicable during finalisation of the design and construction methodology for the amended project. To aid with this process, constraints mapping has been developed for the amended project. Areas within the amended project footprint that provide potential habitat for biodiversity of conservation significance (such as existing conservation sites, connectivity corridors, KFH, HBTs, and potential habitat for species listed as threatened under either the BC and/or EPBC Act) have been mapped as a biodiversity constraint, with conservation status, likelihood of occurrence and condition of available habitats forming key considerations. Micro-siting of the transmission line infrastructure and associated construction work sites and other areas of disturbance would occur to avoid impacts wherever practicable. Site features with the highest biodiversity conservation significance would be given the highest priority, in particular, known and intact habitat for threatened species and ecological communities.

Where native vegetation disturbance activities are required in areas that have not been previously subject to biodiversity survey, additional survey will be carried out prior to the commencement of construction to inform micro-siting opportunities, as part of the BMP (as detailed in Section 14.2.2). Priorities for additional survey would be based on: potential conservation value as identified through vegetation and habitat mapping for threatened species; and to address data gaps with regard to geographic and landform/habitat coverage. Additionally, this would potentially allow for impact reduction through field validation of conditions which have been assessed conservatively at this stage with assumed presence. These surveys would be carried out by a suitably qualified ecologist and survey windows will be aligned with construction timing as much as possible.

Opportunities to refine the areas to be directly disturbed within construction compounds and ancillary facilities, to prioritise impacts within areas of limited biodiversity value (ie cleared land or areas of native vegetation with vegetation integrity scores of less than 15 where an offset is not required) would be sought during design refinement, facilitated by the constraints mapping prepared for the amended project. Existing access tracks and waterway crossings have been prioritised for use in the amended project footprint, to minimise the construction of new tracks. Where this is not possible, the design would seek to minimise impacts to native vegetation. Transmission line structures would be located and constructed to minimise impact to vegetated riparian zones wherever practicable.

Any biodiversity offset credit liabilities related to retained vegetation such as the connectivity corridors would be considered in final BAM calculations (refer to Table 14-1 and Section 13.5).

The following electrical transmission industry-recognised method is proposed in regard to mitigating bird strike and EMF impacts during detailed design:

- design considerations to minimise interaction of birds with the transmission lines which might otherwise result in injury or fatality
- design considerations to minimise nesting on the transmission line structures, which might otherwise result in low-level EMF exposure to birds
- use of fauna deterrent devices, most likely consisting of the "flapper" variety. Positioning and exact diverter model is to be finalised during design refinement but at minimum these will be used within one kilometre of wetland/riverine habitats to reduce impacts on aerial fauna species from collision and allow safer passage within these areas.

Two CLASS 1 streams (Derringullen Creek and Gilmore Creek) have been identified as proposed indicative crossing locations (Section 13.7.1). It is recommended that waterway crossing methods are reviewed for any CLASS 1 streams during detailed design to establish the most suitable crossing method given the size of the streams and permanence of flow. Based upon the CLASS 1 rating and size of the streams, the potential for impacts to KFH and fish passage is increased at these sites. Therefore, a single span bridge structure is recommended, aligning with the recommended crossing types identified by NSW DPI Fisheries.

The complete suite of detailed design measures is detailed in Table 14-1. In addition to the development and implementation of the CEMP, specific mitigation measures have been identified for inclusion in a BMP. The proposed measures have been identified to manage both construction and operational impacts and some measures have been identified to manage impacts in a site-specific location. The location/s applicable to each mitigation measure are identified in the Table 14-1 where relevant. For construction, the BMP would set out measures to minimise and manage impacts on biodiversity. See Table 14-1 for detailed measures to be addressed in the BMP. Other specific pre-construction measures are also listed in Table 14-1.

These include preparation of:

- Supplementary Hollow and Nest Strategy to offset loss of tree hollow fauna habitat
- Connectivity Strategy.

These strategies may be prepared pre-clearing, updated and implemented on a staged basis across the amended project footprint, aligned with the proposed construction and clearing schedule.

14.1.2 Construction phase

The construction phase would be guided by implementation of the CEMP and related BMP as well as the Supplementary Hollow and Nest Strategy and Connectivity Strategy.

The complete suite of proposed mitigation measures during construction of the amended project are detailed in Table 14-1.

14.1.3 Operation phase

Transgrid would amend and/or develop and implement guidelines and procedures for operation and maintenance of the amended project that address the vegetation clearing and maintenance commitments in this BDAR and seek to avoid or minimise disturbance in areas of high biodiversity conservation significance (ie threatened species and communities). Relevant Transgrid operational workers and vegetation maintenance contractors would receive training regarding the operational and maintenance guidelines and procedures.

Proposed mitigation measures during operation of the amended project are outlined in Table 14-1.

14.2 Proposed mitigation and management measures

Proposed mitigation and management measures are documented in Table 14-1, which includes details of the matter, timing, and location for implementing each measure. Details regarding frequency and responsibility for each mitigation and management measure will be addressed in the BMP. To illustrate the changes to mitigation measures between the EIS and the amended project, text that has been removed is shown in **~~strike through~~** and new text is shown in **bold** text. For the purposes of the mitigation measures, reference to 'project footprint' has the same meaning as 'amended project footprint'.

The mitigation and management measures proposed have been developed based on experience on other major transmission line projects similar in nature and location (such as Snowy 2.0 Main Works (EMM 2019) Snowy 2.0 Transmission Connection Project (Jacobs, 2021), EnergyConnect (NSW-Eastern Section) (WSP, 2022), EnergyConnect (NSW-Western Section) (WSP, 2021)), and with consideration of mitigation and management measures adopted on other linear infrastructure projects (such as roads, rail and pipelines). This includes the implementation of risk assessment processes guided by experienced construction environment professionals. As such, the proposed measures are considered likely to be effective.

Government and industry policies, guidelines and procedures have been developed to address potential impacts from major infrastructure projects. Mitigation measures carried out in accordance with these guidelines and procedures have proven to be effective on similar projects. As such, the proposed measures are considered to be proven.

Adaptive management measures are required to evaluate remaining risks and associated consequence for biodiversity after mitigation measures are applied. Adaptive management is an adjustment of actions based on results, to achieve a specified outcome (DPE, 2023a). Adaptive management is provided in Table 14-1 for the following:

- uncertain impacts, such as those associated with inaccessible lands/unexpected finds
- for risk associated with potential failure of mitigation
- circumstances where avoidance by the final design may not be achievable
- prescribed impacts on Category 1 land.

Adaptive management plans are underpinned by monitoring programs, which signal if mitigation measures are being implemented as planned. They provide early warning of ineffective measures and/or uncertain impacts occurring (DPE, 2023a). Monitoring programs, inspections and independent auditing would confirm the effectiveness of mitigation measures. Further measures would be developed and undertaken if required, including implementation of corrective and preventative actions for any actual or potential non-compliant activities.

The estimated costs of the environmental mitigation measures provided in this BDAR are considered an integral component to the amended project and as a result have been captured in the amended project capital costs. In order to confirm the effectiveness of these mitigation measures, compliance monitoring audits would be undertaken by the Environmental Representative, Transgrid, independent auditors and regulators. Audit frequency and reporting parameters would be identified in the CEMP. Independent audits would be carried out in accordance with the Independent Audit Post Approval Requirements (DPIE, 2020g).

Table 14-1: Summary of proposed mitigation measures

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
B1	Biodiversity conservation significance	Impacts to matters of biodiversity conservation significance will be avoided to the greatest extent practicable during finalisation of the design and construction methodology for the project. **Biodiversity constraints mapping will be used to guide prioritisation of areas of high biodiversity conservation significance (particularly serious and irreversible impacts (SAIIs), and critically endangered ecological communities (CEECs)) to avoid, where practicable. Spatial data, threatened species locations and constraints mapping will be provided to the design and construction teams and considered in detailed design. Associated mapping will be included on sensitive area plans and provided to the construction workforce.** Micro-siting of the transmission line infrastructure and associated work sites and other areas of disturbance **(eg controlled blasting and rock crushing sites)** will occur to avoid or minimise impacts wherever practicable. Site features with the highest biodiversity conservation significance, in particular recorded threatened species, and their habitat, will be given the highest priority for impact avoidance. This will also include micro-siting to avoid or minimise prescribed impacts (as described in ***Technical Report 1 – Revised Biodiversity Development Assessment Report*** (the BDAR**)**) where possible (ie avoiding impact to rocky habitats or caves and waterways). Micro-siting of infrastructure requiring sub-surface work, such as transmission line structure footings, will be undertaken as part of the detailed design stage of the project, to minimise prescribed impacts where possible (ie avoiding impact to breeding habitat features, **groundwater dependent ecosystems (**GDEs**)**, aquatic habitats and supporting aquifers). **Clearing will be undertaken in accordance with the Vegetation Clearing Memo and where practicable will conserve mid and ground story vegetation in the ECZ and HTZ. Vegetation clearing methods in areas of threatened groundcovers (eg orchids) may require a bespoke approach.** **~~Spatial data (refer to Technical Report 1 - Biodiversity Development Assessment Report for species polygons for species credit species) and buffered threatened species locations will be provided to the design and construction teams and considered in detailed design. Associated mapping will be included on sensitive area plans and provided to the construction workforce.~~**	Detailed design and construction	All locations	Proven

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
B2 ~~B5~~	**~~Biodiversity conservation within~~** Protected areas and conservation lands	Design and micro-siting of project infrastructure including transmission line structure benches and access tracks will avoid and/or minimise impacts within protected areas (ie nature refuges) and conservation lands (ie established BioBank and Biodiversity Stewardship sites and Conservation Agreement sites) occurring within the project footprint.	Detailed design	Conservation Agreement site situated adjacent to Bago State Forest or any established BioBank and Biodiversity Stewardship sites within the project footprint	Effective
B3 ~~B18~~	Biodiversity Management **Plan**	A **Biodiversity Management Plan (**BMP**)** will be prepared in consultation with **~~BCD~~ NSW DCCEEW Environment and Heritage** and approved by **DPHI ~~DPE~~** prior to construction. The BMP will be prepared by a qualified ecologist and include a plan for implementing, evaluating and reporting on the effectiveness of all mitigation measures outlined in ***Technical Report 1 – Revised Biodiversity Development Assessment Report*** (the BDAR**)**, including: • Measures to minimise impacts to biodiversity, including measures to reduce disturbance to sensitive flora and fauna procedures for clearing of vegetation, including pre-clearing inspections and procedures for the relocation of flora and fauna. • Preparation of a fauna handling and rescue procedure to be implemented during construction and operation for the ethical handling of injured or displaced fauna. Further, the fauna handling and rescue procedure would include an incident reporting protocol for fauna relocations, rescue and rehabilitation, euthanasia and/or fatality. • Procedures for the demarcation and protection of retained vegetation, including vegetation adjacent to construction areas and **during** weed management. • Vegetation clearing procedures for a two staged habitat removal process required for removal of key habitat features (hollow-bearing trees, habitat trees, and bushrock) identified in ***Technical Report 1 – Revised Biodiversity Development Assessment Report*** (the BDAR**)** and/or pre-clearing inspection, including procedures to record the effort and outcomes of the habitat removal process. • **~~Measures to protect retained vegetation~~**	Detailed design and construction	All locations	Proven/ Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• ~~**Measures to avoid and minimise impacts to Golden Sun Moth, Striped Legless Lizard and Pink-tailed Legless Lizard habitats within transmission line easements during construction and operation**~~ • ~~**A rehabilitation plan for Golden Sun Moth habitat temporarily disturbed during construction incorporating seeding without the use of fertiliser or clover. The plan would include a suitable mix of native C3 grasses including Wallaby grasses Rytidosperma spp. and Speargrasses Austrostipa bigeniculata, A.scabra and a low biomass dryland C4 grass (ie Redleg grass Bothriochloa macra). A temporary nurse crop such as sterile ryecorn could be used to stabilise the soil and suppress weeds during establishment. Planting specifications and requirements for post-care, including weed control, are to be outlined in the plan.**~~ • Retention of habitat features such as rocky outcrops, surface rock, **dead wood**, logs, wherever practicable. • ~~**Habitat supplementation measures such as nest boxes, hollow re-use / creation, re-use of timber/logs as habitat within the transmission line easement where practicable. A monitoring program will also be developed to assess the efficacy of supplementary habitat measures on an ongoing basis in accordance with a Supplementary Hollow and Nest Strategy**~~ • Proposed rehabilitation of temporary disturbance areas including management and maintenance measures. • Unexpected species finds protocol to be implemented if threatened ecological communities, flora and fauna species, not assessed in ***Technical Report 1 – Revised Biodiversity Development Assessment Report*** **(**the BDAR**)**, are encountered during pre-clearing inspections. • A description of biosecurity protocols for plant and equipment movement between sites, including species specific measures. • Education of construction teams regarding the presence of native fauna and risks of vehicle collision, particularly early in the morning and late in the afternoon/at night; implementation of speed limits on sealed and unsealed tracks and roads. • Outline monitoring and compliance management requirements. • Approach to relocation of nests by suitably qualified ecologist where found within construction work sites (ie nests found in hazardous areas will be translocated to nearby safe areas, direct handling of eggs and chicks will be avoided where possible). This could include potentially new poles/nest platforms. • Details on the pre-clearing and clearing supervision process.			

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• ~~Approach to avoid building during raptor nesting periods~~ • ~~Site specific monitoring of Booroolong Frog habitats within and adjacent to proposed work locations to inform appropriate construction controls and contingency measures.~~ • **Procedures for consultation with DPI Fisheries and pre-construction survey (where required) for threatened aquatic species should be established (and Commonwealth DCCEEW for Riek's Crayfish, as required), along with processes for reporting and consideration of recommendations into design and construction methods, as relevant.** • **Procedures for reporting the outcomes of pre-construction aquatic biodiversity surveys (where required under mitigation measure B33) at CLASS 1 crossing locations (new and upgraded tracks) potentially supporting threatened aquatic species and any management measures to be implemented (eg timing construction outside of breeding seasons, crossing type, micro siting).** • **Procedures for the stockpiling and supply of felled trees for KFH rehabilitation or improvement works, including procedures for consultation with DPI Fisheries.** **The BMP will include adaptive management measures for uncertain/ indirect/ prescribed impacts and a biodiversity monitoring program. The adaptive management measures would detail procedures for uncertain impacts, risk associated with potential failure of mitigation, circumstances where avoidance may not be achievable and prescribed impacts. The adaptive management measures would be underpinned by monitoring programs, to provide early warning of ineffective measures and/or uncertain impacts occurring. The adaptive management measures would include:** • **performance criteria to guide monitoring** • **measurable thresholds to identify when remedial action is triggered** • **adaptive management response/actions** • **a trigger for additional credit obligations and/or conservation measures for uncertain, indirect or prescribed impacts, where these impacts cannot be adaptively managed** • **reporting requirements.** ~~This plan will also the guide the re-use of hollows, logs, limbs and other habitat features encountered during clearing to be retained for placement within adjacent vegetation or on the maintained easement within shrub retention areas, in accordance with the revegetation plan.~~ ~~The BMP will include a program to monitor, evaluate and report on the outcomes of a biodiversity monitoring program, as relevant.~~ The **adaptive management measures and**			

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		monitoring program will be developed to target specific species considered to be most at risk of significant impacts, as determined during the detailed design phase. The BMP will stipulate objectives for monitoring**, reporting and evaluation**, and how baseline data will be captured and represented.			
B4 ~~**B2**~~	~~**Biodiversity conservation**~~ **Supplementary biodiversity survey**	Where ~~**native vegetation disturbance**~~ **construction** activities are required in areas **of native vegetation** that have not been previously subject to biodiversity survey, ~~**additional**~~ **supplementary biodiversity** survey will**, where possible,** be carried out prior to ~~**work occurring in any such areas**~~ **disturbance** to inform detailed design **and micro-siting opportunities, adherence to clearing limits and biodiversity offsetting requirements. Areas subject to additional survey may include but are not limited to previously inaccessible lands, tracks to access isolated clearing areas and any areas requiring direct impacts outside the project footprint.** ~~**Priorities for additional survey will be based on potential conservation value (identified through vegetation and habitat mapping for threatened species), and geographic and landform/habitat coverage data gaps.**~~ ~~**Additional biodiversity survey will be conducted to assess the condition of vegetation where threatened species habitat has conservatively been assumed to be present.**~~ The surveys will be carried out by a suitably qualified ~~**ecologist**~~ **person** and ~~**will allow for additional impact reduction opportunities.**~~ **would incorporate the following at a minimum:** • **survey of the area of vegetation to be cleared to determine clearing extent** • **vegetation surveys to determine PCTs/TECs and Vegetation Integrity of the areas to be impacted** • **survey and map habitat constraints for candidate threatened species to inform presence/ absence** • **additional targeted surveys to confirm presence/ absence of candidate flora and fauna species conservatively assumed present.** • **adaptive management measures in the BMP will outline appropriate response actions to be implemented in the event that additional biodiversity constraints are identified.** • **an assessment of the likelihood of additional indirect and prescribed impacts as a result of additional clearing and disturbance to be undertaken prior to clearing.**	Detailed design **and construction**	All locations	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		Future survey requirements and processes for reporting and consideration of recommendations into design and construction methods, as relevant, will be included in the BMP (mitigation measure B3).			
B5	**Supplementary Biodiversity Assessment Strategy**	**A Supplementary Biodiversity Assessment Strategy (SBAS) will be prepared and implemented by Transgrid with the primary purpose of credit liability reduction. The SBAS will be prepared in consultation with NSW DCCEEW Environment and Heritage and will include but is not limited to:** • **Target species, approach and timing of post *Technical Report 1 – Revised Biodiversity Development Assessment Report* biodiversity surveys. Results will be used for design and construction avoidance (where possible) plus validation of assumed presence where a credit liability reduction is proposed.** • **Method for validation of PCTs/TECs assumed present on previously inaccessible land where surrogate, duplicate or benchmark plots were used and low confidence of PCT allocation or condition.** • **Monitoring, and periodic reporting of final areas of impact and application for credit liability reduction.** • **Approach for any newly identified PCTs/candidate species.** **A trigger for additional credit obligations and/or conservation measures for uncertain, indirect or prescribed impacts, where these impacts cannot be adaptively managed.**	**Detailed design and construction**	**All locations**	Effective
B6	**SAIIs**	**The design and construction methodology for the project must identify additional avoidance and minimisation measures to further reduce impacts to entities which are likely to have a serious and irreversible impact to the greatest extent practicable. Opportunities for intact and/ or higher condition remnants should be prioritised for avoidance incorporating consideration of connectivity between retained remnants within and adjacent to the project footprint must be considered in the connectivity strategy.**	**Detailed design**	**Where SAII candidate species considered likely to result in SAII are mapped**	Effective
B7	**SAIIs**	**Additional and Appropriate Measures (compensatory measures) are to be implemented by Transgrid where impacts to likely SAIIs cannot be further reduced and/ or where likely SAII risks remain. Compensatory measures will be developed and delivered in consultation with the NSW DCCEEW Environment and Heritage and incorporate and/or support the long-term**	**Construction and operation**	**Retained remnants and potential stewardship**	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		augmentation, enhancement and protection of native vegetation and/or habitat of the target entity within landscapes local to the impact.		**site locations within and adjacent to the easement**	
B8 ~~**B6**~~	**Threatened frogs:** Booroolong Frog**, Sloane's Froglet, Stuttering Frog and Yellow-spotted Tree Frog** ~~**habitat**~~	Where **threatened frog (including** Booroolong Frog**)** habitats have been identified the following avoidance measures will be implemented**, where practicable:** • avoid installing waterway crossings • avoid disturbance within 50 m of the top of bank of the waterway (including riparian vegetation). Where avoidance is not possible: • Waterway crossing designs should avoid instream structures to minimise the potential for hydrological change, erosion and sedimentation impacts of downstream environments. • Location of waterway crossings will be determined in consultation with a suitably qualified Ecologist to avoid or minimise impacts to potential habitats or ecological features. • Develop site specific erosion and sedimentation control plans to ensure the potential for erosion and sedimentation impacts are minimised as far as practicable, including monitoring the success of erosion and sediment control measures. • **Develop and implement site-specific hygiene protocols (eg cleaning of plant machinery), to minimise the spread of pathogens and exotic weeds during and post-construction (in line with *Hygiene protocols for the control of diseases in Australian frogs* [DCCEEW, 2011]).** A suitably qualified ecologist will be engaged to undertake **site specific** monitoring surveys for the species at the **proposed creek** crossing site**s within and adjacent to the species habitat as well as** ~~in~~ downstream receiving environments~~**, in accordance with the Biodiversity Management Plan (**~~**that may be subject to potential indirect impacts. The** BMP~~**) and in consultation with the BCD.**~~ **(refer to mitigation measure B3) will incorporate a monitoring program for threatened frogs to be implemented during construction.**	Detailed design and construction	~~**Leech Gully (and associated first and second order tributaries), Gilmore Creek and Adjungbilly Creek**~~ **Threatened frog habitats within 250 m downstream of the project footprint. Potential construction monitoring site locations have been identified at Tarlo River, Wollondilly River, Adjungbilly Creek, Brungle Creek, Yaven Creek and Adelong Creek (Figure 13-2 of *Technical Report 1 –***	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
				***Revised Biodiversity Development Assessment Report*).**	
B9	**Threatened insects: Golden Sun Moth and Key's Matchstick Grasshopper**	**The detailed design will consider opportunities to avoid and minimise impacts to Golden Sun Moth and Key's Matchstick Grasshopper within transmission line easements to be implemented during construction.** **As a part of the BMP (refer to mitigation measure B3), a rehabilitation plan would be developed for threatened insect habitat temporarily disturbed during construction. Planting specifications and requirements for post-care, including weed control, are to be outlined in the plan and would be subject to agreement of the relevant landowner.**	**Detailed design and construction**	**Within mapped habitats**	Proven
B10 ~~B16~~	Connectivity strategy	As a part of the BMP **(refer to mitigation measure B3)**, a Connectivity Strategy will be developed **~~following design refinement~~ in consultation with NSW DCCEEW Environment and Heritage ~~and pre clearing~~**. The core objectives of the strategy will be to outline the final location**s** of the proposed mitigation measures identified within ***Technical Report 1 – Revised Biodiversity Development Assessment Report***. The Connectivity Strategy will be implemented to maintain connectivity in areas identified as facilitating fauna movement **~~(as identified in Technical Report 1 - Biodiversity Development Assessment Report)~~**. Consideration of connectivity corridors will occur as a minimum at: • key riparian crossings • areas of the transmission line joining proposed biodiversity stewardship sites (ie Donna Valley Biodiversity Stewardship Site) and/or conservation reserve estate (ie Tarlo River National Park, Bango Nature Reserve, Mudjarn Nature Reserve and Minjary National Park) • transmission line structure locations that occur in woodland vegetation at strategic locations (ie vegetation corridors with moderate to high landscape connectivity, and with moderate to high levels of fauna activity/ movement). The final locations of connectivity corridors and minimum width requirements will be identified **~~as part of a Connectivity Strategy developed in consultation with BCD (as identified in~~ *~~Technical Report 1 - Biodiversity Development Assessment Report; Figure 13-15~~*~~)~~**. Access tracks will avoid connectivity corridors and favour existing access wherever possible. Construction will avoid and minimise any disturbance of connectivity corridors, where	Detailed design and construction	Transmission line corridor at strategic locations (as identified in *Technical Report 1 –* ***Revised*** *Biodiversity Development Assessment Report*; **Attachment 24, Figure 13-2~~,~~ ~~Figure 13-15~~**)	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		practicable. Connectivity measures such as fauna sensitive structures (ie under transmission glider poles), vegetation stepping stones, or reduced clearing will be considered**. Glider connectivity opportunities will be considered** in at least six locations within the project footprint~~, where gliders have been observed using the area.~~ **that align with glider corridors and opportunities identified in the glider memo (Niche, 2023)**.			
B11 ~~B17~~	**Collision risk and** Bird-strike	~~As a part of the BMP,~~ Conductor line-marking techniques will be considered at specific locations identified in ***Technical Report 1 – Revised Biodiversity Development Assessment Report*** (the BDAR**)** during design refinement to minimise bird strike. Use of fauna deterrent devices, most likely consisting of the "flapper" variety, will be considered. Positioning and exact diverter model will also be considered during detailed design and will be developed as part of the ~~Connectivity Strategy~~ **project design**. At a minimum, these will be used at sites recommended for specific corridors (refer to *Technical Report 1 –* ***Revised*** *Biodiversity Development Assessment Report***, Attachment 24**) where flapper devices are considered warranted based on distribution, and nature of avifauna records, and nearby suitable waterbird habitat (within 1 km). **Fauna deterrent methods proposed are outlined in the Connectivity Strategy.**	Detailed design	Transmission line corridor – at sites recommended for specific corridors (as identified in *Technical Report 1 –* ***Revised*** *Biodiversity Development Assessment Report*; **Attachment 24** ~~**Attachment 21**~~)	Effective
B12 ~~B21~~	~~**Alternative roosting and/or nesting habitat for threatened fauna**~~ **Supplementary Hollow and Nest Strategy**	~~Nest boxes will be provided for~~ **Develop and implement a Supplementary Hollow and Nest Strategy to provide** alternative roosting and/or nesting habitat for threatened fauna displaced during clearing ~~in accordance with a Supplementary Hollow and Nest Strategy~~. The strategy ~~will include~~ **should address measures such as nest boxes, hollow re-use / creation, re-use of timber/logs as habitat within the transmission line easement where practicable.** **The strategy would be captured in the BMP (as per mitigation measure B3) and will address** the following requirements: • **nest boxes and other supplementary measures (such as hollow hogs) to be installed as close to the cleared area as possible (subject to landowner agreement and suitable trees being present)**	Construction	All locations where hollow bearing trees are being removed	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• survey of tree hollows and nests within the proposed clearing extents • identify the **target species,** size, type, number and **suitable** location of nest boxes**/hollows** required based on the results of the ecological surveys and active hollow resources in adjacent areas • ~~**appropriately sized**~~ **the installation of appropriate** nest boxes **or hollow replacements** will be ~~**installed within the vicinity of hollow-bearing trees (subject to landowner agreement and suitable trees being present) no more than two weeks**~~ **undertaken as early as practicable** prior to clearing ~~**of**~~ **activities to prevent** the ~~**tree**~~ **use of the nest boxes or hollow replacements by invasive or non-targeted species** • nest boxes **can** ~~**will**~~ also include the re-use of existing hollows salvaged prior to or during clearing where practicable • **record the type, height, orientation and location of nest boxes installed and provide as spatial data to Transgrid** • **an annual monitoring program to assess the efficacy of supplementary habitat** measures ~~**to address and manage nests (such as raptor nests) prior to clearing**~~. **Throughout the construction phase.** **Post construction monitoring and replacement of damaged nest boxes will form part of discussions with individual landowners.**			
B13 ~~**B23**~~	Biodiversity exclusion zones	Biodiversity exclusion zones for retained vegetation and threatened species habitats will be confirmed by a suitably qualified ecologist and identified as 'No disturbance' zones prior to the commencement of clearing or any site activity that could damage the vegetation within the exclusion zone. These areas will be identified as a no-go zone within approved plans and on-site demarcation will be required. High visibility protection fencing will be erected on site including signage clearly identifying these areas as no-go zones. Requirements for the protection and management of no-go zones will be addressed as a part of the site induction. Biodiversity exclusion zones will be physically marked and demarcated, and included on sensitive area maps and project GIS/GPS systems, prior to clearing. ~~**Further information regarding priorities for biodiversity exclusion zones are detailed in Technical Report 1 – Biodiversity Development Assessment Report.**~~	Detailed design and construction	Transmission line easement (at relevant sites)	Proven

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
B14 ~~B24~~	Biodiversity management training	All relevant project personnel involved in vegetation clearance, including relevant sub-contractors will be trained on biodiversity management protocols and the 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.	Construction	All locations	Effective
B15 ~~B25~~	Features of high biodiversity conservation significance	Features of high biodiversity conservation significance within the operational easement, including biodiversity exclusion zones identified during construction and retained habitat for threatened species, will be recorded in Transgrid's GIS. The GIS information will be reviewed during the planning of all maintenance or other future activities that could cause disturbance.	Construction and operation	All locations, as relevant	Effective
B16 ~~B26~~	Vegetation clearing and maintenance	Update and implement existing procedures and guidelines for operation and maintenance of the project that address the following: • vegetation clearing and maintenance commitments in ***Technical Report 1 – Revised Biodiversity Development Assessment Report*** (the BDAR**)** and EIS • avoiding access and disturbance in biodiversity exclusion zones identified during the construction • avoiding access and disturbance in areas of high biodiversity conservation significance • avoiding maintenance of vegetation that does not need to be maintained during operation. Provide training to relevant Transgrid operational workers and vegetation maintenance contractors regarding the operational and maintenance guidelines and procedures.	Operation	All locations	Effective
B17 ~~B28~~	Vegetation clearing	Works for clearing and construction of access tracks will be carried out in such a manner that the least practicable disturbance to actual ground cover and contours is caused. Trees will be removed as close as possible to ground level and root balls will be left in situ wherever practicable. Areas of particular focus for minimising ground disturbance include the following: • steep or Highly Erodible lands where slopes are in excess of 18 degrees from the horizontal • Protected Riparian Land (PRL) defined as land within 20 m of the bed or bank of a prescribed stream. Generally, named watercourses are classed as protected riparian land; however, some unnamed watercourses may be classed as protected riparian land	Construction	Transmission line corridor - Protected Lands or waterfront land	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• waterfront land (40 m from the top of bank) • in areas where large rock outcrops are prevalent on the easement • hazard trees identified from the LiDAR assessment will be flagged for removal, and any adjacent and important habitat trees and features identified for retention will be clearly marked and included in maps within the CEMP to avoid disturbance during the felling activities.			
B18 ~~B27~~	Revegetation of disturbed areas	All disturbed lands/areas must be managed throughout the construction work (in accordance with the relevant *Managing Urban Stormwater* (Landcom, 2004) (Blue Book) or comparable best practice guidelines, including: • vegetation removal, restoration, and management • stockpiling, erosion and sediment management • stabilisation / rehabilitation of disturbed lands/areas must be undertaken within suitable timeframes • temporary erosion and sediment controls must be maintained (and not removed) until rehabilitation measures are providing effective stabilisation of disturbed lands/areas. Disturbed areas (including areas not required for operation) will be stabilised/rehabilitated to a standard either: • as agreed with the landowner • in accordance with the relevant Managing Urban Stormwater (Blue Book) or comparable best practice guidelines.	Construction	All locations	Effective
B19 ~~B29~~	Re-use of felled timber	Logs and tree hollows that could provide fauna habitat (the total length of wood at least 10 cm in diameter and at least 0.5 m long) will be relocated to adjacent **~~woodland~~** and/or suitable woodland locations where available/feasible. **Opportunities to retain felled trees as habitat on-easement will be considered in select areas (ie connectivity corridors and riparian lands).** The opportunity to stockpile and supply felled trees for KFH rehabilitation or improvement work will be discussed with DPI Fisheries. Trees within the boundaries of State forests, Crown Lands, Travelling Stock Reserves, public roads or within 40 m of the bank of any river will be disposed of strictly in accordance with the	Construction	Transmission line corridor	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		requirements of the appropriate authorities. These requirements will be determined by the contractors before carrying out such work.			
B20 ~~**B22**~~	Pre-clearing survey	Pre-clearing surveys will be completed prior to clearing at each location by a suitability qualified and experienced ecologist. The proposed clearing extents will be marked out on site prior to the pre-clearing surveys. During the surveys, the ecologist will: • survey the proposed clearing extent • identify any fauna **habitat and fauna** that will require relocation prior to clearing; **document location of any fauna release sites off easement** • confirm the location and mark out the extents of any biodiversity exclusion zones **including locations of unexpected finds (threatened species or threatened species habitat)** • **confirm presence of karst roosting habitat for bats within areas identified as high potential karst habitats and develop adaptive safeguards to mitigate indirect impacts to roosting individuals** • confirm that hollow-bearing trees **to be retained** within and adjacent to the clearing extents are prominently marked/tagged • 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.**~~ • survey and confirm the presence of raptor nests within and adjacent to the clearing extents • ~~**document, mark and record the location of threatened flora/fauna**~~ • ~~**document, mark and record other habitat features (eg rock piles) to be retained if possible.**~~ ~~**The results of the pre-clearing surveys will be used to update and confirm the accuracy of sensitive area maps.**~~	Detailed design and construction	Transmission line **easement** ~~**corridor**~~ (at relevant sites)	Proven
B21 ~~**B3**~~	Hazard tree clearing	Opportunities for individually assessing and selectively clearing hazard trees will be considered further during detailed design to minimise impacts. Hazard tree inspections would be undertaken by an appropriately qualified arborist prior to the commencement of construction in accordance with *Transgrid's Maintenance Plan – Easement and Access Tracks*.	Detailed design and construction	Hazard tree zone	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
B22 ~~**B19**~~	Biosecurity and hygiene protocols	A Biosecurity Management Plan will be developed as a part of the BMP, to be implemented during construction. The plan will include: • Protocols for the identification of priority weed species, relevant pests and diseases of concern, mandatory reporting obligations and management of Emergency, Control and Biosecurity zones as per the NSW Biosecurity Act 2015. • Weed and pest animal management and monitoring requirements would also be outlined within the plan where relevant. • **Inclusion of a Trigger Action Response Plan (TARP) for key biosecurity threats including known biosecurity threats to threatened species and populations.** • Locations, timing and methods for removing soil and plant matter from vehicles and machinery and sourcing clean soil and materials free of contaminants for construction work. • Clean down stations (water or air, dependent on the identified biosecurity risk) will be constructed at suitable locations to clean down vehicles and employee shoes to stop the spread of weeds, pathogens (eg amphibian chytrid fungus, Phytophthora **cinnamomi** ~~**cinnamomic**~~, exotic rust fungi and Epizootic Haematopoietic Necrosis Virus (EHNV)) and the introduction of new species. The biosecurity plan would address any Property Management Plan requirements where relevant. • **Phytophthora has been detected in locations associated with the adjoining Snowy 2.0 project and in Lob's Hole (as identified in Appendix C (NSW DCCEEW Environment and Heritage detailed response) of the Submissions Report). If construction vehicles are required to move through areas of known or likely infestation, the risk of spread will be managed through the implementation of suitable hygiene protocols detailed in the Biosecurity Management Plan.** **Transgrid would consult with relevant agencies and groups involved with pest management in order to contribute to existing or future monitoring and management programs. Consideration of potential contributions would be targeted towards areas where greatest impacts occur, particularly through relatively intact landscapes where easement introduction increases the risk of native fauna predation.**	Detailed design and construction	All locations	Proven
B23 ~~**B20**~~	~~**Weed management**~~ **Biosecurity and hygiene protocols**	**A** weed control strategy **would be developed and implemented** during the operational stage of the project will be guided by existing Transgrid operational weed management procedures **to manage existing or emerging issues**. ~~**During maintenance activities, general biosecurity duty obligations will be implemented as per existing Transgrid procedures. Biosecurity risks within**~~	Operation	All locations, as relevant	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		~~**the works footprint, such as weeds, would also be assessed and control measures implemented, as required, to manage existing or emerging issues.**~~			
B24 ~~**B31**~~	Light	Directional lighting will be used for any permanent lighting ~~**required**~~ (ie substation) **or temporary lighting (ie worker accommodation) required** to minimise light spill as much as possible in accordance with *Australian standard AS4282:2019*. Artificial lighting required during construction will be directed towards the work site and minimise light spill, to the extent practicable. **Permanent lighting will be erected at least 50 m from remnant vegetation where practicable.**	Detailed design and construction	All locations	Effective
B25	**Noise and vibration (controlled blasting and crushing)**	**Prior to controlled blasting and/or crushing activities taking place an ecologist will be engaged to determine potential impacts on Bats, Owls, Cockatoos, Raptors and Superb Parrot. An impact assessment of proposed activities will be completed, and if impacts are likely, appropriate mitigation measures will be proposed. Mitigation measures may include cessation of certain activities, avoiding breeding seasons (where practicable) and/or amending the construction methodology including selecting alternative plant or equipment. Any impact assessments conducted will be provided to NSW DCCEEW Environment and Heritage. In the unlikely event that impacts are unavoidable, offsetting requirements will be discussed with NSW DCCEEW Environment and Heritage.**	**Detailed design and construction**	**All locations**	Effective
B26 ~~**B7**~~	Surface water, soils and groundwater	The key measures proposed to avoid, manage and/or mitigate impacts to surface water, and groundwater and soils will involve: • Preparation of Soil and Water Management Plans (SWMPs) as part of the Construction Environmental Management Plan (CEMP) to manage water quality impacts during construction of the project, **including water quality monitoring requirements.** • Preparation of Erosion and Sediment Control Plans (ESCPs) by a certified professional in erosion and sediment control ~~**and Water Quality Monitoring Program (WQMP) within the SWMPs**~~**.** • Consideration of appropriately designed scour protection at new stormwater management points. The SWMP will include a combination of the following ~~**plans**~~: • ESCPs	Detailed design and construction	All locations	Proven

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• **water quality monitoring requirements** ~~**WQMP**~~ • ~~**Excavation Dewatering Plans**~~ • **management of dewatering processes** • Emergency Spill **Procedure** ~~**Plans**~~ • Unexpected Contaminants Finds Protocol. ESCPs will be developed for the activities and areas that are considered higher risk. The plans will detail the processes, responsibilities and measures to manage potential soil and water quality impacts in accordance with the principles and requirements in: • *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom, 2004) and Volumes 2A (DECC, 2008a) and Volume 2C (DECC, 2008b), commonly referred to as the 'Blue Book' • *Best Practice Erosion and Sediment Control* (IECA, 2008) • **Controlled activities -** Guidelines for ~~**Controlled Activities**~~ **instream works** on Waterfront Land (**DPE Water, 2022b** ~~**NRAR 2018**~~).			
B27 ~~**B8**~~	Riparian corridors	To the greatest extent practicable: • Transmission line structures will be located and constructed to minimise impact to vegetated riparian zones (VRZs). • The final transmission line easement will target narrow crossing points of waterways and riparian areas clear of vegetation. • Shrub or ground stratum native vegetation within vegetated riparian zones will be protected to the greatest extent practicable, with vegetation clearing ideally limited to the tree stratum only, with trunk bases being retained in-situ. • Where threatened species are known to occur, work methods will avoid or minimise impacts by limiting clearing wherever possible and delineating their habitat outside the final disturbance area as no-go zones. • Work near waterways will be undertaken to avoid impacts such as herbicide drift/overspray, erosion and damage to the banks. Riparian areas subject to disturbance will be progressively stabilised and rehabilitated. • **Disturbance of bush rock in riparian areas will be avoided wherever practicable.**	Detailed design and construction	Transmission line corridor - within riparian corridors	Effective
B28 ~~**B4**~~	Biodiversity ~~**conservation along access tracks**~~ **impact**	~~**Existing tracks**~~ **Micro-siting of infrastructure requiring sub-surface work, such as transmission line structure footings** and ~~**clearings**~~ **access tracks**, will be ~~**used, where possible, to limit**~~	Detailed design and construction	~~**All locations**~~ **Transmission line corridor,**	Proven

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
	avoidance and minimisation	**undertaken as part of** the ~~**construction of new tracks. Where this is not possible, the**~~ **detailed** design ~~**will seek**~~ **stage of the project,** to: • minimise **prescribed impacts and** impacts to native vegetation, **where possible** including cut and fill • design and micro-siting of new access tracks will seek to avoid or minimise impacts to **breeding and sheltering** habitat **for fauna, including** habitat trees and rocky habitats (ie rock outcrops, large boulders, piled rock, and rock features that provide potential sheltering) **avoid impacts to groundwater dependent ecosystems (GDEs), aquatic habitats and aquifers** • **prioritise restoration of disturbed areas within lands of high biodiversity significance including connectivity corridors, intact vegetation remnants** and breeding habitat for fauna, including threatened species **and ecological communities**). Access track corridors will be established with consideration to terrain to minimise cut/fill and vegetation clearing.		**construction compounds, accommodation facilities and access tracks**	
B29 ~~**B30**~~	Access track construction	Access tracks will be used as necessary for the construction work and as far as is practicable~~,~~ ~~**vehicle traffic shall be confined to these tracks**~~. Track construction will be carried out to cause minimum disturbance to soil and vegetation both on and adjacent to the track. Tracks will be routed to follow the natural contour of the land as far as practicable to minimise the amount of cut and fill and soil disturbance. For any temporary access tracks, the disturbed surfaces and formed areas will be revegetated in accordance with the approved CEMP or *Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads* (DECC, 2008a). In addition, other erosion control mechanisms will be put in place during the initial track construction work to contain any sediment that may erode from the disturbed surfaces.	Construction	Access tracks	Effective
B30 ~~**B9**~~	Waterway crossing ~~**(access tracks)**~~	The following factors will be considered during the detailed design and micro siting process for waterway crossings to minimise potential impacts to aquatic environments, wherever practicable: • Any existing crossings will be re-used or upgraded in preference to establishing new crossings. • Disturbance to waterways (bed, banks and associated riparian zones), will be avoided or minimised.	Detailed design and construction	Transmission line corridor – access track waterway crossing	Proven

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• The crossing design and construction work sites will minimise disturbance to any native vegetation, including native instream, fringing, and riparian vegetation within the access track alignment. • Waterway crossings will be constructed perpendicular to the flow of the water and be positioned away from channel bends (where erosive forces are typically greatest). Preferably crossings will be located in straight stream sections with well-defined channel geometries and shallow stream gradients, in stable dry reaches. • Micro-siting will avoid direct and indirect (erosion or sedimentation) impacts to riverine features such as riffles and rapids and sensitive habitat features (ie snags, coarse woody debris, instream macrophytes, boulders). • Where instream structures are required, considerations to potential flooding and erosive effects will be made in the design and construction of the crossing.			
B31 ~~B10~~	Waterway crossing ~~(access tracks)~~	Crossing structures will be designed so that the existing nominal flow velocity, low flow conditions and fish passage are maintained wherever possible. This will include the following considerations: • Minimise the impact of essential instream structures by mimicking natural flows (DPI, 2005b). • Following Fairfull (2013), for waterway crossings incorporating culverts, a minimum of 300 mm of water should pool through the structure, with a centrally placed low-flow cell being preferable. • In line with Cotterell (1998), it is recommended that flow over or through instream crossing structures are designed such that they maintain water velocity of 0.3 m/s or less, which is likely to facilitate passage for native species of fish (velocities exceeding 1 m/s, are likely to prevent upstream migration of native fish).	Detailed design	Transmission line corridor – access track waterway crossing	Proven
B32 ~~B11~~	Waterway crossing ~~(access tracks)~~	Any sections of stream or waterway banks that are impacted or modified by the project will be reformed or remediated to resemble the pre-work condition and form wherever possible or alternatively to a stable design form, as appropriate following the completion of construction work. This may include revegetation to stabilise bank sediments. Waterway banks impacted by the project will be reinstated such that bank stability at the crossing location is the same or better than prior to construction. Stabilising materials such as rock armouring, hydro mulch, jute matting, or other suitable geotextile materials may be utilised where necessary.	Construction and operation	Transmission line corridor - access track waterway crossing	Proven

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		Any temporary stream crossings will be removed and rehabilitated at the completion of their operational use.			
B33 ~~**B12**~~	Waterway crossing ~~**(access tracks)**~~	**CLASS 1 KFH streams include larger streams supporting more sensitive aquatic habitats, with important function in the landscape and potential habitats for threatened species. As such CLASS 1 streams require additional consideration:** • The need for and location of waterway crossings at identified **CLASS 1** locations ~~**(V9-14 – Derringullen Creek, V9-28 - Gilmore Creek, as well as V9-13 - Yellow Creek and V9-12) will**~~ **would be** confirmed during detailed design by the construction contractors. ~~**This may include consultation with NSW DPI Fisheries**~~ • Crossing design would preference a single span bridge structure ~~**at Derringullen Creek and Gilmore Creek**~~ **where practicable** (aligning with the recommended crossing types identified by NSW DPI Fisheries for CLASS 1 streams) **to avoid instream impacts, particularly within threatened species potential distributions as identified in Table 13-29 of *Technical Report 1 – Revised Biodiversity Development Assessment Report*.** • **Consultation should be undertaken with NSW DPI Fisheries (and Commonwealth DCCEEW for Riek's Crayfish, as required) as to crossing designs and the potential occurrence of threatened aquatic species to inform detailed design and survey.** **Pre-construction survey would be completed at those CLASS 1 streams identified as supporting potential habitats for threatened species at the site of proposed new tracks or upgraded tracks (Table 13-29) to determine:** • **the presence/absence or likelihood of threated aquatic species occurring** • **completion of an updated 7-part test or SIA assessment, as relevant** • **determine any additional mitigation measures eg timing of works outside the breeding season where possible** • **recommendations as to micro-siting and design in order to minimise potential impacts to threatened aquatic species.** **The survey requirements, procedures for consultation with DPI Fisheries and Commonwealth DCCEEW and processes for reporting and consideration of recommendations into design and construction methods, as relevant, will be included in the BMP (mitigation measure B3).**	Detailed design and construction	~~**V9-14 – Derringullen Creek, V9-28 – Gilmore Creek, V9-13 – Yellow Creek, V9-12 – unnamed stream**~~ **CLASS 1 streams identified in Table 13-29 of *Technical Report 1 – Revised Biodiversity Development Assessment Report***	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
B34 ~~**B13**~~	Waterway crossing ~~**(access tracks)**~~	In the event that any further or alternative waterway crossings are required in areas mapped as Key Fish Habitat (KFH) or indicative threatened species distribution mapping (DPI ~~**2022a**~~ **2023a**), an aquatic ecological assessment will be undertaken at the proposed crossing location. The assessment approach will be consistent with that used for the EIS and will address any potential impacts to threatened aquatic species or KFH. This assessment may be desktop based if suitable levels of information are available but may also recommend a field inspection if threatened aquatic species or sensitive aquatic habitat features are considered to have a moderate or higher likelihood of occurring, in order to guide micro-siting and design/mitigation measures to minimise impacts to aquatic environments. **Further to this, if a waterway crossing at Oolong Creek is required, the waterway crossing will incorporate a fish passage barrier to prevent the upstream incursion of European Carp and Redfin Perch to protect the Endangered Southern Pygmy Perch Population. If the design cannot incorporate an appropriate fish passage barrier, further engagement will be undertaken with DPI Fisheries to confirm alternate measures for implementation.**	Detailed design and construction	Access track waterway crossing	Effective
B35 ~~**B14**~~	Waterway crossing ~~**(access tracks)**~~	In addition to standard erosion and sediment control measures, the following procedures and considerations will be incorporated into construction methodologies for waterway crossings, where appropriate and practicable: • Minimise disturbance to native vegetation, including instream, fringing and riparian vegetation within the **updated** indicative disturbance area. This may include the demarcation of areas of native vegetation to be retained during work. • Any coarse woody debris or boulders located within instream work sites will be temporarily ~~**relocated**~~ **stockpiled** during construction and then returned to the watercourse, at locations where scour risk can be avoided **and risk of dislodgment and downstream damage is low**. • Waterway crossing work will be constructed during no or low flow conditions and under calm weather conditions. Work will also be timed to occur outside of any locally high ~~**seasonal**~~ flow periods. • Silt curtains or coffer dams will be deployed around instream work sites where required, to protect against any impacts to water quality or indirect impacts to retained vegetation. These measures will be situated so to avoid blocking fish passage wherever practical and removed as soon as they are no longer required. • Flow diversion measures will be installed on bunded waterway crossings as appropriate or where construction during no or low flow conditions is not feasible. Flow diversion	Construction	Transmission line corridor - access track waterway crossing	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		measures may include pumps to ensure that water can be moved from one side of blockages to the other, with screened inlets to prevent the entrapment of aquatic fauna and outlet structures that are designed to avoid scouring of the channel. Where waterways are bunded or flow obstructed, all obstructions to flow will need to be removed as soon as practical after watercourse crossing construction has been completed. • Appropriate erosion and sediment controls that take into account ~~**the**~~ potentially flood prone **areas** ~~**nature of the land**~~ will be employed to ~~**protect against any impacts to**~~ **manage** water quality **impacts and** ~~**or**~~ indirect impacts to retained vegetation. • Waterway bed and bank material excavated during construction will be stockpiled outside of the active channel and avoid riparian vegetation. Any material excavated from the bed of waterways will be stockpiled separately from other materials and returned to the waterway bed following the completion of construction work. • If the stockpiling of sediment or soil is required, it will be located as far away from waterways as practicable and managed so that it is secure against flooding and runoff to prevent any sediment entering waterways. Adequate erosion and sediment control measures will be in place to protect stockpiled sediment against runoff during rainfall or flooding. • Only excavated natural materials (ENM) or virgin excavated natural materials (VENM) will be used as fill during reclamation work, ie no contaminated material, building or demolition rubble will be used as fill in any stream crossings. • Chemicals will be stored in adequate bunding (in accordance with *Australia Standard 1940 – The storage and handling of flammable and combustible liquids*) as far away from streams as practicable and appropriately protected against flooding or runoff. Spill kits will be made available, and a spill response plan developed. • Plant refuelling will occur as far away from streams as possible and appropriate spill prevention measures (such as diversion bunds/cut off drains upslope and drip trays and spill kits) will be implemented when refuelling.			
B36 ~~**B15**~~	Waterway crossing ~~**and access tracks**~~	Regular monitoring/inspections of waterway crossing and access track conditions will be undertaken during operation. Consideration of the maintenance and inspection recommendations detailed in *Fish passage in streams: Fisheries guidelines for design of stream crossings* (Cotterell, 1998) to inform the monitoring/inspection details are recommended. This may include monitoring/inspections following random events, eg flooding. This will review: • the crossing structures, access tracks and associated erosion and sediment control measures to determine if they are continuing to operate satisfactorily • any maintenance requirements in order to prevent impacts to aquatic environments	Operation	Transmission line corridor - access track waterway crossing	Effective

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		• any issues that require intervention or rehabilitation eg bank erosion as a result of, or in proximity to, crossing locations.			
B37	**Biodiversity offsetting**	**A Biodiversity Offset Package will be prepared in consultation with NSW DCCEEW Environment and Heritage and must include, but not necessarily be limited to:** • **the specific biodiversity offset measures required to be implemented and delivered** • **specific biodiversity offset measures that have been implemented and delivered** • **the cost for each specific biodiversity offset measure, which would be required to be paid into the Biodiversity Conservation Fund if the relevant measure is not implemented and delivered** • **a Supplementary Biodiversity Assessment Strategy which outlines how impacts to biodiversity will be assessed and reported, and the process for credit reduction requests** • **the timing and responsibilities for the implementation and delivery of the measures required in the Package.** **The approved Biodiversity Offset Package may, in consultation with NSW DCCEEW Environment and Heritage, be periodically updated to reflect changes to the biodiversity offset liability.**	**Detailed design and construction**	**All locations**	Effective
B38	**McPhersons Plain**	**Unless otherwise agreed by the Planning Secretary, in consultation with NSW DCCEEW Environment and Heritage:** • **no construction work will occur within the existing horse exclusion fencing at McPhersons Plain** • **transmission line structures will be located outside a 30 m buffer area applied to the existing horse exclusion fencing at McPhersons Plain** • **construction benches will be oriented away from McPhersons Plain and will not encroach into the 30 m buffer area.**	**Detailed design and construction**	**McPhersons Plain**	Effective
~~**B32**~~	~~**SAII entities**~~	~~**Impacts to SAII entities are to be addressed through the following measures:**~~ • ~~**Additional surveys scheduled for completion in spring 2023 to confirm presence/absence within habitat areas where species presence is assumed.**~~ • ~~**Route refinement and design avoidance during the detailed design to avoid and minimise impacts wherever practicable.**~~	~~**Detailed design**~~	~~**All locations**~~	

EMM	Matters	Mitigation measures and adaptive management	Project stage	Application location(s)	Likely efficacy
		~~**Design refinements have been identified and will be incorporated into the project design where practicable to avoid impacts to the following four SAII entities:**~~ • ~~***Glycine latrobeana***~~ • ~~***Diuris ochroma***~~ • ~~***Prasophyllum innubum***~~ ~~***Pterostylis oreophila.***~~			

14.2.1 Connectivity strategy

A Connectivity Strategy (Table 14-1, mitigation measure B10) would be developed outlining design commitments with regard to the location and nature of proposed mitigation measures to address prescribed impacts associated with habitat connectivity where impaired or severed as a result of the amended project (as identified in Section 2.3, Attachment 24, Figure 13-2). A draft BMP, which includes the Connectivity Strategy, would be provided for consultation to NSW DCCEEW Environment and Heritage for review and comment prior to project approval. Measures considered as a part of the Connectivity Strategy that would be further developed during detailed design include:

- where proposed lines will parallel existing lines, a small deviation of the route to facilitate retention of a vegetated stepping-stone is recommended between existing and proposed lines.
- restoration of brake and winch sites and access tracks post-construction where they intersect glider corridors
- temporary installation of glider poles in proposed restoration areas to facilitate connectivity during vegetation establishment
- where tree retention is not feasible within the proposed easements, permanent installation of glider poles, to maintain connectivity
- permanent installation of glider poles within existing easements that intersect glider connectivity corridors, to restore connectivity where feasible
- further assessment of potential collision risks and appropriate design mitigations, where required
- ongoing retention of large trees within Hazard Tree Zones that intersect glider corridors, subject to regular arboricultural assessment and tree maintenance/ pruning to minimise any safety risks.

14.2.2 Supplementary Biodiversity Assessment Strategy

A Supplementary Biodiversity Assessment Strategy (SBAS) will be prepared to guide surveys conducted post BDAR lodgement and post approval to confirm presence/absence of species within the disturbance footprint. Supplementary surveys are required for several reasons including previously inaccessible land, poor flowering seasons over the assessment phase of the project and data deficiencies which have resulted in a high level of assumed presence for a number of species. Under the SBAS, species identified as at risk of Serious and Irreversible Impact (SAII), Matters of National Environmental Significance (MNES) and high credit liability will be preferentially targeted for survey. The strategy will also outline requirements for validation of PCTs/TECs assumed present on previously inaccessible land where surrogate, duplicate or benchmark plots were used and low confidence of PCT allocation or condition. Additionally, the SBAS will guide post approval credit reduction through provision of documented evidence of avoidance during any further detailed design or during construction.

Survey, monitoring and reporting requirements will be outlined to facilitate application to NSW DCCEEW for a reduction in the overall credit liability of the project.

15. Offset requirements

This chapter details offset requirements necessary to address any residual biodiversity impacts associated with the amended project in accordance with Section 9 and 10 of the BAM (DPIE, 2020a).

A summary of the ecosystem credit requirement for the amended project are provided below. The credit report is provided in Attachment 23. Credits have been calculated and displayed for direct impacts within each IBRA subregion.

15.1 Offsets for direct impacts

15.1.1 Ecosystem credits

The total ecosystem credit offset requirement, as determined using the BAM-C (version 61), for unavoidable impacts on native vegetation is summarised in Table 15-1 and detailed for each IBRA subregion in Table 15-2 to Table 15-7. The full credit reports for each subregion, including like-for-like trading options, provided in Attachment 23.

Table 15-1: Summary of ecosystem credits for the amended project

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
5	River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains	-							2.29	28					**2.32**	**28**
266	White Box grassy woodland	White Box Yellow Box Blakely's Red Gum Woodland*					2.45	17	50.15	1,562					**52.60**	**1,579**
268	White Box - Blakely's Red Gum - Long-leaved Box - Norton's Box - Red Stringybark grass-shrub woodland on shallow soils on hills	White Box Yellow Box Blakely's Red Gum Woodland*							25.98	811					**26.01**	**811**
277	Blakely's Red Gum - Yellow Box grassy tall woodland	White Box Yellow Box Blakely's Red Gum Woodland*			0.18	3	0.18	3	123.84	476					**124.2**	**482**
278	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	White Box Yellow Box Blakely's Red Gum Woodland*							9.01	79					**9.01**	**79**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
280	Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	White Box Yellow Box Blakely's Red Gum Woodland*			1.66	35	15.44	169	51.53	673					**68.62**	**877**
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	White Box Yellow Box Blakely's Red Gum Woodland*	0.35	7	4.57	51	0.79	23							**5.71**	**81**
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	-									9.62	243	1.52	24	**11.14**	**267**
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	-					1.26	19	5.44	144					**6.7**	**163**
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills	-							10.75	166	0.18	3			**10.93**	**169**
294	Norton's Box - Red Box - White Box tussock grass open forest	-							0.14	2					**0.14**	**2**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
295	Robertson's Peppermint - Broad-leaved Peppermint - Norton's Box - stringybark shrub-fern open forest	-							0.79	12	3.19	49			**3.98**	**61**
297	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills	-							2.01	25					**2.01**	**25**
299	Riparian Ribbon Gum - Robertson's Peppermint - Apple Box riverine very tall open forest	-							1.28	3	17.12	342			**18.4**	**345**
300	Ribbon Gum - Narrow-leaved (Robertson's) Peppermint montane fern - grass tall open forest on deep clay loam soils	-									1.55	34	18.13	397	**19.68**	**431**
301	Drooping Sheoke - Ricinocarpus bowmannii - grasstree tall open shrubland of the Coolac - Tumut Serpentinite Belt	Coolac-Tumut Serpentinite Shrubby Woodland							3.41	63					**3.41**	**63**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
306	Red Box - Red Stringybark - Norton's Box hill heath shrub - tussock grass open forest of the Tumut region	-							3.89	13					**3.89**	**13**
314	Apple Box - Red Stringybark basalt scree open forest in the upper Murray River region	-							7.56	114					**7.56**	**114**
316	Norton's Box - Red Box - Red Stringybark +/- Nodding Flax Lily forb-grass open forest	-							17.15	437					**17.15**	**437**
319	Tumbledown Red Gum - White Cypress Pine hill woodland	-							1.47	23					**1.47**	**23**
322	Inland Scribbly Gum - Red Stringybark - Black Cypress Pine hillslope shrub-tussock grass open forest	-					0.88	14							**0.88**	**14**
335	Tussock grass - sedgeland fen - - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-	-			0.37	16									**0.37**	**16**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
	region of the NSW South-Western Slopes Bioregion															
343	Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates in the Tarcutta - Gundagai region	-							5.88	54					**5.88**	**54**
349	Inland Scribbly Gum - Red Stringybark open forest on hills composed of silicous substrates	-					4.06	55							**4.06**	**55**
351	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest	-					6.28	121							**6.28**	**121**
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region	White Box Yellow Box Blakely's Red Gum Woodland*					7.27	36	7.73	0	0.07	0			**15.07**	**36**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
637	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	Montane Peatlands and Swamps*											0.02	1	**0.02**	**1**
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	-									7.12	117	58.9	1,280	**66.02**	**1,397**
679	Black Sallee - Snow Gum low woodland of montane valleys, South-Eastern Highlands Bioregion and Australian Alps Bioregion	Monaro Tableland Cool Temperate Grassy Woodland			1.1	31									**1.1**	**31**
		-											3.76	77	**3.76**	**77**
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest	-			3.85	85									**3.85**	**85**
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	-			7.23	153	0.6	14	1.28	15					**9.11**	**182**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
870	Grey Gum - Thin-leaved Stringybark grassy woodland	-	1.86	50											**1.86**	**50**
939	Montane wet heath and bog of the eastern tablelands	Montane Peatlands and Swamps*											0.55	7	**0.55**	**7**
952	Mountain Gum - Narrow-leaved Peppermint - Snow Gum dry shrubby open forest on undulating tablelands	Tableland Basalt Forest			5.54	75									**5.54**	**75**
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	Tableland Basalt Forest									0.62	11			**0.62**	**11**
		-			0								89.59	2,005	**89.59**	**2,005**
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	-	6.63	183	16.52	269	18.89	518							**42.04**	**970**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
1097	Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux	Tableland Basalt Forest	0.35	3											**0.35**	**3**
1107	River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes	Tableland Basalt Forest	0.03	1											**0.03**	**1**
1150	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges	-	15.97	387											**15.97**	**387**
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	-			11.85	419									**11.85**	**419**
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Monaro Tableland Cool Temperate Grassy Woodland			0.82	3									**0.82**	**3**
		-							0.33	0					**0.33**	**0**

PCT ID	PCT name	TEC	BUN		CRO		MUR		INL		BON		SNO		Total	
			Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Clearing (ha)	Credit	Total clearing (ha)	Total credits
1196	Snow Gum - Mountain Gum shrubby open forest of montane areas	-											28.94	573	**28.94**	**573**
1224	Sub-alpine dry grasslands and heathlands of valley slopes	-											0.02	1	**0.02**	**1**
1256	Tableland swamp meadow on impeded drainage sites	Montane Peatlands and Swamps*			0.31	5	0.03	2							**0.34**	**7**
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	White Box Yellow Box Blakely's Red Gum Woodland*	23.96	361	61.06	368	70.98	510							**156**	**1,239**
Total			**49.20**	**992**	**115.04**	**1,513**	**129.07**	**1,501**	**331.93**	**4,700**	**39.49**	**799**	**201.43**	**4,365**	**866.16**	**13,870**

Note: * indicates TEC is also listed under the EPBC Act

Table 15-2: Ecosystem credits for the Bungonia IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.16	30.3	TCZ - 30.3	TCZ - 3
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.13	39.6	TCZ - 39.6	TCZ - 3
					ECZ – 0.06		ECZ - 28.4	ECZ - 1
					HTZ – nil		N/A	N/A
Total PCT 283								7
870	Grey Gum - Thin-leaved Stringybark grassy woodland	Very high	No associated TEC	>100	TCZ - 1.1	81.3	TCZ - 81.3	TCZ - 34
					ECZ - 0.76		ECZ - 57.7	ECZ - 16
					HTZ - nil		N/A	N/A
Total PCT 870								50
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Low	No associated TEC	>100	TCZ – 1.28	20.9	TCZ - 20.9	TCZ - 12
					ECZ – 0.04		ECZ - 18.0	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.05	46.7	TCZ - 46.7	TCZ -1
					ECZ – 0.17		ECZ - 39.9	ECZ - 3
					HTZ – 0.01		HTZ - 15.6	HTZ - 1
		High		>100	TCZ – 1.38	70.3	TCZ - 70.3	TCZ - 42
					ECZ – 0.36		ECZ - 47.8	ECZ - 8
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 1.91	85.4	TCZ - 85.4	TCZ - 71
					ECZ – 1.4		ECZ - 69.6	ECZ - 43
					HTZ – 0.03		HTZ - 24.4	HTZ - 1
Total PCT 1093								183
1097	Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux	Very low	Tableland Basalt Forest	>100	TCZ – 0.28	3.2	TCZ - 3.2	TCZ - 0
					ECZ – 0.02		ECZ - 3.1	ECZ - 0
					HTZ – 0.01		HTZ - 2.8	HTZ - 0
		Low		<5	TCZ – nil	20.5	N/A	N/A
					ECZ – 0.02		ECZ -19.8	ECZ - 1
					HTZ – nil		N/A	N/A
				>100	TCZ – 0.01	20.5	TCZ - 20.5	TCZ - 1
					ECZ – 0.01		ECZ - 19.8	ECZ - 1
					HTZ – nil		N/A	N/A
Total PCT 1097								3
1107	River Peppermint - Narrow-leaved Peppermint open	High	Tableland Basalt Forest	>100	TCZ - nil	66.3	N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
	forest on sheltered escarpment slopes				ECZ - 0.03		ECZ - 58.1	ECZ - 1
					HTZ - nil		N/A	N/A
Total PCT 1107								1
1150	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges	Very Low	No associated TEC	>100	TCZ – 0.38	4.3	TCZ - 4.3	TCZ - 0
					ECZ – 0.03		ECZ - 4.0	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.26	22.3	TCZ - 22.3	TCZ - 2
					ECZ – 0.13		ECZ - 4.5	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.49	37.7	TCZ - 37.7	TCZ - 7
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 7.23	75.4	TCZ - 75.4	TCZ - 204
					ECZ – 7.07		ECZ - 64.6	ECZ - 171
					HTZ – 0.38		HTZ - 16.3	HTZ - 2
Total PCT 1150								387
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 16.53	19.1	TCZ - 19.1	TCZ - 198
					ECZ – 0.24		ECZ - 4.7	ECZ - 1
					HTZ – nil		N/A	N/A
		Low		<5	TCZ – 0.07	29	TCZ - 29.0	TCZ - 1
					ECZ – 0.05		ECZ - 5.9	ECZ - 1
					HTZ – nil		N/A	N/A
				>100	TCZ – 3.99	29	TCZ - 29.0	TCZ - 72
					ECZ – 1.06		ECZ - 5.9	ECZ - 4
					HTZ – 0.06		HTZ - 0.2	HTZ - 1
		Moderate		>100	TCZ – 0.11	37.9	TCZ - 37.9	TCZ - 3
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.67	80.2	TCZ - 80.2	TCZ - 34
					ECZ – 0.95		ECZ - 56.5	ECZ - 34
					HTZ – nil		N/A	N/A
		Very high		>100	TCZ – 0.22	80.1	TCZ - 80.1	TCZ - 11
					ECZ – 0.01		ECZ - 59.1	ECZ - 1
					HTZ – nil		N/A	N/A
Total PCT 1330								361
Total				-	**49.2**	-	-	**992**

Table 15-3: Ecosystem credits for the Crookwell IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ - 0.18	23.2	TCZ - 23.2	TCZ - 3
					ECZ - nil		N/A	N/A
					HTZ - nil		N/A	N/A
Total PCT 277								3
280	Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – nil	1	N/A	N/A
					ECZ – 0.02		ECZ - 0.5	ECZ - 0
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.69	42	TCZ - 42.0	TCZ - 18
					ECZ – 0.94		ECZ - 27.7	ECZ - 16
					HTZ – 0.01		HTZ - 7.3	HTZ - 1
Total PCT 280								35
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 2.78	14	TCZ - 14.0	TCZ - 0
					ECZ – 0.13		ECZ - 7.6	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.24	30.3	TCZ - 30.3	TCZ - 5
					ECZ – 0.05		ECZ - 22.1	ECZ - 1
					HTZ – 0.01		HTZ - 0.0	HTZ - 1
		Moderate		>100	TCZ – 0.18	49.5	TCZ - 49.5	TCZ - 6
					ECZ – 0.1		ECZ - 29.7	ECZ - 2
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.6	64.8	TCZ - 64.8	TCZ - 24
					ECZ – 0.46		ECZ - 42.5	ECZ - 12
					HTZ – nil		N/A	N/A
Total PCT 283								51
335	Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys	Very high	No associated TEC	>100	TCZ - 0.36	84.4	TCZ - 84.4	TCZ - 15
					ECZ - 0.01		ECZ - 0.0	ECZ - 1
					HTZ - nil		N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
Total PCT 335								16
679	Black Sallee - Snow Gum low woodland of montane valleys	Low	Monaro Tableland Cool Temperate Grassy Woodland	>100	TCZ – 0.36	41.8	TCZ - 41.8	TCZ - 9
					ECZ – 0.02		ECZ - 16.8	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.42	41.8	TCZ - 41.8	TCZ -11
					ECZ – 0.08		ECZ - 16.8	ECZ - 1
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.07	81.7	TCZ - 81.7	TCZ - 4
					ECZ – 0.15		ECZ - 52.2	ECZ - 5
					HTZ – nil		N/A	N/A
Total PCT 679								31
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest	Very Low	No associated TEC	>100	TCZ – 0.64	10.5	TCZ - 10.5	TCZ - 0
					ECZ – 0.04		ECZ - 5.6	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.36	7.7	TCZ - 7.7	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 1.11	48.5	TCZ - 48.5	TCZ - 24
					ECZ – 0.07		ECZ - 39.5	ECZ - 1
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 1.33	86	TCZ - 86	TCZ - 50
					ECZ – 0.33		ECZ - 65.6	ECZ - 9
					HTZ – 0.01		HTZ - 20.2	HTZ - 1
Total PCT 727								85
731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	Low	No associated TEC	>100	TCZ – 3.4	22.1	TCZ - 22.1	TCZ - 1
					ECZ – 0.18		ECZ - 10.1	ECZ - 38
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.36	62.5	TCZ - 62.5	TCZ - 11
					ECZ – 0.81		ECZ - 49.8	ECZ - 20
					HTZ – 0.01		HTZ - 1.5	HTZ - 1
		Very high		>100	TCZ – 1.01	81.9	TCZ - 81.9	TCZ - 41
					ECZ – 1.4		ECZ - 56.8	ECZ - 40
					HTZ – 0.07		HTZ - 15.8	HTZ - 1
Total PCT 731								153

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
952	Mountain Gum - Narrow-leaved Peppermint - Snow Gum dry shrubby open forest on undulating tablelands	Very Low	Tableland Basalt Forest in the Sydney Basin and South-Eastern Highlands Bioregions	>100	TCZ – 3.65	23.5	TCZ - 23.5	TCZ - 43
					ECZ – 0.04		ECZ - 16.1	ECZ - 1
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.72	26.8	TCZ - 26.8	TCZ - 10
					ECZ – 0.27		ECZ - 5.0	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.52	48	TCZ - 48.0	TCZ - 12
					ECZ – 0.39		ECZ - 41.3	ECZ - 8
					HTZ – nil		N/A	N/A
Total PCT 952								75
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands	Very Low	No associated TEC	>100	TCZ – 4.01	0.9	TCZ - 0.9	TCZ - 0
					ECZ – 0.29		ECZ - 0.4	ECZ - 0
					HTZ – 0.02		HTZ - 0.0	HTZ - 0
		Low		>100	TCZ – 3.10	28.2	TCZ - 28.2	TCZ - 38
					ECZ – 0.27		ECZ - 22.6	ECZ - 3
					HTZ – nil		N/A	N/A
				<5	TCZ – nil		N/A	N/A
					ECZ – 0.01		ECZ - 22.6	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.67	50.9	TCZ - 50.9	TCZ - 15
					ECZ – 0.49		ECZ - 33.6	ECZ - 7
					HTZ – 0.01		HTZ - 4.3	HTZ - 1
				<5	TCZ –0.09		TCZ - 50.9	TCZ - 2
					ECZ – 0.03		ECZ - 33.6	ECZ - 1
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 4.34	68.7	TCZ - 68.7	TCZ - 131
					ECZ – 3.15		ECZ - 49.8	ECZ - 69
					HTZ – 0.04		HTZ - 4.6	HTZ - 1
Total PCT 1093								269
1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	Low	No associated TEC	>100	TCZ – 1.73	27.3	TCZ - 27.3	TCZ - 30
					ECZ – 0.12		ECZ - 1.9	ECZ - 1
					HTZ – 0.19		HTZ - 1.5	HTZ - 1
		High		>100	TCZ – 2.36	74.8	TCZ - 74.8	TCZ - 110

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
					ECZ – 3.26		ECZ - 56.5	ECZ - 115
					HTZ – 0.06		HTZ - 30.0	HTZ - 1
		Very High		>100	TCZ – 0.85	81.6	TCZ - 81.6	TCZ - 43
					ECZ – 3.07		ECZ - 60.5	ECZ - 116
					HTZ – 0.13		HTZ - 25.7	HTZ - 2
Total PCT 1151								419
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Very low	Monaro Tableland Cool Temperate Grassy Woodland	>100	TCZ – 0.69	5.6	TCZ - 5.6	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.13	37.1	TCZ - 37.1	TCZ - 3
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
Total PCT 1191								3
1256	Tableland swamp meadow on impeded drainage sites	Low	Montane Peatlands and Swamps	>100	TCZ - 0.29	27.8	TCZ - 27.8	TCZ - 4
					ECZ - 0.02		ECZ - 0.0	ECZ - 1
					HTZ - nil		N/A	N/A
Total PCT 1256								5
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 42.52	2.1	TCZ - 2.1	TCZ - 0
					ECZ – 0.57		ECZ - 0.9	ECZ - 0
					HTZ – 0.01		HTZ - 0.0	HTZ - 0
				25 - 100	TCZ – 1.71		TCZ - 2.1	TCZ - 0
					ECZ – 0.11		ECZ - 0.9	ECZ - 0
					HTZ – nil		N/A	N/A
				<5	TCZ – nil		N/A	N/A
					ECZ – 0.01		ECZ - 0.9	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 7.32	24.7	TCZ - 24.7	TCZ - 113
					ECZ – 2.85		ECZ - 11.7	ECZ - 21
					HTZ – 0.03		HTZ - 3.8	HTZ - 1
				25 - 100	TCZ – nil		N/A	N/A
					ECZ – 0.14		ECZ - 11.7	ECZ - 1
					HTZ – 0.02		HTZ - 3.8	HTZ - 1
				<5	TCZ – nil		N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
					ECZ – 0.05		ECZ - 11.7	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – nil	40.8	N/A	N/A
					ECZ – 0.06		ECZ - 36.8	ECZ - 1
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.64	79.3	TCZ - 79.3	TCZ - 32
					ECZ – 1.88		ECZ - 63.8	ECZ - 75
					HTZ – 0.05		HTZ - 17.2	HTZ - 1
				<5	TCZ – nil		N/A	N/A
					ECZ – 0.18		ECZ - 63.8	ECZ - 7
					HTZ – 0.01		HTZ - 17.2	HTZ - 1
		Very high		>100	TCZ – 0.65	87.9	TCZ - 87.9	TCZ - 36
					ECZ – 2.09		ECZ - 58.3	ECZ - 76
					HTZ – 0.16		HTZ - 13.9	HTZ - 1
Total PCT 1330								368
Total				-	**115.04**	-	-	**1513**

Table 15-4: Ecosystem credits for the Murrumbateman IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	VI loss	Ecosystem credits
266	White Box grassy woodland	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 1.91	0.9	TCZ - 0.9	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Low		<5	TCZ – 0.11	45.9	TCZ - 45.9	TCZ - 3
					ECZ – 0.02		ECZ - 34.5	ECZ - 1
					HTZ – nil		N/A	N/A
				>100	TCZ – 0.1	68	TCZ - 45.9	TCZ - 3
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.29	47.8	TCZ - 47.8	TCZ - 9
					ECZ – 0.02		ECZ - 26.2	ECZ - 1
Total PCT 266								17
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ - 0.18	27.9	TCZ - 27.9	TCZ - 3
					ECZ - nil		N/A	N/A
					HTZ - nil		N/A	N/A
Total PCT 277								3.0
280	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 8.61	6.9	TCZ - 6.9	TCZ - 0
					ECZ – 0.06		ECZ - 5.0	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		<5	TCZ – 0.11	28.5	TCZ - 28.5	TCZ - 2
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				5-25	TCZ – 0.01		TCZ - 28.5	TCZ - 1
					ECZ – 0.01		ECZ - 11.6	ECZ - 1
					HTZ – nil		N/A	N/A
				>100	TCZ – 3.33		TCZ - 28.5	TCZ - 59
					ECZ – 0.01		ECZ - 11.8	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		<5	TCZ – 0.03	40.1	TCZ - 40.1	TCZ - 1
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				5-25	TCZ – 0.2		TCZ - 40.1	TCZ - 5
					ECZ – 0.02		ECZ - 37.6	ECZ - 1
					HTZ – nil		N/A	N/A
				>100	TCZ – 0.41		TCZ - 40.1	TCZ - 10
					ECZ – 0.26		ECZ - 37.6	ECZ - 6
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 1.46	62.1	TCZ - 62.1	TCZ - 57

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	VI loss	Ecosystem credits
					ECZ – 0.9		ECZ - 42.5	ECZ - 24
					HTZ – 0.01		HTZ - 8.1	HTZ - 1
Total PCT 280								169
283	Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	High	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.06	55.9	TCZ - 55.9	TCZ - 2
					ECZ – 0.37		ECZ - 31.6	ECZ - 7
					HTZ – nil		N/A	N/A
		Very High		>100	TCZ – 0.18	82.8	TCZ - 82.8	TCZ - 9
					ECZ – 0.18		ECZ - 47.4	ECZ - 5
					HTZ – nil		N/A	N/A
Total PCT 283								23
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	Very Low	No associated TEC	>100	TCZ – 0.12	4.8	TCZ - 4.8	TCZ - 0
					ECZ – 0.03		ECZ - 2.8	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.01	28.8	TCZ - 100	TCZ - 1
					ECZ – 0.21		ECZ - 18.1	ECZ - 2
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.78	41.7	TCZ - 41.7	TCZ - 14
					ECZ – 0.11		ECZ - 33.3	ECZ - 2
					HTZ – nil		N/A	N/A
Total PCT 287								19
322	Inland Scribbly Gum - Red Stringybark - Black Cypress Pine hillslope shrub-tussock grass open forest	Low	No associated TEC	>100	TCZ – 0.55	23.6	TCZ - 23.6	TCZ - 5
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.23	75.7	TCZ - 75.7	TCZ - 7
					ECZ – 0.1		ECZ - 52.2	ECZ - 2
					HTZ – nil		N/A	N/A
Total PCT 322								14
349	Inland Scribbly Gum - Red Stringybark open forest on hills composed of silicous substrates	Very low	No associated TEC	>100	TCZ – 1.26	15.6	TCZ - 15.6	TCZ - 0
					ECZ – 0.03		ECZ - 13.7	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.7	26.7	TCZ - 26.7	TCZ - 8
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.8	50.6	TCZ - 50.6	TCZ - 18
					ECZ – 0.58		ECZ - 38.0	ECZ - 10
					HTZ – 0.01		HTZ - 37.2	HTZ - 1
		Very high		>100	TCZ – 0.25	77.6	TCZ - 77.6	TCZ - 8
					ECZ – 0.39		ECZ - 59.2	ECZ - 10

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	VI loss	Ecosystem credits
					HTZ – nil		N/A	N/A
Total PCT 349								55
351	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest	Very Low	No associated TEC	>100	TCZ – 1.15	10.2	TCZ - 10.2	TCZ - 0
					ECZ – 0.02		ECZ - 4.6	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.05	23.5	TCZ - 23.5	TCZ - 11
					ECZ – 0.04		ECZ - 19.7	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.97	56.7	TCZ - 56.7	TCZ - 24
					ECZ – 1.12		ECZ - 48.6	ECZ - 24
					HTZ – 0.05		HTZ - 15.1	HTZ - 1
		High		>100	TCZ – 1.88	73.2	TCZ - 73.2	TCZ - 60
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
Total PCT 351								121
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 3.28	3.6	TCZ - 3.6	TCZ - 0
					ECZ – 0.02		ECZ - 2.8	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 2.15	14.0	TCZ - 14.0	TCZ - 0
					ECZ – 0.23		ECZ - 12.0	ECZ - 0
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 1.13	38.3	TCZ - 38.3	TCZ - 27
					ECZ – 0.42		ECZ - 32.8	ECZ - 9
					HTZ – nil		N/A	N/A
Total PCT 352								36
731	Broad-leaved Peppermint - Red Stringybark grassy open forest	High	No associated TEC	>100	TCZ - 0.05	69.5	TCZ - 69.5	TCZ - 2
					ECZ - 0.53		ECZ - 41.9	ECZ - 11
					HTZ - 0.02		HTZ - 5.3	HTZ - 1
Total PCT 731								14
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Very Low	No associated TEC	>100	TCZ – 0.57	6.8	TCZ - 6.8	TCZ - 0
					ECZ – 0.01		ECZ - 5.5	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.09	22.5	TCZ - 22.5	TCZ - 11
					ECZ – 0.08		ECZ - 19.1	ECZ - 1
					HTZ – 0.04		HTZ - 0	HTZ - 1
		Moderate		>100	TCZ – 1.92	57.9	TCZ - 57.9	TCZ - 49
					ECZ – 1.65		ECZ - 46	ECZ - 33
					HTZ – 0.02		HTZ - 8.8	HTZ - 1
		Very High		>100	TCZ – 5.98	83.1	TCZ - 83.1	TCZ - 217

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	VI loss	Ecosystem credits
					ECZ – 7.34		ECZ - 63.3	ECZ - 203
					HTZ – 0.19		HTZ - 26.2	HTZ - 2
Total PCT 1093								518
1256	Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands	Very low	Montane Peatlands and Swamps	>100	TCZ – 0.01	27.8	TCZ - 27.8	TCZ - 1
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.02	34.7	TCZ - 34.7	TCZ - 1
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
Total PCT 1256								2
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	TCZ – nil	8.6	N/A	N/A
					ECZ – 0.01		ECZ - 4.5	ECZ - 0
					HTZ – nil		N/A	N/A
				>100	TCZ – 41.22		TCZ - 8.6	TCZ - 0
					ECZ – 1.03		ECZ - 4.5	ECZ - 0
					HTZ – 0.04		HTZ - 0.9	HTZ - 0
		Low		<5	TCZ – 0.08	16.1	TCZ - 16.1	TCZ - 1
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				>100	TCZ – 13.83		TCZ - 16.1	TCZ - 139
					ECZ – 3.43		ECZ - 11.4	ECZ - 24
					HTZ – 0.05		HTZ - 0	HTZ - 1
		Moderate		<5	TCZ – 0.2	45.9	TCZ - 45.9	TCZ - 6
					ECZ – 0.15		ECZ - 36.9	ECZ - 3
					HTZ – 0.03		HTZ - 13.1	HTZ - 1
				>100	TCZ – 2.52		TCZ - 45.9	TCZ - 72
					ECZ – 1.87		ECZ - 36.9	ECZ - 43
					HTZ – 0.02		HTZ - 13.1	HTZ - 1
		High		>100	TCZ – 1.27	70.2	TCZ - 70.2	TCZ - 56
					ECZ – 4.05		ECZ - 48.8	ECZ - 123
					HTZ – 0.16		HTZ - 8.9	HTZ - 1
		Very high		>100	TCZ – 0.5	72.9	TCZ - 72.9	TCZ - 23
					ECZ – 0.52		ECZ - 48.3	ECZ - 16
					HTZ – nil		N/A	N/A
Total PCT 1330								510
Total				-	**129.07**	-	-	**1501**

Table 15-5: Ecosystem credits for the Inland Slopes IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
5	River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains	Low	No associated TEC	>100	TCZ – 0.04	22.1	TCZ - 22.1	TCZ - 1
					ECZ – 0.05		ECZ - 16.6	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.48	43.4	TCZ - 43.4	TCZ - 8
					ECZ – 1.5		ECZ - 28.8	ECZ - 17
					HTZ – 0.22		HTZ - 12.4	HTZ - 1
Total PCT 5								28
266	White Box grassy woodland in the upper slopes sub-region of the NSW South-Western Slopes Bioregion	Very low	White Box Yellow Box Blakely's Red Gum Woodland	<5	TCZ – nil	5.7	N/A	N/A
					ECZ – 0.02		ECZ - 4.5	ECZ - 0
					HTZ – nil		N/A	N/A
				>100	TCZ – 8.7		TCZ - 5.7	TCZ - 0
					ECZ – 0.01		ECZ - 4.5	HTZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 23.66	54.4	TCZ - 54.4	TCZ - 805
					ECZ – 1.5		ECZ - 44.1	ECZ - 42
					HTZ – 0.14		HTZ - 14.5	HTZ - 1
		Moderate		>100	TCZ – 4.28	78.5	TCZ - 78.5	TCZ - 210
					ECZ – 1.03		ECZ - 55.7	ECZ - 36
					HTZ – 0.08		HTZ - 9.9	HTZ - 1
		High		>100	TCZ – 8.6	74.4	TCZ - 74.4	TCZ - 400
					ECZ – 1.9		ECZ - 53.6	HTZ - 64
					HTZ – 0.22		HTZ - 22.3	HTZ - 3
Total PCT 266								1562
268	White Box - Blakely’s Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills	Very low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 0.4	3.5	TCZ - 3.5	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 15.35	36.0	TCZ - 36.0	TCZ - 345
					ECZ – 0.15		ECZ - 22	ECZ - 2
					HTZ – nil		N/A	N/A
				<5	TCZ –nil		N/A	N/A
					ECZ – 0.09		ECZ - 22	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.64	40.3	TCZ - 40.3	TCZ - 16
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
		High		>100	TCZ – 0.25	67.4	TCZ - 67.4	TCZ - 11
					ECZ – 0.33		ECZ - 52.8	ECZ - 11
					HTZ – nil		N/A	N/A
		Very high		>100	TCZ – 7.42	80.8	TCZ - 80.8	TCZ - 375

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
					ECZ – 1.3		ECZ - 58.4	ECZ - 49
					HTZ – 0.05		HTZ - 0	HTZ - 1
Total PCT 268								811
277	Blakely’s Red Gum - Yellow Box grassy tall woodland	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 102.79	11.0	TCZ - 11.0	TCZ - 0
					ECZ – 1.8		ECZ - 6.1	ECZ - 0
					HTZ – 0.22		HTZ - 0.3	HTZ - 0
				5 - 25	TCZ – 0.14		TCZ - 11.0	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				<5	TCZ – 0.04		TCZ - 11.0	TCZ - 0
					ECZ – 0.15		ECZ - 6.1	ECZ - 0
					HTZ – 0.01		HTZ - 0.3	HTZ - 0
		Low		>100	TCZ – 6.85	37.2	TCZ - 37.2	TCZ - 159
					ECZ – 2.48		ECZ - 24.3	ECZ - 38
					HTZ – 0.28		HTZ - 7.6	HTZ - 1
				<5	TCZ – 0.81		TCZ - 37.2	TCZ - 19
					ECZ – 0.42		ECZ - 24.3	ECZ - 6
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 2.4	61.7	TCZ - 61.7	TCZ - 93
					ECZ – 1.2		ECZ - 37.7	ECZ - 28
					HTZ – 0.13		HTZ - 22.6	HTZ - 2
		High		>100	TCZ – 0.75	75.5	TCZ - 75.5	TCZ - 35
					ECZ – 3.2		ECZ - 46.8	ECZ - 94
					HTZ – 0.17		HTZ - 13.7	HTZ - 1
Total PCT 277								476
278	Riparian Blakely’s Red Gum - box - shrub - sedge - grass tall open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 5.2	6.2	TCZ - 6.2	TCZ - 0
					ECZ – 0.06		ECZ - 5.3	ECZ - 0
					HTZ – 0.01		HTZ - 4.7	HTZ - 0
		Low		>100	TCZ – 0.76	30.2	TCZ - 30.2	TCZ - 14
					ECZ – 1.7		ECZ - 21.2	ECZ - 23
					HTZ – 0.1		HTZ - 13.9	HTZ - 1
				<5	TCZ – 0.06		TCZ - 30.2	TCZ - 1
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 0.23	78.4	TCZ - 78.4	TCZ - 11
					ECZ – 0.83		ECZ - 53.1	ECZ - 28
					HTZ – 0.1		HTZ - 21.4	HTZ - 1
Total PCT 278								79
280	Red Stringybark - Blakely’s Red	Very Low	White Box Yellow Box	>100	TCZ – 29.03	7.4	TCZ - 7.4	TCZ - 0
					ECZ – 0.59		ECZ - 3.4	ECZ - 0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
	Gum +/- Long-leaved Box shrub/grass hill woodland		Blakely's Red Gum Woodland		HTZ – 0.02		HTZ - 0	HTZ - 0
				25 - 100	TCZ – 0.04		TCZ - 7.4	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ – nil		N/A	N/A
				<5	TCZ – 0.03		TCZ - 7.4	TCZ - 0
					ECZ – 0.12		ECZ - 3.4	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.2	26.6	TCZ - 26.6	TCZ - 19
					ECZ – 0.11		ECZ - 9.8	ECZ - 1
					HTZ –nil		N/A	N/A
		Moderate		25 - 100	TCZ – 1	47.1	TCZ - 47.1	TCZ - 18
					ECZ – 0.27		ECZ - 35.4	ECZ - 5
					HTZ –nil		N/A	N/A
				>100	TCZ – 7.8		TCZ - 47.1	TCZ - 231
					ECZ – 2.1		ECZ - 35.4	ECZ - 47
					HTZ – 0.21		HTZ - 12.6	HTZ - 2
		High		25 - 100	TCZ – 0.82	67.1	TCZ - 67.1	TCZ - 27
					ECZ – 0.2		ECZ - 46.4	ECZ - 5
					HTZ – nil		N/A	N/A
				>100	TCZ – 5.4		TCZ - 67.1	TCZ - 226
					ECZ – 2.4		ECZ - 46.4	ECZ - 70
					HTZ – 0.11		HTZ - 13.5	HTZ - 1
Total PCT 280								673
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes	Very Low	No associated TEC	>100	TCZ – 1.3	26	TCZ - 26	TCZ - 14
					ECZ – 0.03		ECZ - 17.8	ECZ - 1
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 0.1	26	TCZ - 26	TCZ - 1
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.76	48.5	TCZ - 48.5	TCZ - 16
					ECZ – 0.26		ECZ - 35.1	ECZ - 4
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 0.07	53.7	TCZ - 53.7	TCZ - 2
					ECZ – nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Very high		>100	TCZ – 0.63	100.0	TCZ - 100.0	TCZ - 28
					ECZ – 2.2		ECZ - 79.3	ECZ - 77
					HTZ – 0.09		HTZ - 13.7	HTZ - 1
Total PCT 287								144
290		Very Low		>100	TCZ – 4.4	10.2	TCZ - 10.2	TCZ - 0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills		No associated TEC		ECZ – 0.03		ECZ - 5.1	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.2	33.6	TCZ - 33.6	TCZ - 17
					ECZ – 0.05		ECZ - 31.2	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 0.47	49.1	TCZ - 49.1	TCZ - 10
					ECZ – 0.17		ECZ - 41	ECZ - 3
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 3.2	74.2	TCZ - 74.2	TCZ - 103
					ECZ – 1.2		ECZ - 57.8	ECZ - 31
					HTZ – 0.03		HTZ - 2.8	HTZ - 1
Total PCT 290								166
294	Nortons Box - Red Box - White Box tussock grass open forest of the southern section of the NSW South Western Slopes Bioregion	Low	No associated TEC	>100	TCZ – 0.12	28.8	TCZ - 28.8	TCZ - 1
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ –0.02	40.4	TCZ - 40.4	TCZ - 1
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
Total PCT 294								2
295	Robertsons Peppermint - Broad-leaved Peppermint - Nortons Box - stringybark shrub-fern open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Moderate	No associated TEC	>100	TCZ – 0.57	39.8	TCZ - 39.8	TCZ - 9
					ECZ – 0.22		ECZ - 32.4	ECZ - 3
					HTZ –nil		N/A	N/A
Total PCT 295								12
297	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest	Very Low	No associated TEC	>100	TCZ – 0.54	8.2	TCZ - 8.2	TCZ - 0
					ECZ – 0.06		ECZ - 3.8	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.03	20.8	TCZ - 20.8	TCZ - 1
					ECZ – 0.02		ECZ - 14.2	ECZ - 1
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.87	52.7	TCZ - 52.7	TCZ - 17
					ECZ – 0.49		ECZ - 32.0	ECZ - 6
					HTZ –nil		N/A	N/A
Total PCT 297								25
299		Very Low		>100	TCZ – 0.13	4	TCZ - 4	TCZ - 0

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest		No associated TEC		ECZ – 0.98		ECZ - 3	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 0.05	44.9	TCZ - 44.9	TCZ - 1
					ECZ – 0.08		ECZ - 31.5	ECZ - 1
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.04	44.9	TCZ - 44.9	TCZ - 1
					ECZ – nil		N/A	N/A
					HTZ –nil		N/A	N/A
Total PCT 299								3
301	Drooping Sheoke - Ricinocarpus bowmannii - grasstree tall open shrubland of the Coolac - Tumut Serpentinite Belt	Very low	Coolac-Tumut Serpentinite Shrubby Woodland	>100	TCZ – 0.29	0.4	TCZ - 0.4	TCZ - 0
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 1.8	29.7	TCZ - 29.7	TCZ - 26
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.72	46.9	TCZ - 46.9	TCZ - 17
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
		High		>100	TCZ – 0.6	66.2	TCZ - 66.2	TCZ - 20
					ECZ –nil		N/A	N/A
					HTZ –nil		N/A	N/A
Total PCT 301								63
306	Red Box - Red Stringybark - Nortons Box hill heath shrub - tussock grass open forest of the Tumut region	Very Low	No associated TEC	>100	TCZ – 2.45	14.7	TCZ - 14.7	TCZ - 0
					ECZ – 0.03		ECZ - 6.3	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 1.25	23.4	TCZ - 23.4	TCZ - 11
					ECZ – 0.13		ECZ - 21.8	ECZ - 1
					HTZ – 0.03		HTZ - 10.0	HTZ- 1
Total PCT 306								13
314	Apple Box - Red Stringybark basalt scree open forest in the upper Murray River region	Very Low	No associated TEC	>100	TCZ – 2.5	1.8	TCZ - 1.8	TCZ - 0
					ECZ – 0.04		ECZ - 0.8	ECZ - 0
					HTZ – 0.01		HTZ - 0.0	HTZ - 0
		Low		>100	TCZ – 0.28	22.7	TCZ - 22.7	TCZ - 3
					ECZ – 0.12		ECZ - 18.8	ECZ - 1
					HTZ – nil		N/A	N/A
		Moderate		>100	TCZ – 2.6	41.4	TCZ - 41.4	TCZ - 48
					ECZ – 0.61		ECZ - 33.6	ECZ - 9
					HTZ – 0.04		HTZ - 11.0	HTZ - 1
		Very high		>100	TCZ – 1.2	90.7	TCZ - 90.7	TCZ - 47
					ECZ – 0.15		ECZ - 67.1	ECZ - 4

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
					HTZ – 0.01		HTZ - 4.2	HTZ - 1
Total PCT 314								114
316	Nortons Box - Red Box - Red Stringybark +/- Nodding Flax Lily forb-grass open forest	Very low	No associated TEC	>100	TCZ – 0.11	4.3	TCZ - 4.3	TCZ - 0
					ECZ – 0.03		ECZ - 1.9	ECZ - 0
					HTZ – nil		N/A	N/A
		Low		>100	TCZ – 5.46	40.4	TCZ - 40.4	TCZ - 97
					ECZ – 0.09		ECZ - 38.3	ECZ - 2
					HTZ – nil		N/A	N/A
		Very high		>100	TCZ – 2.95	90.4	TCZ - 90.4	TCZ - 117
					ECZ – 7.97		ECZ - 61.7	ECZ - 215
					HTZ – 0.54		HTZ - 25.9	HTZ - 6
Total PCT 316								437
319	Tumbledown Red Gum - White Cypress Pine hill woodland	Low	No associated TEC	>100	TCZ – 0.86	20	TCZ - 20	TCZ - 8
					ECZ – 0.01		ECZ - 8.5	ECZ - 1
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.53	54.1	TCZ - 54.1	TCZ - 13
					ECZ – 0.07		ECZ - 37.8	ECZ - 1
					HTZ –nil		N/A	N/A
Total PCT 319								23
343	Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates	Very Low	No associated TEC	>100	TCZ – 3.1	7.0	TCZ - 7	TCZ - 0
					ECZ – 0.12		ECZ - 3	ECZ - 0
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 0.89	31.8	TCZ - 31.8	TCZ - 14
					ECZ – 0.08		ECZ - 21.5	ECZ - 1
					HTZ –nil		N/A	N/A
		Moderate		>100	TCZ – 0.9	51.1	TCZ - 51.1	TCZ - 23
					ECZ – 0.75		ECZ - 38.7	ECZ - 15
					HTZ – 0.04		HTZ - 24.8	HTZ - 1
Total PCT 343								54
352	Red Stringybark - Blakely’s Red Gum hillslope open forest on meta-sediments	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	>100	TCZ – 6.3	13.1	TCZ - 13.1	TCZ - 0
					ECZ – 0.03		ECZ - 5.6	ECZ - 0
					HTZ –nil		N/A	N/A
		Low		>100	TCZ – 1.39	13.7	TCZ - 13.7	TCZ - 0
					ECZ – nil		N/A	N/A
					HTZ –nil		N/A	N/A
Total PCT 352								0
731	Broad-leaved Peppermint - Red Stringybark grassy open	Very Low	No associated TEC	>100	TCZ – 0.7	21.0	TCZ - 21.0	TCZ - 7
					ECZ – 0.07		ECZ - 9.7	ECZ - 1
					HTZ – 0.03		HTZ - 1.2	HTZ - 1
		Low		>100	TCZ – 0.38	21.0	TCZ - 21.0	TCZ - 4

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Scores	VI loss	Ecosystem credits
	forest on undulating hills				ECZ – 0.07		ECZ - 9.7	ECZ - 1
					HTZ – 0.03		HTZ - 1.2	HTZ - 1
Total PCT 731								15
1191	Snow Gum - Candle Bark woodland on broad valley flats	Very low	No associated TEC	>100	TCZ – 0.16	11.0	TCZ - 11.0	TCZ - 0
					ECZ – 0.17		ECZ - 10.0	ECZ - 0
					HTZ –nil		N/A	N/A
Total PCT 1191								0
Total				-	**331.93**	-	-	**4700**

Table 15-6: Ecosystem credits for the Bondo IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Loss VI	Ecosystem credits
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	Low	No associated TEC	>100	TCZ - 1.06	30.5	TCZ - 30.5	TCZ - 16
					ECZ - 3.06		ECZ - 28.0	ECZ - 43
					HTZ - nil		N/A	N/A
		High			TCZ - 1.08	87.7	TCZ - 87.7	TCZ - 47
					ECZ - 3.73		ECZ - 62.5	ECZ - 117
					HTZ - 0.2		HTZ - 26.2	HTZ - 3
		Very High			TCZ - 0.1	87.7	TCZ - 87.7	TCZ - 4
					ECZ - 0.38		ECZ - 62.5	ECZ - 12
					HTZ - 0.01		HTZ - 26.2	HTZ - 1
Total PCT 285								243
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Low	No associated TEC	>100	TCZ - 0.18	32.9	TCZ - 32.9	TCZ - 3
					ECZ - nil		N/A	N/A
					HTZ - nil		N/A	N/A
Total PCT 290								3
295	Robertsons Peppermint - Broad-leaved Peppermint - Nortons Box - stringybark shrub-fern open forest	Moderate	No associated TEC	>100	TCZ - 1.07	47.4	TCZ - 47.4	TCZ - 19
					ECZ - 2.13		ECZ - 38.2	ECZ - 30
					HTZ - nil		N/A	N/A
Total PCT 295								49
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Very low	No associated TEC	>100	TCZ - 0.49	2	TCZ - 2	TCZ - 0
					ECZ - 1.17		ECZ - 0.9	ECZ - 0
					HTZ - nil		N/A	N/A
		Moderate			TCZ - 3.96	62	TCZ - 62	TCZ - 107
					ECZ - 11.28		ECZ - 47.4	ECZ - 234
					HTZ - 0.22		HTZ - 6.8	HTZ - 1
Total PCT 299								342
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils in the upper NSW South Western Slopes Bioregion and western Kosciuszko escarpment	Low	No associated TEC	>100	TCZ - 0.14	68.8	TCZ - 68.8	TCZ - 4
					ECZ - nil		N/A	N/A
					HTZ - nil		N/A	N/A
		Moderate			TCZ - 0.35	68.8	TCZ - 68.8	TCZ - 9
					ECZ - 1.06		ECZ - 53.5	ECZ - 21
					HTZ - nil		N/A	N/A

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	Loss VI	Ecosystem credits
Total PCT 300								34
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	Low	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	>100	TCZ - 0.07	14.0	TCZ - 14.0	TCZ - 0
					ECZ - nil		N/A	N/A
					HTZ - nil		N/A	N/A
Total PCT 352								0
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands Bioregion and Australian Alps Bioregion	Very low	No associated TEC	>100	TCZ - 0.06	8.4	TCZ - 8.4	TCZ - 0
					ECZ - 0.14		ECZ - 7.7	ECZ - 0
					HTZ - 0.02		HTZ - 0	HTZ - 0
		Low			TCZ - 0.10	40.9	TCZ - 40.9	TCZ - 2
					ECZ - 0.05		ECZ - 26.3	ECZ - 1
					HTZ - nil		N/A	N/A
		High			TCZ - 1.52	60.6	TCZ - 60.6	TCZ - 35
					ECZ - 4.12		ECZ - 49.8	ECZ - 77
					HTZ - 1.11		HTZ - 5.2	HTZ - 2
Total PCT 638								117
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges, South Eastern Highlands Bioregion and Australian Alps Bioregion	Very low	Tableland Basalt Forest	>100	TCZ - 0.03	11.8	TCZ - 11.8	TCZ - 0
		Moderate			TCZ - 0.06	66.1	TCZ - 66.1	TCZ - 1
					ECZ - 0.53		ECZ - 50.2	ECZ - 10
Total PCT 953								11
Total				-	**39.49**	-	-	**799**

Table 15-7: Ecosystem credits for the Snowy Mountains IBRA subregion

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	VI loss	Ecosystem credits
285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps in the NSW South Western Slopes	Low	No associated TEC	>100	TCZ- 0.41	32.5	TCZ- 32.5	TCZ- 7
					ECZ- 1.02		ECZ- 5.3	ECZ- 16
					HTZ- 0.09		HTZ- 0.09	HTZ- 1
Total PCT 300								24
300	Ribbon Gum - Narrow-leaved (Robertsons) Peppermint montane fern - grass tall open forest on deep clay loam soils	Low	No associated TEC	>100	TCZ - 0.49	33.1	TCZ - 33.1	TCZ - 6
					ECZ - 0.12		ECZ - 28.5	ECZ- 1
					HTZ - 0.13		HTZ - 0	HTZ - 1
		Moderate		>100	TCZ - 0.07	45.9	TCZ - 45.9	TCZ - 1
					ECZ - 0.2		ECZ - 43.5	ECZ - 3
					HTZ - 0.01		HTZ - 0	HTZ - 1
		Very High		>100	TCZ- 4.85	82.0	TCZ - 82	TCZ - 149
					ECZ- 9.02		ECZ - 19.2	ECZ - 212
					HTZ- 3.24		HTZ - 62.8	HTZ- 23
Total PCT 300								397
637	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	High	Montane Peatlands and Swamps	>100	TCZ- 0.02	75.2	TCZ- 75.2	TCZ- 1
					ECZ- nil		ECZ- nil	ECZ- nil
					HTZ- nil		HTZ- nil	HTZ- nil
Total PCT 637								1
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	Low	No associated TEC	>100	TCZ - 0.55	34.1	TCZ - 34.1	TCZ - 11
					ECZ - 0.77		ECZ - 26.9	ECZ - 10
					HTZ - 0.07		HTZ - 2.2	HTZ - 1
		Moderate		>100	TCZ - 4.93	45.4	TCZ - 45.4	TCZ - 112
					ECZ - 7.62		ECZ - 36.6	ECZ - 139
					HTZ - 3.23		HTZ - 4.8	HTZ - 8
		High		>100	TCZ - 12.83	67.1	TCZ - 67.1	TCZ - 430
					ECZ - 21.28		ECZ - 49.8	ECZ - 529
					HTZ - 7.62		HTZ - 10.5	HTZ - 40
Total PCT 638								1280
679	Black Sallee - Snow Gum low woodland of montane valleys	Low	No associated TEC	>100	TCZ - 0.27	32.9	TCZ - 32.9	TCZ - 3
					ECZ - 0.03		ECZ- 32.7	ECZ- 1
					HTZ - 0.01		HTZ - 0.0	HTZ - 1
		High		>100	TCZ - 1.55	69.8	TCZ - 69.8	TCZ - 41
					ECZ - 1.73		ECZ - 46.8	ECZ - 30
					HTZ - 0.17		HTZ - 18.2	HTZ - 1

PCT ID	PCT name	Condition	TEC	Patch size (ha)	Clearing zones (ha)	Current VI Score	VI loss	Ecosystem credits
Total PCT 679								77
939	Montane wet heath and bog of the eastern tablelands	High	Montane Peatlands and Swamps	>100	TCZ - 0.07	78.7	TCZ - 78.7	TCZ - 3
					ECZ - 0.45		ECZ - 15.3	ECZ - 3
					HTZ - 0.03		HTZ - 0	HTZ - 1
Total PCT 939								7
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	Low	No associated TEC	>100	TCZ - 5.61	27.5	TCZ - 27.5	TCZ - 58
					ECZ - 2.04		ECZ - 24.9	ECZ - 19
					HTZ - 0.40		HTZ - 0	HTZ - 1
		Moderate		>100	TCZ - 3.21	55.5	TCZ - 55.5	TCZ - 67
					ECZ - 5.04		ECZ - 41.6	ECZ- 79
					HTZ - 0.61		HTZ - 16	HTZ- 4
		High		>100	TCZ - 15.14	76	TCZ - 76	TCZ - 431
					ECZ - 17.53		ECZ - 59.1	ECZ - 388
					HTZ - 3.49		HTZ - 21.5	HTZ - 28
		Very High		>100	TCZ - 12.42	83.9	TCZ - 83.9	TCZ - 391
					ECZ - 19.70		ECZ - 68.1	ECZ - 503
					HTZ - 4.40		HTZ - 21.8	HTZ - 36
Total PCT 953								2005
1196	Snow Gum - Mountain Gum shrubby open forest of montane areas	Low	No associated TEC	>100	TCZ - 0.93	35	TCZ - 35	TCZ - 12
					ECZ - 0.55		ECZ - 32.9	ECZ - 7
					HTZ - 0.11		HTZ - 0	HTZ - 1
		High		>100	TCZ - 6.16	73.4	TCZ - 73.4	TCZ - 169
					ECZ - 19.10		ECZ - 52.6	ECZ - 376
					HTZ - 2.09		HTZ - 10.5	HTZ - 8
Total PCT 1196								573
1224	Sub-alpine dry grasslands and heathlands of valley slopes	High	No associated TEC	>100	TCZ - 0.02	88.4	TCZ - 88.4	TCZ - 1
					ECZ - nil		ECZ - nil	N/A
					HTZ - nil		HTZ - nil	N/A
Total PCT 1224								1
Total					**201.43**	**-**	**-**	**4365**

15.1.2 Species credits

Table 15-8 shows the total species credit offset requirement for species either known or likely to be impacted by the amended project. Table 15-9 shows the total offset requirement for species credit species with limited potential to be impacted. Species have been included in this table where there is incomplete information to be able to exclude them from the BAM-C despite a limited likelihood of potential impacts and/or occurrence within the updated indicative disturbance footprint.

The total species credit offset requirement, as determined using the BAM-C (version 61), is provided for each IBRA subregion in Table 15-10 to Table 15-15. The full credit reports for each subregion, including like-for-like trading options, are provided in Attachment 23.

Further consultation with NSW DCCEEW is required to identify species credit requirements for threatened fauna habitat subject to clearing within Category 1 exempt lands (prescribed impacts), as documented in Attachment 24 (mitigation measure B37, Table 14-1).

Table 15-8: Species credit species likely to be impacted

Species credit species likely to be impacted
Species have been included in this section of the table where some level of impact for the species is considered at least moderately likely.

Scientific name	Common name	BUN		CRO		MUR		INL		BON		SNO		Total	
		Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Total clearing (ha)/count (c)	Total credits
Flora															
Acacia bynoeana	Bynoe's Wattle	1.26	44	2.63	73									3.89	**117**
Ammobium craspedioides	Yass Daisy			2038 (c)	4076	1338 (c)	2676	5040 (c)	10080	5 (c)	10	12 (c)	24	8433 (c)	**16866**
Kunzea cambagei	Cambage Kunzea	7.29	250											7.29	**250**
Leucochrysum albicans* subsp. *tricolor	Hoary Sunray	6023 (c)	12046	24597 (c)	49194	11201 (c)	22402	1041 (c)	2082			581 (c)	1162	43443 (c)	**86886**
Pomaderris cotoneaster	Cotoneaster Pomaderris	6.67	231							1.41	45			8.08	**276**
Prasophyllum bagoense	Bago Leek-orchid											0.04	3	0.04	**3**
Prasophyllum innubum	Brandy Marys Leek-orchid											0.02	1	0.02	**1**
Prasophyllum keltonii	Kelton's Leek-orchid											0.03	2	0.03	**2**
Prasophyllum petilum	Tarengo Leek-Orchid					26.92	380	17.83	363					44.75	**743**
Pterostylis oreophila	Blue-tongued Greenhood											0.56	10	0.56	**10**
Solanum armourense	Solanum armourense	0.35	17											0.35	**17**
Swainsona recta	Small Purple-pea					9.73	91	55.64	1085					65.37	**1176**
Swainsona sericea	Silky Swainson-pea	7.38	106			13.85	147	87.93	1669					109.16	**1922**

Species credit species likely to be impacted
Species have been included in this section of the table where some level of impact for the species is considered at least moderately likely.

Scientific name	Common name	BUN		CRO		MUR		INL		BON		SNO		Total	
		Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Total clearing (ha)/count (c)	Total credits
Thesium australe	Austral Toadflax	23.87	218	59.32	242	58.44	256	0.33	2			0.01	1	141.97	**719**
Xerochrysum palustre	Swamp Everlasting											0.68	8	0.68	**8**
Fauna															
Aprasia parapulchella	Pink-tailed Legless Lizard	9.39	136	9.77	146	6.61	82	8.35	200					34.12	**564**
Callocephalon fimbriatum	Gang-gang Cockatoo	25.91	859	31.27	888	43.64	1076	110.19	3030	31.74	792	187.40	5147	430.15	**11792**
Calyptorhynchus lathami	Glossy Black-Cockatoo	26.43	858	13.43	418			0.93	24					40.79	**1300**
Cercartetus nanus	Eastern Pygmy-possum	24.19	837	38.15	1063	34.78	955			22.99	599	108.90	2714	229.01	**6168**
Delma impar	Striped Legless Lizard			17.43	52	39.32	150	33.32	147					90.07	**349**
Haliaeetus leucogaster	White-bellied Sea-Eagle							2.48	45	0.43	14			2.91	**59**
Hieraaetus morphnoides	Little Eagle	1.03	13	0.35	12	0.10	6	3.55	86	4.85	97	79.28	1660	89.16	**1874**
Keyacris scurra	Key's Matchstick Grasshopper			33.23	338	54.54	486	74.12	1156					161.89	**1980**
Litoria castanea	Yellow-spotted Tree Frog			0.63	29							0.54	9	1.17	**38**
Lophoictinia isura	Square-tailed Kite							2.46	56	1.45	25	33.40	700	37.31	**781**
Myotis macropus	Southern Myotis	13.32	182			27.47	257	3.14	18	14.00	314			57.93	**771**
Ninox connivens	Barking Owl	25.14	849					69.77	1929	8.41	181	137.47	3755	240.79	**6714**

Species credit species likely to be impacted Species have been included in this section of the table where some level of impact for the species is considered at least moderately likely.															
Scientific name	**Common name**	**BUN**		**CRO**		**MUR**		**INL**		**BON**		**SNO**		**Total**	
		Clearing (ha)/count (c)	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Total clearing (ha)/count (c)**	**Total credits**
nox strenua	Powerful Owl	23.49	818			26.77	802	14.53	455	7.22	173	155.19	4289	227.20	**6537**
Petauroides volans	Greater Glider	9.13	321					11.48	374	6.86	160	115.11	3022	142.58	**3877**
***Petaurus australis* - endangered population**	Yellow-bellied Glider population on the Bago Plateau									8.51	205	112.81	2854	121.32	**3059**
Petaurus norfolcensis	Squirrel Glider			10.85	345	6.19	197	17.45	559	4.69	150	20.97	604	60.15	**1855**
***Petaurus norfolcensis* - endangered population**	Squirrel Glider							10.46	331					10.46	**331**
Petroica rodinogaster	Pink Robin	0.03	1					0.03	1	10.69	264	24.51	596	35.26	**862**
Phascogale tapoatafa	Brush-tailed Phascogale	19.39	680							5.78	126	136.89	3733	162.06	**4539**
Phascolarctos cinereus	Koala	6.19	159	41.80	1119	52.02	1302	119.51	3224	32.99	830	188.58	5174	441.09	**11808**
Polytelis swainsonii	Superb Parrot			14.40	304	29.41	540	69.79	1761	0.00	1			113.60	**2606**
Synemon plana	Golden Sun Moth					17.57	73	9.82	88					27.39	**161**
Tyto novaehollandiae	Masked Owl	3.58	121					30.37	977	6.39	142	138.09	3776	178.43	**5016**
Tyto tenebricosa	Sooty Owl									5.78	189	57.30	1852	63.08	**2041**
Total credit requirement			**18746**		**58299**		**31878**		**29742**		**4317**		**41096**		**184078**

Table 15-9: Species credit species with limited potential to be impacted

Species credit species with limited potential to be impacted
Species have been included in this section of the table where there is incomplete information to be able to exclude them from the BAM-C despite a limited likelihood of potential impacts and/or occurrence within the disturbance footprint, for example:
The species/entity was not found during field surveys of comparable habitat, however the survey coverage was incomplete or surveys were not conducted during the required season and the species is known or predicted from the broader IBRA sub-region.

Scientific name	Common name	BUN		CRO		MUR		INL		BON		SNO		Total	
		Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Total clearing (ha)/count (c)	Total credits
Flora															
Acacia ausfeldii	Ausfeld's Wattle							15.86	512					15.86	**512**
Acacia flocktoniae	Flockton Wattle	10.08	348											10.08	**348**
Baloskion longipes	Dense Cord-rush	1.26	44											1.26	**44**
Bossiaea fragrans	Bossiaea fragrans							6.23	251					6.23	**251**
Bossiaea oligosperma	Few-seeded Bossiaea	2.36	56											2.36	**56**
Caesia parviflora var. minor	Small Pale Grass-lily							1.68	26					1.68	**26**
Caladenia concolor	Crimson Spider Orchid					1.95	74.00	29.92	1381					31.88	**1455**
Caladenia montana	Calandenia montana									9.30	169	199.30	3995	208.60	**4164**
Commersonia prostrata	Dwarf Kerrawang			0.82	4									0.82	**4**
Cullen parvum	Small Scurf-pea							16.55	342					16.55	**342**
Dillwynia glaucula	Michelago Parrot-pea	1.26	44											1.26	**44**
Diuris aequalis	Buttercup Doubletail	6.07	183	36.36	803									42.43	**986**

Species credit species with limited potential to be impacted Species have been included in this section of the table where there is incomplete information to be able to exclude them from the BAM-C despite a limited likelihood of potential impacts and/or occurrence within the disturbance footprint, for example: The species/entity was not found during field surveys of comparable habitat, however the survey coverage was incomplete or surveys were not conducted during the required season and the species is known or predicted from the broader IBRA sub-region.															
Scientific name	**Common name**	**BUN**		**CRO**		**MUR**		**INL**		**BON**		**SNO**		**Total**	
		Clearing (ha)/count (c)	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Total clearing (ha)/count (c)**	**Total credits**
Diuris tricolor	Pine Donkey Orchid							1.27	13					1.27	**13**
Eucalyptus aggregata	Black Gum			4 (c)	8			3 (c)	6					7 (c)	**14**
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	12 (c)	24											12 (c)	**24**
Eucalyptus robertsonii* subsp. *hemisphaerica	Robertson's Peppermint			2 (c)	6									2 (c)	**6**
Genoplesium superbum	Superb Midge Orchid	9.42	476											9.42	**476**
Grevillea iaspicula	Wee Jasper Grevillea					8 (c)	24.00							8 (c)	**24**
Grevillea wilkinsonii	Tumut Grevillea							21.00	936					21.00	**936**
Lepidium hyssopifolium	Aromatic Peppercress			64.50	408									64.50	**408**
Persoonia marginata	Clandulla Geebung							4.26	142					4.26	**142**
Persoonia mollis subsp. revoluta	Persoonia mollis subsp. revoluta	1.37	52											1.37	**52**
Phyllota humifusa	Dwarf Phyllota	10.50	354											10.50	**354**

Species credit species with limited potential to be impacted Species have been included in this section of the table where there is incomplete information to be able to exclude them from the BAM-C despite a limited likelihood of potential impacts and/or occurrence within the disturbance footprint, for example: The species/entity was not found during field surveys of comparable habitat, however the survey coverage was incomplete or surveys were not conducted during the required season and the species is known or predicted from the broader IBRA sub-region.															
Scientific name	**Common name**	**BUN**		**CRO**		**MUR**		**INL**		**BON**		**SNO**		**Total**	
		Clearing (ha)/count (c)	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Clearing (ha)/count (c)**	**Species credits**	**Total clearing (ha)/count (c)**	**Total credits**
Pomaderris delicata	Delicate Pomaderris	1.37	77											1.37	**77**
Pomaderris pallida	Pale Pomaderris					1.16	67.00							1.16	**67**
Pterostylis alpina	Alpine Greenhood											2.14	57	2.14	**57**
Pterostylis foliata	Slender Greenhood									6.89	155	43.07	930	49.96	**1085**
Pultenaea humilis	Dwarf Bush-pea							18.43	523					18.43	**523**
Senecio garlandii	Woolly Ragwort							9.88	238					9.88	**238**
Thelymitra alpicola	Alpine Sun-orchid											0.54	5	0.54	**5**
Fauna															
Burhinus grallarius	Bush Stone-curlew							54.25	1533					54.25	**1533**
Chalinolobus dwyeri	Large-eared Pied Bat							2.42	78					2.42	**78**
Crinia sloanei	Sloane's Froglet							0.66	13					0.66	**13**
Cyclodomorphus praealtus	Alpine She-oak Skink											30.83	837	30.83	**837**
Litoria booroolongensis	Booroolong Frog			0.01	1			0.05	1					0.06	**2**

Species credit species with limited potential to be impacted
Species have been included in this section of the table where there is incomplete information to be able to exclude them from the BAM-C despite a limited likelihood of potential impacts and/or occurrence within the disturbance footprint, for example:
The species/entity was not found during field surveys of comparable habitat, however the survey coverage was incomplete or surveys were not conducted during the required season and the species is known or predicted from the broader IBRA sub-region.

Scientific name	Common name	BUN		CRO		MUR		INL		BON		SNO		Total	
		Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Clearing (ha)/count (c)	Species credits	Total clearing (ha)/count (c)	Total credits
Mastacomys fuscus	Broad-toothed Rat											0.03	1	0.03	**1**
Mixophyes balbus	Stuttering Frog	13.87	710											13.87	**710**
Pseudomys fumeus	Smoky Mouse									5.78	189			5.78	**189**
Total credit requirement			**2368**		**1230**		**165**		**5995**		**513**		**5825**		**16096**

Table 15-10: Species credits for Bungonia IBRA subregion

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credits
Acacia bynoeana	Bynoe's Wattle	1093_High_ECZ_101, 1093_High_TCZ_101	1.26	44
Acacia flocktoniae	Flockton Wattle	870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1330_High_TCZ_101, 1330_Moderate_TCZ_101	10.08	348
Aprasia parapulchella	Pink-tailed Legless Lizard	283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_4, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_4, 1330_Low_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 1330_Verylow_TCZ_101, 283_Low_TCZ_101, 1330_Verylow_ECZ_101	9.39	136
Baloskion longipes	Dense Cord-rush	1093_High_ECZ_101, 1093_High_TCZ_101	1.26	44
Bossiaea oligosperma	Few-seeded Bossiaea	1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101	2.36	56
Callocephalon fimbriatum	Gang-gang Cockatoo	283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1097_Low_ECZ_4, 1097_Low_ECZ_101, 1107_High_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Low_ECZ_101, 1150_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	25.91	859
Calyptorhynchus lathami	Glossy Black-Cockatoo	870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101,	26.43	858

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credits
		1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1097_Low_ECZ_4, 1097_Low_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Low_ECZ_101, 1150_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_4, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_4, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101		
Cercartetus nanus	Eastern Pygmy-possum	283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1093_High_ECZ_101,1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1107_High_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	24.19	837
Dillwynia glaucula	Michelago Parrot-pea	1093_High_ECZ_101, 1093_High_TCZ_101	1.26	44
Diuris aequalis	Buttercup Doubletail	1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1097_Low_ECZ_4, 1097_Low_ECZ_101, 1097_Verylow_TCZ_101, 1097_Low_TCZ_101, 1097_Verylow_ECZ_101, 1097_Verylow_HTZ_101	6.07	183
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	1330_Verylow_TCZ_101	12	24
Genoplesium superbum	Superb Midge Orchid	1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Low_ECZ_101, 1150_Low_TCZ_101, 1150_Verylow_ECZ_101, 1150_Verylow_TCZ_101"	9.42	476
Hieraaetus morphnoides	Little Eagle	870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1093_Veryhigh_TCZ_101, 1097_Low_ECZ_4,	1.03	13

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credits
		1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101		
Kunzea cambagei	Cambage Kunzea	1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Low_TCZ_101	7.29	250
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1097_Low_ECZ_4, 1097_Verylow_TCZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_4, 1330_Low_ECZ_101, 1330_Low_TCZ_4, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_TCZ_101, 1330_Verylow_ECZ_101	6023 (count)	12046
Mixophyes balbus	Stuttering Frog	1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101	13.87	710
Myotis macropus	Southern Myotis	870_Veryhigh_TCZ_101, 1107_High_ECZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 1330_Verylow_TCZ_101, 1330_Verylow_ECZ_101	13.32	182
Ninox connivens	Barking Owl	870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1097_Low_ECZ_4, 1097_Low_ECZ_101, 1107_High_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Low_ECZ_101, 1150_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	25.14	849
Ninox strenua	Powerful Owl	870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101,	23.49	818

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credits
		1093_Veryhigh_TCZ_101, 1097_Low_ECZ_101, 1107_High_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101		
Persoonia mollis subsp. *revoluta*	Persoonia mollis subsp. revoluta	1150_High_TCZ_101	1.37	52
Petauroides volans	Greater Glider	1097_Low_ECZ_101, 1107_High_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Low_ECZ_101, 1330_High_TCZ_101	9.13	321
Petroica rodinogaster	Pink Robin	1107_High_ECZ_101	0.03	1
Phascogale tapoatafa	Brush-tailed Phascogale	1093_High_ECZ_101, 1093_High_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1107_High_ECZ_101, 1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101	19.39	680
Phascolarctos cinereus	Koala	283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1097_Low_ECZ_4, 1097_Low_ECZ_101, 1107_High_ECZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_4, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_4, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	6.19	159
Phyllota humifusa	Dwarf Phyllota	1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101, 1150_Moderate_TCZ_101	10.5	354
Pomaderris cotoneaster	Cotoneaster Pomaderris	1150_High_ECZ_101, 1150_High_HTZ_101, 1150_High_TCZ_101	6.67	231
Pomaderris delicata	Delicate Pomaderris	1150_High_TCZ_101	1.37	77
Solanum armourense	Solanum armourense	1093_High_ECZ_101, 1093_High_TCZ_101	0.35	17
Swainsona sericea	Silky Swainson-pea	283_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_4, 1330_Low_ECZ_101, 1330_Low_TCZ_4, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101,	7.38	106

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credits
		1330_Verylow_TCZ_101, 283_Low_TCZ_101, 1330_Verylow_ECZ_101		
Thesium australe	Austral Toadflax	1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_4, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_4, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 1330_Verylow_TCZ_101, 1330_Verylow_ECZ_101	23.87	218
Tyto novaehollandiae	Masked Owl	870_Veryhigh_ECZ_101, 870_Veryhigh_TCZ_101, 1097_Low_ECZ_101, 1107_High_ECZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	3.58	121
			Total	**21114**

Table 15-11: Species credits for Crookwell IBRA subregion

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Acacia bynoeana	Bynoe's Wattle	1093_Moderate_ECZ_101, 1093_Moderate_ECZ_4, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Moderate_TCZ_4, 1093_High_ECZ_101, 1093_High_TCZ_101	2.63	73
Ammobium craspedioides	Yass Daisy	277_Low_TCZ_101, 283_Verylow_ECZ_101, 283_Verylow_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 731_Low_TCZ_101, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 1330_Low_ECZ_2510001, 1330_Verylow_ECZ_25100, 1330_Verylow_TCZ_25100	2038	4076
Aprasia parapulchella	Pink-tailed Legless Lizard	280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 283_Verylow_ECZ_101, 283_Verylow_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 731_Low_ECZ_101, 731_Low_TCZ_101, 731_High_ECZ_101, 731_High_TCZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Verylow_TCZ_25100	9.77	146

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Callocephalon fimbriatum	Gang-gang Cockatoo	280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 727_Low_TCZ_10101, 727_Moderate_ECZ_101, 727_Moderate_TCZ_101, 727_Veryhigh_ECZ_101, 727_Veryhigh_HTZ_101, 727_Veryhigh_TCZ_101, 731_Low_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 952_Low_ECZ_101, 952_Low_TCZ_101, 952_Moderate_ECZ_101, 952_Moderate_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_TCZ_101, 1093_High_ECZ_101, 1093_High_HTZ_101, 1093_High_TCZ_101, 1151_High_ECZ_101, 1151_High_HTZ_101, 1151_High_TCZ_101, 1151_Veryhigh_ECZ_101, 1151_Veryhigh_HTZ_101, 1151_Veryhigh_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_HTZ_101, 1330_High_HTZ_4, 1330_High_TCZ_101	31.27	888
Calyptorhynchus lathami	Glossy Black-Cockatoo	731_Low_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_High_ECZ_101, 1093_High_TCZ_101, 1151_High_ECZ_101, 1151_High_HTZ_101, 1151_High_TCZ_101, 1151_Veryhigh_ECZ_101, 1151_Veryhigh_HTZ_101, 1151_Veryhigh_TCZ_101, 1330_Low_HTZ_101, 1330_Moderate_ECZ_101	13.43	418

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Cercartetus nanus	Eastern Pygmy-possum	280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 727_Low_TCZ_10101, 727_Moderate_ECZ_101, 727_Moderate_TCZ_101, 727_Veryhigh_ECZ_101, 727_Veryhigh_HTZ_101, 727_Veryhigh_TCZ_101, 731_Low_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 952_Low_ECZ_101, 952_Low_TCZ_101, 952_Moderate_ECZ_101, 952_Moderate_TCZ_101, 1093_Low_ECZ_101, 1093_Low_ECZ_4, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_High_ECZ_101, 1093_High_HTZ_101, 1093_High_TCZ_101, 1151_High_ECZ_101, 1151_High_HTZ_101, 1151_High_TCZ_101, 1151_Veryhigh_ECZ_101, 1151_Veryhigh_HTZ_101, 1151_Veryhigh_TCZ_101, 1191_Moderate_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_HTZ_101, 1330_High_HTZ_4, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101, 1330_Veryhigh_TCZ_101	38.15	1063
Commersonia prostrata	Dwarf Kerrawang	1191_Verylow_TCZ_101, 1191_Moderate_TCZ_101	0.82	4
Delma impar	Striped Legless Lizard	277_Low_TCZ_101, 1330_Verylow_HTZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_TCZ_101, 1330_Verylow_ECZ_25100, 1330_Verylow_TCZ_25100	17.43	52

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Diuris aequalis	Buttercup Doubletail	731_Low_ECZ_101, 731_Low_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 1093_Verylow_ECZ_101, 1093_Verylow_HTZ_101, 1093_Verylow_TCZ_101, 1093_Low_ECZ_101, 1093_Low_ECZ_4, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_ECZ_4, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Moderate_TCZ_4, 1093_High_ECZ_101, 1093_High_HTZ_101, 1093_High_TCZ_101, 1151_Low_ECZ_101, 1151_Low_HTZ_101, 1151_Low_TCZ_101, 1151_High_ECZ_101, 1151_High_HTZ_101, 1151_High_TCZ_101, 1151_Veryhigh_ECZ_101, 1151_Veryhigh_HTZ_101, 1151_Veryhigh_TCZ_101, 1191_Verylow_TCZ_101, 1191_Moderate_TCZ_101	36.36	803
Eucalyptus aggregata	Black Gum	679_Moderate_ECZ_101, 679_Moderate_TCZ_101, 1191_Verylow_TCZ_101, 1191_Moderate_TCZ_101	4	8
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	727_Moderate_TCZ_101	2	6
Hieraaetus morphnoides	Little Eagle	679_Moderate_ECZ_101, 679_Moderate_TCZ_101, 731_Veryhigh_ECZ_101, 1093_Moderate_ECZ_101, 1093_High_ECZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_High_ECZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101	0.35	12

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Keyacris scurra	Key's Matchstick Grasshopper	283_Verylow_ECZ_101, 283_Verylow_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 727_Veryhigh_TCZ_101, 1256_Low_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_HTZ_101, 1330_High_HTZ_4, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101, 1330_Veryhigh_TCZ_101, 1330_Low_ECZ_2510001, 1330_Low_HTZ_25100, 1330_Verylow_ECZ_25100, 1330_Verylow_TCZ_25100	33.23	338
Lepidium hyssopifolium	Aromatic Peppercress	277_Low_TCZ_101, 283_Verylow_ECZ_101, 283_Verylow_TCZ_101, 283_Low_ECZ_101, 283_Low_HTZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 1330_Verylow_HTZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_ECZ_4, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_HTZ_101, 1330_High_HTZ_4, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101, 1330_Veryhigh_TCZ_101, 1330_Low_ECZ_2510001, 1330_Low_HTZ_25100, 1330_Verylow_ECZ_25100, 1330_Verylow_TCZ_25100	64.50	408

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	280_Moderate_ECZ_101, 679_Low_TCZ_101, 679_Moderate_ECZ_101, 679_Moderate_TCZ_101, 727_Verylow_TCZ_101, 727_Low_TCZ_10101, 727_Moderate_ECZ_101, 727_Moderate_TCZ_101, 731_Low_TCZ_101, 731_High_ECZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_TCZ_101, 952_Verylow_ECZ_101, 952_Verylow_TCZ_101, 952_Low_ECZ_101, 952_Low_TCZ_101, 952_Moderate_ECZ_101, 952_Moderate_TCZ_101, 1093_Verylow_ECZ_101, 1093_Verylow_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_ECZ_4, 1093_Moderate_TCZ_101, 1093_Moderate_TCZ_4, 1093_High_ECZ_101, 1093_High_TCZ_101, 1151_Low_TCZ_101, 1191_Verylow_TCZ_101, 1191_Moderate_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_ECZ_4, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_TCZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_2510001, 1330_Verylow_TCZ_25100	24597	49194
Litoria booroolongensis	Booroolong Frog	1330_Low_ECZ_101	0.01	1
Litoria castanea	Yellow-spotted Tree Frog	335_Veryhigh_ECZ_101, 335_Veryhigh_TCZ_101, 1256_Low_ECZ_101, 1256_Low_TCZ_101	0.63	29
Petaurus norfolcensis	Squirrel Glider	731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 1151_High_ECZ_101, 1151_High_HTZ_101, 1151_High_TCZ_101, 1151_Veryhigh_ECZ_101, 1151_Veryhigh_HTZ_101, 1151_Veryhigh_TCZ_101, 1330_High_ECZ_4, 1330_High_HTZ_4	10.85	345

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Phascolarctos cinereus	Koala	280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 679_Moderate_ECZ_101, 679_Moderate_TCZ_101, 679_High_ECZ_101, 727_Low_TCZ_10101, 727_Moderate_ECZ_101, 727_Moderate_TCZ_101, 727_Veryhigh_ECZ_101, 727_Veryhigh_HTZ_101, 727_Veryhigh_TCZ_101, 731_Low_ECZ_101, 731_Low_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 731_Veryhigh_ECZ_101, 731_Veryhigh_HTZ_101, 731_Veryhigh_TCZ_101, 952_Low_ECZ_101, 952_Low_TCZ_101, 952_Moderate_ECZ_101, 952_Moderate_TCZ_101, 1093_Low_ECZ_101, 1093_Low_ECZ_4, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_ECZ_4, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Moderate_TCZ_4, 1093_High_ECZ_101, 1093_High_HTZ_101, 1093_High_TCZ_101, 1151_High_ECZ_101, 1151_High_HTZ_101, 1151_High_TCZ_101, 1151_Veryhigh_ECZ_101, 1151_Veryhigh_HTZ_101, 1151_Veryhigh_TCZ_101, 1191_Moderate_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_HTZ_101, 1330_High_HTZ_4, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101, 1330_Veryhigh_TCZ_101, 1330_Low_ECZ_2510001, 1330_Low_HTZ_25100	41.80	1119

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Polytelis swainsonii	Superb Parrot	280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 283_Low_ECZ_101, 283_Low_TCZ_101, 283_Moderate_ECZ_101, 283_Moderate_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_ECZ_4, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_High_ECZ_4, 1330_High_HTZ_101, 1330_High_HTZ_4, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101, 1330_Veryhigh_TCZ_101, 1330_Low_ECZ_2510001, 1330_Low_HTZ_25100	14.40	304
Thesium australe	Austral Toadflax	679_Low_ECZ_101, 679_Low_TCZ_101, 679_Moderate_ECZ_101, 679_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_TCZ_101, 1191_Verylow_TCZ_101, 1191_Moderate_TCZ_101, 1330_Verylow_HTZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_HTZ_101, 1330_Veryhigh_TCZ_101, 1330_Low_ECZ_2510001, 1330_Low_HTZ_25100, 1330_Verylow_ECZ_25100, 1330_Verylow_TCZ_25100	59.32	242
Total				**59529**

Table 15-12: Species credits for Murrumbateman IBRA subregion

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Ammobium craspedioides	Yass Daisy	266_Low_TCZ_101, 266_Low_TCZ_4, 266_Verylow_TCZ_101, 277_Low_TCZ_101, 280_High_ECZ_101, 280_High_TCZ_101, 283_High_ECZ_101, 352_Low_TCZ_101, 352_Verylow_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Low_TCZ_4, 1330_Moderate_ECZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101	1338	2676
Aprasia parapulchella	Pink-tailed Legless Lizard	322_High_ECZ_101, 322_High_TCZ_101, 322_Low_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101	6.61	82
Caladenia concolor	Crimson Spider Orchid	280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_TCZ_4, 280_Moderate_ECZ_525, 280_Moderate_TCZ_525	1.95	74

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Callocephalon fimbriatum	Gang-gang Cockatoo	280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 283_Veryhigh_ECZ_101, 283_Veryhigh_TCZ_101, 287_Low_ECZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 322_High_ECZ_101, 322_High_TCZ_101, 349_Low_TCZ_101, 349_Veryhigh_ECZ_101, 349_Veryhigh_TCZ_101, 351_High_TCZ_101, 351_Low_ECZ_101, 351_Low_TCZ_101, 351_Moderate_ECZ_101, 351_Moderate_HTZ_101, 351_Moderate_TCZ_101, 352_Low_ECZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_HTZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 280_Moderate_TCZ_525	43.64	1076

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Cercartetus nanus	Eastern Pygmy-possum	280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 283_High_ECZ_101, 283_High_TCZ_101, 283_Veryhigh_ECZ_101, 283_Veryhigh_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 322_High_ECZ_101, 322_High_TCZ_101, 349_Low_TCZ_101, 349_Veryhigh_ECZ_101, 349_Veryhigh_TCZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_HTZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 280_Moderate_TCZ_525	34.78	955
Delma impar	Striped Legless Lizard	277_Low_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_HTZ_101, 1330_Verylow_TCZ_101	39.32	150
Grevillea iaspicula	Wee Jasper Grevillea	1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_TCZ_101	8	24
Hieraaetus morphnoides	Little Eagle	283_High_TCZ_101, 351_Low_TCZ_101, 352_Low_ECZ_101, 352_Moderate_ECZ_101, 1330_High_ECZ_101, 1330_Moderate_TCZ_101	0.10	6

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Keyacris scurra	Key's Matchstick Grasshopper	266_Low_ECZ_4, 266_Low_TCZ_101, 266_Low_TCZ_4, 266_Verylow_TCZ_101, 280_Verylow_ECZ_101, 283_High_ECZ_101, 283_Veryhigh_ECZ_101, 283_Veryhigh_TCZ_101, 322_High_TCZ_101, 352_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Low_TCZ_4, 1330_Moderate_ECZ_101, 1330_Moderate_ECZ_4, 1330_Moderate_HTZ_101, 1330_Moderate_HTZ_4, 1330_Moderate_TCZ_101, 1330_Moderate_TCZ_4, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_ECZ_4, 1330_Verylow_HTZ_101, 1330_Verylow_TCZ_101	54.54	486
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	280_Verylow_TCZ_101, 322_High_ECZ_101, 322_High_TCZ_101, 322_Low_TCZ_101, 349_Low_TCZ_101, 349_Moderate_ECZ_101, 349_Verylow_TCZ_101, 351_Low_ECZ_101, 351_Low_TCZ_101, 351_Moderate_ECZ_101, 351_Moderate_TCZ_101, 351_Verylow_TCZ_101, 352_Low_ECZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 352_Verylow_TCZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_ECZ_4, 1330_Verylow_TCZ_101	11201	22402

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Myotis macropus	Southern Myotis	349_Low_TCZ_101, 349_Moderate_TCZ_101, 349_Verylow_ECZ_101, 349_Verylow_TCZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Verylow_ECZ_101, 352_Verylow_TCZ_101, 1256_Verylow_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Low_TCZ_4, 1330_Moderate_ECZ_101, 1330_Moderate_ECZ_4, 1330_Moderate_HTZ_4, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_TCZ_101	27.47	257
Ninox strenua	Powerful Owl	283_High_ECZ_101, 283_High_TCZ_101, 283_Veryhigh_ECZ_101, 283_Veryhigh_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 351_High_TCZ_101, 351_Low_TCZ_101, 352_Low_ECZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 731_High_ECZ_101, 731_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	26.77	802

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Petaurus norfolcensis	Squirrel Glider	283_High_ECZ_101, 283_High_TCZ_101, 283_Veryhigh_TCZ_101, 1093_Low_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_TCZ_101, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	6.19	197
Phascolarctos cinereus	Koala	266_Low_ECZ_4, 266_Low_TCZ_4, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_TCZ_101, 280_Low_TCZ_4, 280_Moderate_ECZ_101, 280_Moderate_TCZ_101, 280_Moderate_TCZ_4, 283_High_ECZ_101, 283_High_TCZ_101, 283_Veryhigh_ECZ_101, 283_Veryhigh_TCZ_101, 287_Low_ECZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 322_High_ECZ_101, 322_High_TCZ_101, 349_Low_TCZ_101, 349_Moderate_ECZ_101, 349_Moderate_HTZ_101, 349_Moderate_TCZ_101, 349_Veryhigh_ECZ_101, 349_Veryhigh_TCZ_101, 351_High_TCZ_101, 351_Low_ECZ_101, 351_Low_TCZ_101, 351_Moderate_ECZ_101, 351_Moderate_HTZ_101, 351_Moderate_TCZ_101, 352_Low_ECZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 731_High_ECZ_101, 731_High_HTZ_101, 731_High_TCZ_101, 1093_Low_ECZ_101, 1093_Low_TCZ_101, 1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_ECZ_101, 1093_Veryhigh_HTZ_101, 1093_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Low_TCZ_4, 1330_Moderate_ECZ_101,	52.02	1302

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		1330_Moderate_ECZ_4, 1330_Moderate_HTZ_101, 1330_Moderate_HTZ_4, 1330_Moderate_TCZ_101, 1330_Moderate_TCZ_4, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 280_Low_ECZ_525, 280_Low_TCZ_525, 280_Moderate_ECZ_525, 280_Moderate_TCZ_525		

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Polytelis swainsonii	Superb Parrot	266_Low_ECZ_4, 266_Low_TCZ_4, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_TCZ_101, 280_Low_TCZ_4, 280_Moderate_ECZ_101, 280_Moderate_TCZ_101, 280_Moderate_TCZ_4, 283_High_ECZ_101, 283_High_TCZ_101, 283_Veryhigh_ECZ_101, 283_Veryhigh_TCZ_101, 322_High_ECZ_101, 322_High_TCZ_101, 349_Low_TCZ_101, 349_Moderate_ECZ_101, 349_Moderate_HTZ_101, 349_Moderate_TCZ_101, 349_Veryhigh_ECZ_101, 349_Veryhigh_TCZ_101, 352_Low_ECZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_ECZ_4, 1330_Moderate_HTZ_101, 1330_Moderate_HTZ_4, 1330_Moderate_TCZ_101, 1330_Moderate_TCZ_4, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101, 280_Low_ECZ_525, 280_Low_TCZ_525, 280_Moderate_ECZ_525, 280_Moderate_TCZ_525	29.41	540
Pomaderris pallida	Pale Pomaderris	1093_Moderate_ECZ_101, 1093_Moderate_HTZ_101, 1093_Moderate_TCZ_101, 1093_Veryhigh_TCZ_101	1.16	67
Prasophyllum petilum	Tarengo Leek Orchid	277_Low_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_ECZ_4, 1330_Moderate_HTZ_101, 1330_Moderate_HTZ_4, 1330_Moderate_TCZ_101, 1330_Moderate_TCZ_4, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	26.92	380

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Swainsona recta	Small Purple-pea	266_Low_TCZ_101, 266_Low_TCZ_4, 1330_High_ECZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Low_TCZ_4, 1330_Moderate_ECZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_TCZ_101	9.73	91
Swainsona sericea	Silky Swainson-pea	266_Low_TCZ_101, 266_Low_TCZ_4, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Low_TCZ_4, 280_Moderate_TCZ_4, 280_Verylow_TCZ_101, 283_High_ECZ_101, 283_Veryhigh_TCZ_101, 1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Low_TCZ_4, 1330_Moderate_ECZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_HTZ_101, 1330_Verylow_TCZ_101, 280_Low_ECZ_525, 280_Low_TCZ_525, 280_Moderate_ECZ_525, 280_Moderate_TCZ_525	13.85	147
Synemon plana	Golden Sun Moth	280_High_ECZ_101, 280_Verylow_TCZ_101, 322_Low_TCZ_101, 351_Low_TCZ_101, 351_Moderate_TCZ_101, 351_Verylow_TCZ_101, 352_Low_TCZ_101, 352_Moderate_ECZ_101, 352_Moderate_TCZ_101, 352_Verylow_ECZ_101, 352_Verylow_TCZ_101, 1093_Moderate_TCZ_101, 1093_Verylow_TCZ_101, 1330_Low_ECZ_101, 1330_Low_TCZ_101, 1330_Moderate_TCZ_101, 1330_Verylow_ECZ_101, 1330_Verylow_HTZ_101, 1330_Verylow_TCZ_101	17.57	73

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Thesium australe	Austral Toadflax	1330_High_ECZ_101, 1330_High_HTZ_101, 1330_High_TCZ_101, 1330_Low_ECZ_101, 1330_Low_HTZ_101, 1330_Low_TCZ_101, 1330_Moderate_ECZ_101, 1330_Moderate_ECZ_4, 1330_Moderate_HTZ_101, 1330_Moderate_HTZ_4, 1330_Moderate_TCZ_101, 1330_Moderate_TCZ_4, 1330_Veryhigh_ECZ_101, 1330_Veryhigh_TCZ_101	58.44	256
Total				**32043**

Table 15-13: Species credits for Inland Slopes IBRA subregion

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Acacia ausfeldii	Ausfeld's Wattle	266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 294_Low_TCZ_101, 294_Moderate_TCZ_101	15.86	512
Ammobium craspedioides	Yass Daisy	266_High_ECZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_TCZ_101, 266_Verylow_TCZ_101, 268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_ECZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_TCZ_101, 268_Verylow_TCZ_101, 277_High_ECZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 277_Verylow_ECZ_4, 277_Verylow_ECZ_101, 277_Verylow_TCZ_101, 287_Veryhigh_ECZ_101, 287_Verylow_TCZ_101, 290_High_TCZ_101, 290_Verylow_TCZ_101, 343_Verylow_TCZ_101, 352_Low_TCZ_101, 352_Verylow_TCZ_101, 277_Verylow_TCZ_525	5040	10080
Aprasia parapulchella	Pink-tailed Legless Lizard	290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_TCZ_101, 290_Verylow_TCZ_101, 290_Verylow_ECZ_101, 294_Low_TCZ_101, 319_Moderate_TCZ_101, 319_Low_ECZ_101, 319_Low_TCZ_101, 319_Moderate_ECZ_101	8.35	200
Bossiaea fragrans	Bossiaea fragrans	268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_TCZ_101, 268_Verylow_TCZ_101	6.23	251

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Burhinus grallarius	Bush Stone-curlew	5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_High_ECZ_25100, 280_High_TCZ_25100, 280_Moderate_ECZ_101, 280_Moderate_TCZ_101, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_Low_TCZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101,	54.25	1533
Caesia parviflora var. minor	Small Pale Grass-lily	295_Moderate_TCZ_101, 295_Moderate_ECZ_101, 297_Moderate_TCZ_101, 297_Verylow_TCZ_101, 297_Low_TCZ_101	1.68	26
Caladenia concolor	Crimson Spider Orchid	268_High_ECZ_101, 268_High_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_ECZ_101, 268_Veryhigh_HTZ_101, 268_Veryhigh_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 280_High_ECZ_25100, 280_High_TCZ_25100, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100	29.92	1381
Callocephalon fimbriatum	Gang-gang Cockatoo	5_Moderate_ECZ_101, 5_Moderate_HTZ_101,	110.19	3030

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		5_Moderate_TCZ_101, 266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_ECZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_ECZ_101, 268_Veryhigh_HTZ_101, 268_Veryhigh_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 294_Low_TCZ_101, 294_Moderate_TCZ_101, 295_Moderate_TCZ_101, 297_Moderate_ECZ_101, 297_Moderate_TCZ_101, 299_Low_ECZ_101, 299_Low_TCZ_101, 299_Moderate_TCZ_101, 306_Low_ECZ_101, 306_Low_HTZ_101, 306_Low_TCZ_101, 314_Low_ECZ_101, 314_Low_TCZ_101, 314_Moderate_ECZ_101,		

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		314_Moderate_HTZ_101, 314_Moderate_TCZ_101, 314_Veryhigh_ECZ_101, 314_Veryhigh_HTZ_101, 314_Veryhigh_TCZ_101, 316_Low_ECZ_101, 316_Low_TCZ_101, 316_Veryhigh_ECZ_101, 316_Veryhigh_HTZ_101, 316_Veryhigh_TCZ_101, 343_Low_ECZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101, 352_Low_TCZ_101, 731_Low_ECZ_101, 731_Low_HTZ_101, 731_Low_TCZ_101, 280_High_ECZ_25100, 280_High_TCZ_25100, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100		
Calyptorhynchus lathami	Glossy Black-Cockatoo	266_Low_ECZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 343_Moderate_ECZ_101	0.93	24
Chalinolobus dwyeri	Large-eared Pied Bat	277_High_ECZ_101, 277_High_HTZ_101, 277_Low_ECZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 731_Low_ECZ_101, 731_Low_HTZ_101, 731_Low_TCZ_101	2.42	78
Crinia sloanei	Sloane's Froglet	5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101	0.66	13
Cullen parvum	Small Scurf-pea	5_Low_ECZ_101, 5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101	16.55	342
Delma impar	Striped Legless Lizard	277_Low_ECZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 277_Verylow_ECZ_101, 277_Verylow_HTZ_101, 277_Verylow_TCZ_101	33.32	147
Diuris tricolor	Pine Donkey Orchid	731_Low_ECZ_101, 731_Low_HTZ_101, 731_Low_TCZ_101, 731_Verylow_ECZ_101,	1.27	13

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		731_Verylow_HTZ_101, 731_Verylow_TCZ_101		
Eucalyptus aggregata	Black Gum	277_Verylow_TCZ_101	3.00	6
Grevillea wilkinsonii	Tumut Grevillea	266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_TCZ_4, 278_Low_TCZ_101, 301_Low_TCZ_101, 301_Moderate_TCZ_101	21.00	936
Haliaeetus leucogaster	White-bellied Sea-Eagle	5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 277_Low_ECZ_4, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_TCZ_101, 280_Low_TCZ_101, 280_Moderate_TCZ_101, 287_Veryhigh_ECZ_101	2.48	45
Hieraaetus morphnoides	Little Eagle	266_High_ECZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_TCZ_101, 268_High_ECZ_101, 268_High_TCZ_101, 268_Low_TCZ_101, 268_Veryhigh_TCZ_101, 277_High_ECZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101,	3.55	86

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 297_Moderate_TCZ_101, 299_Low_ECZ_101, 301_Low_TCZ_101, 306_Low_ECZ_101, 306_Low_HTZ_101, 306_Low_TCZ_101, 314_Moderate_ECZ_101, 314_Moderate_HTZ_101, 314_Moderate_TCZ_101, 314_Veryhigh_ECZ_101, 314_Veryhigh_TCZ_101, 316_Veryhigh_ECZ_101, 316_Veryhigh_HTZ_101, 316_Veryhigh_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101, 731_Low_ECZ_101		
Keyacris scurra	Key's Matchstick Grasshopper	266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 266_Verylow_TCZ_101, 266_Verylow_ECZ_101, 277_High_ECZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 277_Verylow_ECZ_101, 277_Verylow_HTZ_101, 277_Verylow_TCZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_TCZ_101, 278_Verylow_TCZ_101, 290_Low_TCZ_101	74.12	1156
Leucochrysum albicans subsp. tricolor	Hoary Sunray	268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_TCZ_101, 268_Verylow_TCZ_101, 352_Low_TCZ_101, 352_Verylow_TCZ_101, 731_Low_ECZ_101, 731_Low_TCZ_101,	1041	2082

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		731_Verylow_ECZ_101, 731_Verylow_TCZ_101, 1191_Verylow_ECZ_101, 1191_Verylow_TCZ_101		
Litoria booroolongensis	Booroolong Frog	280_Moderate_TCZ_101	0.05	1
Lophoictinia isura	Square-tailed Kite	5_Moderate_ECZ_101, 5_Moderate_TCZ_101, 266_High_ECZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_TCZ_101, 268_High_ECZ_101, 268_High_TCZ_101, 268_Low_TCZ_101, 277_High_ECZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 731_Low_ECZ_101, 280_Moderate_ECZ_25100	2.46	56
Myotis macropus	Southern Myotis	5_Low_ECZ_101, 5_Low_TCZ_101, 299_Low_TCZ_101, 299_Verylow_ECZ_101, 299_Verylow_TCZ_101, 352_Low_TCZ_101, 352_Verylow_TCZ_101, 1191_Verylow_ECZ_101, 1191_Verylow_TCZ_101	3.14	18
Ninox connivens	Barking Owl	5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101, 266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101,	69.77	1929

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_ECZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_ECZ_101, 268_Veryhigh_HTZ_101, 268_Veryhigh_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 295_Moderate_TCZ_101, 314_Low_ECZ_101, 314_Low_TCZ_101, 314_Moderate_ECZ_101, 314_Moderate_HTZ_101, 314_Moderate_TCZ_101, 314_Veryhigh_ECZ_101, 314_Veryhigh_HTZ_101, 314_Veryhigh_TCZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_TCZ_101, 352_Low_TCZ_101, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100		
Ninox strenua	Powerful Owl	287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101,	14.53	455

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 295_Moderate_TCZ_101, 297_Moderate_ECZ_101, 297_Moderate_TCZ_101, 314_Low_ECZ_101, 314_Low_TCZ_101, 314_Moderate_ECZ_101, 314_Moderate_HTZ_101, 314_Moderate_TCZ_101, 314_Veryhigh_ECZ_101, 314_Veryhigh_HTZ_101, 314_Veryhigh_TCZ_101, 352_Low_TCZ_101		
Persoonia marginata	Clandulla Geebung	287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 287_Verylow_TCZ_101	4.26	142
Petauroides volans	Greater Glider	295_Moderate_TCZ_101, 299_Moderate_TCZ_101, 316_Low_ECZ_101, 316_Low_TCZ_101, 316_Veryhigh_ECZ_101, 316_Veryhigh_HTZ_101, 316_Veryhigh_TCZ_101	11.48	374
Petaurus norfolcensis	Squirrel Glider	268_Low_ECZ_101, 268_Low_TCZ_101, 268_Veryhigh_ECZ_101, 268_Veryhigh_HTZ_101, 268_Veryhigh_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 343_Low_ECZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101, 352_Low_TCZ_101	17.45	559
Petaurus norfolcensis - endangered population (wagga wagga LGA)	Squirrel Glider	268_Low_ECZ_101, 268_Low_TCZ_101, 268_Veryhigh_ECZ_101, 268_Veryhigh_HTZ_101, 268_Veryhigh_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 343_Low_ECZ_101, 343_Low_TCZ_101,	10.46	331

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101, 352_Low_TCZ_101		
Petroica rodinogaster	Pink Robin	299_Moderate_TCZ_101	0.03	1
Phascolarctos cinereus	Koala	5_Low_ECZ_101, 5_Low_TCZ_101, 5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101, 266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_ECZ_101, 268_Veryhigh_HTZ_101, 268_Veryhigh_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_4, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 294_Low_TCZ_101, 294_Moderate_TCZ_101, 295_Moderate_TCZ_101, 297_Moderate_ECZ_101, 297_Moderate_TCZ_101,	119.51	3224

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		299_Low_ECZ_101, 299_Low_TCZ_101, 299_Moderate_TCZ_101, 301_High_TCZ_101, 301_Low_TCZ_101, 306_Low_ECZ_101, 306_Low_HTZ_101, 306_Low_TCZ_101, 314_Low_ECZ_101, 314_Low_TCZ_101, 314_Moderate_ECZ_101, 314_Moderate_HTZ_101, 314_Moderate_TCZ_101, 314_Veryhigh_ECZ_101, 314_Veryhigh_HTZ_101, 314_Veryhigh_TCZ_101, 316_Low_ECZ_101, 316_Low_TCZ_101, 316_Veryhigh_ECZ_101, 316_Veryhigh_HTZ_101, 316_Veryhigh_TCZ_101, 319_Moderate_TCZ_101, 343_Low_ECZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101, 352_Low_TCZ_101, 731_Low_ECZ_101, 731_Low_HTZ_101, 731_Low_TCZ_101, 280_High_ECZ_25100, 280_High_TCZ_25100, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100		
Polytelis swainsonii	Superb Parrot	5_Low_ECZ_101, 5_Low_TCZ_101, 5_Moderate_ECZ_101, 5_Moderate_HTZ_101, 5_Moderate_TCZ_101, 266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 278_High_ECZ_101, 278_High_HTZ_101, 278_High_TCZ_101, 278_Low_ECZ_101, 278_Low_HTZ_101, 278_Low_TCZ_4, 278_Low_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101,	69.79	1761

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
		280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 343_Low_ECZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101, 352_Low_TCZ_101, 280_High_TCZ_25100, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100		
Prasophyllum petilum	Tarengo Leek Orchid	277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101	17.83	363
Pultenaea humilis	Dwarf Bush-pea	268_High_ECZ_101, 268_High_TCZ_101, 268_Low_ECZ_4, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_TCZ_101, 287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 294_Low_TCZ_101, 294_Moderate_TCZ_101, 306_Low_ECZ_101, 306_Low_HTZ_101, 306_Low_TCZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101	18.43	523
Senecio garlandii	Woolly Ragwort	287_High_TCZ_101, 287_Low_TCZ_101, 287_Moderate_ECZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 343_Low_TCZ_101, 343_Moderate_ECZ_101, 343_Moderate_HTZ_101, 343_Moderate_TCZ_101	9.88	238

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Swainsona recta	Small Purple-pea	266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 266_Verylow_TCZ_101, 266_Verylow_ECZ_101, 268_Low_ECZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 268_Veryhigh_TCZ_101, 268_Verylow_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 277_Verylow_ECZ_101, 277_Verylow_HTZ_101, 277_Verylow_TCZ_101, 294_Low_TCZ_101, 294_Moderate_TCZ_101	55.64	1085

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Swainsona sericea	Silky Swainson-pea	266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_HTZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 266_Verylow_TCZ_101, 266_Verylow_ECZ_101, 268_Low_TCZ_101, 268_Moderate_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_4, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_4, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_HTZ_101, 277_Moderate_TCZ_101, 277_Verylow_ECZ_101, 277_Verylow_HTZ_101, 277_Verylow_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_High_ECZ_25100, 280_High_TCZ_25100, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 280_Moderate_ECZ_25100, 280_Moderate_TCZ_25100, 280_Verylow_ECZ_4, 280_Verylow_ECZ_101, 280_Verylow_HTZ_101, 280_Verylow_TCZ_4, 280_Verylow_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 290_Verylow_TCZ_101, 290_Verylow_ECZ_101	87.93	1669
Synemon plana	Golden Sun Moth	266_Low_ECZ_101, 266_Low_TCZ_101, 266_Moderate_TCZ_101, 266_Verylow_TCZ_101, 266_Verylow_ECZ_101, 268_Low_TCZ_101, 277_Low_TCZ_101, 277_Verylow_ECZ_101, 277_Verylow_TCZ_101, 278_Low_TCZ_101, 278_Verylow_TCZ_101, 280_High_TCZ_101, 280_Low_TCZ_101, 280_Moderate_TCZ_101	9.82	88
Thesium australe	Austral Toadflax	1191_Verylow_ECZ_101, 1191_Verylow_TCZ_101	0.33	2

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Tyto novaehollandiae	Masked Owl	266_High_ECZ_101, 266_High_HTZ_101, 266_High_TCZ_101, 266_Low_ECZ_101, 266_Low_TCZ_101, 266_Moderate_ECZ_101, 266_Moderate_HTZ_101, 266_Moderate_TCZ_101, 277_High_ECZ_101, 277_High_HTZ_101, 277_High_TCZ_101, 277_Low_ECZ_101, 277_Low_HTZ_101, 277_Low_TCZ_101, 277_Moderate_ECZ_101, 277_Moderate_TCZ_101, 280_High_ECZ_101, 280_High_HTZ_101, 280_High_TCZ_101, 280_Low_ECZ_101, 280_Low_TCZ_101, 280_Moderate_ECZ_101, 280_Moderate_HTZ_101, 280_Moderate_TCZ_101, 287_Moderate_TCZ_101, 287_Veryhigh_ECZ_101, 287_Veryhigh_HTZ_101, 287_Veryhigh_TCZ_101, 290_High_ECZ_101, 290_High_HTZ_101, 290_High_TCZ_101, 290_Low_ECZ_101, 290_Low_TCZ_101, 290_Moderate_ECZ_101, 290_Moderate_TCZ_101, 294_Low_TCZ_101, 294_Moderate_TCZ_101, 352_Low_TCZ_101	30.37	977
Total				**35737**

Table 15-14: Species credits for Bondo IBRA subregion

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Ammobium craspedioides	Yass Daisy	1196_High_ECZ_101	5	10
Caladenia montana		300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101, 300_Low_ECZ_101, 300_Low_HTZ_101, 300_Low_TCZ_101, 300_Moderate_ECZ_101, 300_Moderate_HTZ_101, 300_Moderate_TCZ_101, 638_Low_ECZ_101, 638_Low_HTZ_101, 638_Low_TCZ_101, 679_Low_ECZ_101, 679_Low_HTZ_101, 953_Low_ECZ_101, 953_Low_HTZ_101, 1196_Low_ECZ_101, 1196_Low_HTZ_101, 1196_Low_TCZ_101	9.3	169
Callocephalon fimbriatum	Gang-gang Cockatoo	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	31.74	792

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Cercartetus nanus	Eastern Pygmy-possum	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	22.99	599
Haliaeetus leucogaster	White-bellied Sea-Eagle	285_High_ECZ_101, 285_High_HTZ_101, 285_High_TCZ_101, 299_Moderate_ECZ_101, 299_Moderate_HTZ_101, 299_Moderate_TCZ_101, 300_Moderate_TCZ_101	0.43	14
Hieraaetus morphnoides	Little Eagle	285_Low_ECZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	4.85	97

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Lophoictinia isura	Square-tailed Kite	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	1.45	25
Myotis macropus	Southern Myotis	299_Moderate_ECZ_101, 299_Moderate_HTZ_101, 299_Moderate_TCZ_101, 299_Verylow_ECZ_101, 299_Verylow_TCZ_101, 352_Low_TCZ_101	14	314
Ninox connivens	Barking Owl	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	8.41	181
Ninox strenua	Powerful Owl	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	7.22	173

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Petauroides volans	Greater Glider	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	6.86	160
Petaurus australis - endangered population	Yellow-bellied Glider population on the Bago Plateau	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	8.51	205
Petaurus norfolcensis	Squirrel Glider	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_TCZ_101	4.69	150
Petroica rodinogaster	Pink Robin	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	10.69	264

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Phascogale tapoatafa	Brush-tailed Phascogale	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	5.8	126
Phascolarctos cinereus	Koala	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	32.99	830
Pimelea bracteata	Pimelea bracteata	637_High_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101, 953_High_ECZ_101	3.82	0
Polytelis swainsonii	Superb Parrot	352_Low_TCZ_101	0	1
Pomaderris cotoneaster	Cotoneaster Pomaderris	300_Moderate_ECZ_101, 300_Moderate_TCZ_101	1.41	45
Pseudomys fumeus	Smoky Mouse	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101	5.78	189

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Pterostylis foliata	Slender Greenhood	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 1196_High_TCZ_101, 638_Low_ECZ_101, 638_Low_TCZ_101, 679_Low_ECZ_101, 1196_Low_TCZ_101	6.89	155
Tyto novaehollandiae	Masked Owl	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	6.39	142
Tyto tenebricosa	Sooty Owl	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101	5.78	189
Total				**4830**

Table 15-15: Species credits for Snowy Mountains IBRA subregion

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Ammobium craspedioides	Yass Daisy	679_High_TCZ_101, 953_Moderate_TCZ_101, 1196_High_ECZ_101, 1196_High_TCZ_101	12	24
Caladenia montana	Caladenia montana	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101, 300_Low_ECZ_101, 300_Low_HTZ_101, 300_Low_TCZ_101, 300_Moderate_ECZ_101, 300_Moderate_HTZ_101, 300_Moderate_TCZ_101, 638_Low_ECZ_101, 638_Low_HTZ_101, 638_Low_TCZ_101, 679_Low_ECZ_101, 679_Low_HTZ_101, 953_Low_ECZ_101, 953_Low_HTZ_101, 1196_Low_ECZ_101, 1196_Low_HTZ_101, 1196_Low_TCZ_101	199.3	3995

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Callocephalon fimbriatum	Gang-gang Cockatoo	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	187.4	5147
Cercartetus nanus	Eastern Pygmy-possum	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	108.9	2714
Cyclodomorphus praealtus	Alpine She-oak Skink	679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	30.83	837

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Hieraaetus morphnoides	Little Eagle	285_Low_ECZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	79.28	1660
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	953_High_ECZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_TCZ_101, 953_Low_ECZ_101, 1196_Low_TCZ_101	581	1162
Litoria castanea	Yellow-spotted Tree Frog	939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101	0.54	9
Lophoictinia isura	Square-tailed Kite	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	33.4	700
Mastacomys fuscus	Broad-toothed Rat	1224_High_TCZ_ 101	0.03	1

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Ninox connivens	Barking Owl	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	137.47	3755
Ninox strenua	Powerful Owl	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	155.19	4289
Petauroides volans	Greater Glider	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	115.11	3022

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Petaurus australis - endangered population	Yellow-bellied Glider population on the Bago Plateau	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	112.81	2854
Petaurus norfolcensis	Squirrel Glider	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	20.97	604
Petroica rodinogaster	Pink Robin	300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	24.51	596
Phascogale tapoatafa	Brush-tailed Phascogale	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	136.89	3733

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Phascolarctos cinereus	Koala	285_Low_ECZ_101, 285_Low_HTZ_101, 285_Low_TCZ_101, 300_Veryhigh_ECZ_101, 300_Veryhigh_HTZ_101, 300_Veryhigh_TCZ_101, 638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 679_Low_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101	188.58	5174
Pimelea bracteata	Pimelea bracteata	637_High_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101, 953_High_ECZ_101	0.83	0
Prasophyllum bagoense	Bago Leek-orchid	953_Veryhigh_TCZ_101	0.04	3
Prasophyllum innubum	Brandy Marys Leek-orchid	1224_High_TCZ_101	0.02	1
Prasophyllum keltonii	Kelton's Leek Orchid	953_Veryhigh_TCZ_101	0.03	2
Pterostylis alpina	Alpine Greenhood	679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 1196_High_ECZ_101, 1196_High_HTZ_101, 1196_High_TCZ_101, 679_Low_ECZ_101, 1196_Low_TCZ_101	2.14	57
Pterostylis foliata	Slender Greenhood	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 679_High_ECZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 1196_High_TCZ_101, 638_Low_ECZ_101, 638_Low_TCZ_101, 679_Low_ECZ_101, 1196_Low_TCZ_101	43.07	930

Scientific name	Common name	Vegetation zones	Total clearing (ha)/count	Total species credit requirement
Pterostylis oreophila	Blue-tongued Greenhood	637_High_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101	0.56	10
Thelymitra alpicola	Alpine Sun-orchid	939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101	0.54	5
Thesium australe	Austral Toadflax	1196_Low_TCZ_101	0.01	1
Tyto novaehollandiae	Masked Owl	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101, 953_High_ECZ_101, 953_High_HTZ_101, 953_High_TCZ_101, 953_Low_TCZ_101, 953_Moderate_ECZ_101, 953_Moderate_HTZ_101, 953_Moderate_TCZ_101, 953_Veryhigh_ECZ_101, 953_Veryhigh_HTZ_101, 953_Veryhigh_TCZ_101	138.09	3776
Tyto tenebricosa	Sooty Owl	638_High_ECZ_101, 638_High_HTZ_101, 638_High_TCZ_101, 638_Moderate_ECZ_101, 638_Moderate_HTZ_101, 638_Moderate_TCZ_101	57.3	1852
Xerochrysum palustre	Swamp Everlasting	637_High_TCZ_101, 679_High_HTZ_101, 679_High_TCZ_101, 939_High_ECZ_101, 939_High_HTZ_101, 939_High_TCZ_101	0.68	8
Total				**46921**

15.2 Offsets for indirect and prescribed impacts

As stated in the BAM (DPIE, 2020a) the '*retirement of biodiversity credits may be used with other conservation measures to mitigate prescribed impacts or the indirect impacts of a proposal on areas of native vegetation, TECs and/or threatened species, or their habitat adjacent to the Subject Land. Where part or all of the indirect or prescribed impacts cannot be avoided, minimised or mitigated, the assessor can propose offsets or other measures that benefit threatened entities and their habitat. The approach to calculating any proposed offsets should be documented and justified*.'

A biodiversity offset may need to be applied to threatened biodiversity that may sustain a potential significant loss to habitat associated with prescribed or indirect impacts. The threatened biodiversity assessed in Section 13.4 and 13.5 as experiencing potential indirect or prescribed impacts include:

- 137.44 ha of native vegetation within the amended project footprint subject to likely edge effects as a result of the amended project
- reptile species with a small home range (Pink-tailed Legless Lizard and Striped Legless Lizard), Golden Sun Moth and terrestrial and arboreal mammals for residual impacts to habitat connectivity
- remnants of *Coolac-Tumut Serpentinite Shrubby Woodland, and Monaro Tableland Cool Temperate Grassy Woodland* impacted by fragmentation
- Grey-headed Flying-fox, for residual collision risk impacts
- Pink-tailed Legless Lizard, Striped Legless Lizard, Large Bent-winged Bat and Little Bent-winged Bat for residual impacts to rocky habitat
- Pink-tailed Legless Lizard and Striped Legless Lizard, for residual impacts to 40.85 ha of exotic / Category 1 grassland habitat, where species presence is confirmed during future survey work
- Golden Sun Moth, for residual impacts to exotic grassland habitat, if habitats are identified within non-native vegetation during future survey work within inaccessible lands.

Indirect and prescribed impacts will be addressed where possible through proposed mitigation measures to be applied during construction and operation. Residual impacts are difficult to quantify confidently at this stage and further consultation with NSW DCCEEW is required to confirm any offset requirements as appropriate (mitigation measure B37, Table 14-1). The SBAS (mitigation measure B5, Table 14-1) would include a trigger for additional credit obligations and/or conservation measures for uncertain, indirect or prescribed impacts, where these impacts cannot be adaptively managed.

15.3 Offsets for aquatic species and environments

General policy seven in the *Guidelines for fish habitat conservation and management* (Fairfull, 2013) identify that:

"No net loss of Key Fish Habitat – Significant environmental impacts (direct and indirect) are to be offset by environmental compensation."

It is considered that the amended project would not result in significant environmental impacts to aquatic systems within the updated indicative disturbance area. This is in consideration that:

- No significant impacts to any threatened aquatic biota listed under the FM Act or EPBC Act are considered likely to occur.
- The construction methodology for transmission line structures avoids direct impacts to streams and would be constructed at a minimum of 40 metres from the top of bank, thereby avoiding impacts in many cases, especially for major streams and KFH.
- No trenching or under boring of aquatic habitats are proposed.

- The majority of indicative waterway crossings proposed would use existing tracks and crossings. Potential impacts to aquatic habitats resulting from the establishment of new crossings would be small scale and localised, with upgraded waterway crossings likely to result in more sensitive crossings in the long term.
- The assessment of proposed indicative waterway crossings within identified KFH has identified typically poor condition and modified aquatic habitats throughout the updated indicative disturbance area, and where available "Very Poor" freshwater fish community status grades. The scale of potential impacts in this context is not considered significant and would not significantly increase the operation of any KTPs.
- A standard construction methodology for access tracks and waterway crossings has been developed, aligning with relevant guidelines, to construct the waterway crossings in an environmentally sensitive manner.
- The potential for direct and indirect impacts during construction of waterway crossings and access tracks is further managed through the provision of a comprehensive suite of mitigation measures specific to aquatic habitats, including the avoidance of sensitive habitat features, erosion and sediment control, and the reinstatement of bank forms following work.
- Additional mitigation measures have been proposed to focus on the minimisation of potential impacts to CLASS 1 KFH streams that may support threatened aquatic species, including provision for consultation and pre-construction survey to provide site specific mitigation recommendations at sites of new or upgraded waterway crossings in CLASS 1 KFH.

In light of the factors listed above, no net loss of KFH, or significant impacts to threatened aquatic species are anticipated to occur as a result of the amended project. As such, no offsets for aquatic species or KFH under the FM Act are proposed.

Any impacts to native riparian vegetation will be offset in accordance with the BAM by means of the amended project's ecosystem credit obligation.

15.4 Commonwealth offset liability

The amended project is assessed under the Bilateral Agreement, and as such, the retirement of biodiversity credits as per the NSW Biodiversity Offset Scheme is an acceptable offsetting mechanism for Commonwealth entities (where threatened entities are dual listed).

Offsets are only required for significant residual impacts to MNES, once all measures to avoid, minimise and mitigate impacts have been considered. Therefore, if impacts to MNES can be avoided or minimised to the extent that a significant impact can be avoided, offsets are not required.

The retirement of biodiversity credits or appropriate offsets is required for the following Commonwealth listed threatened biodiversity that have been assessed as potentially significantly impacted by the amended project:

- White Box Yellow Box Blakely's Red Gum Woodland TEC
- twelve threatened flora species and their habitats, as follows: *Acacia bynoeana, Ammobium craspedioides, Kunzea cambagei, Leucochrysum albicans subsp. tricolor, Pimelea bracteata, Pomaderris cotoneaster, Prasophyllum bagoense, Prasophyllum innubum, Prasophyllum keltonii, Pterostylis oreophila, Thesium australe and Xerochrysum palustre*
- 20 threatened fauna species and their habitats, as follows: Regent Honeyeater, Southern Whiteface, Gang-gang Cockatoo, Glossy Black-Cockatoo, Brown Treecreeper, Painted Honeyeater, Swift Parrot, Southern-eastern Hooded Robin, Superb Parrot, Pilotbird, Diamond Firetail, Spotted-tailed Quoll, Golden Sun Moth, Key's Matchstick Grasshopper, Grey-headed Flying-fox, Greater Glider, Yellow-bellied Glider, Koala, Pink-tailed Legless Lizard and Striped Legless Lizard

- six migratory species and their habitats as follows: Fork-tailed Swift, Sharp-tailed Snadpiper, Red-necked Stint, Latham's Snipe, Common Greenshank and March Sandpiper.

No other Commonwealth listed threatened biodiversity was deemed to be significantly impacted via the Commonwealth Significant Impact Criteria (Attachment 3).

The biodiversity credits required for the above threatened species and ecological communities that are dual listed on the BC Act are detailed in Section 15.1. Any significant residual impacts to MNES not addressed under the NSW BOS (ie species that are not dual listed) would be addressed in accordance with the EPBC Act Environmental Offsets Policy (DSEWPC, 2012a), which may include delivery of offsets under the BOS where appropriate. See Section 16.5 where offsets for impacts to MNES are discussed in more detail.

16. Biodiversity Offset Strategy

The amended project requires a biodiversity offset for both BC Act and EPBC Act listed threatened entities as detailed in Chapter 15. The ecosystem and species credit requirement for the amended project is detailed in Section 15.1 and summarised in Table 15-1 and Table 15-8. The biodiversity offset would require the retirement of the biodiversity credit obligation as per the Biodiversity Offset Scheme. Similar to other recent major projects of this nature, it is proposed that the offset liability for the amended project would be revised once detailed design is finalised and additional surveys carried out, particularly within currently inaccessible lands and for species credits which often have restricted seasonal survey requirements. The revised species credit requirement is likely to be significantly lower than that presented here based on further avoidance measures (during detailed design) and targeted surveys for threatened species ruling out presence at particular locations.

In relation to satisfying offsets for State and Commonwealth matters, the Australian Government has formally endorsed the NSW Biodiversity Offsets Scheme (and use of the BAM (DPIE, 2020a) as the methodology for calculating biodiversity credit requirements) through the EPBC Act Condition-setting Policy (DAWE, 2020b), which allows the NSW Biodiversity Offsets Scheme to be applied to assess and meet biodiversity offset requirements for a project.

The biodiversity offset for each entity would be met according to the rules as detailed in Division 6.2 of the BC Regulation which sets out the offset rules under the Biodiversity Offsets Scheme. The rules include retiring like-for-like credits, funding conservation actions that directly benefit the species or community impacted, paying into the Biodiversity Conservation Fund (BCF) the value of the credits and application of variation rules, which allow for suitable offsets to be determined where it can be demonstrated that like-for-like offsets cannot be obtained. However, the Commonwealth does not support application of the variation rules to satisfy an offset obligation for MNES in relation to a controlled action (Division 6.6A of the BC Regulation).

As such, the offset obligation for each MNES would be addressed via one, or a combination of the following:

- retire biodiversity credits based on the like-for-like provisions in the BC Regulation
- fund biodiversity conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and directly benefit the threatened entity impacted
- pay into the BCF.

As per the BAM (DPIE, 2020a), the biodiversity credit obligation for this amended project is required to be discharged through one of the three options as provided by the Biodiversity Offsets Scheme:

- establishment of a Biodiversity Stewardship Site and retirement of required credits
- purchase and retirement of credits from the market
- payment into the BCF for the value of the credits.

Transgrid are investigating the following options to formally satisfy the offset obligation for both State and Commonwealth, which include the following:

- establishment of a Biodiversity Stewardship Site(s) with the required biodiversity values and formally retire the credits
- retire credits from existing Transgrid BioBanking/Biodiversity Stewardship Sites
- purchase biodiversity credits from the credit market and formally retire the credits
- payment of the biodiversity offset obligation into the BCF.

Transgrid would reserve the right to discharge their offset obligation through any of these options upon the amended project approval.

16.1 Existing biodiversity credits

The purchase and retirement of existing biodiversity credits is required to be undertaken based on like-for-like trading rules as outlined under the BC Regulation and as identified by the BAM-C output for the amended project (see Attachment 23).

16.2 Impacts not requiring offsets

Impacts not requiring offset in accordance with BAM subsection 9.2.1(3.) are as detailed in Table 16-1.

Table 16-1: Impacts not requiring offset

PCT ID	PCT name	Condition	TEC	Current VI Score	Justification
Bondo					
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest	Very Low	No associated TEC	2	Low VI score (less than 17)
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region	Low	White Box Yellow Box Blakely’s Red Gum Woodland	14.0	Low VI score (less than 15)
638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	Very Low	No associated TEC	8.4	Low VI score (less than 17)
953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	Very Low	No associated TEC	11.8	Low VI score (less than 17)
Bungonia					
1097	Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux	Very Low	No associated TEC	3.2	Low VI score (less than 17)
1150	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges	Very Low	No associated TEC	4.3	Low VI score (less than 17)
Crookwell					
280	Red Stringybark - Blakely’s Red Gum +/- Long-leaved Box shrub/grass hill woodland	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	1.0	Low VI score (less than 15)
283	Apple Box - Blakely’s Red Gum moist valley and footslopes grass-forb open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	14.0	Low VI score (less than 15)
727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest	Low	No associated TEC	7.7	Low VI score (less than 17)
		Very Low		10.5	Low VI score (less than 17)

PCT ID	PCT name	Condition	TEC	Current VI Score	Justification
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands	Very Low	No associated TEC	0.9	Low VI score (less than 17)
1191	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes	Very Low	Monaro Tableland Cool Temperate Grassy Woodland	5.6	Low VI score (less than 15)
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	2.1	Low VI score (less than 15)
Inland Slopes					
266	White Box grassy woodland in the upper slopes	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	5.7	Low VI score (less than 15)
268	White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	3.5	Low VI score (less than 15)
277	Blakely's Red Gum - Yellow Box grassy tall woodland	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	11.0	Low VI score (less than 15)
278	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	6.2	Low VI score (less than 15)
280	Red Stringybark - Blakely's Red Gum +/- Long-leaved Box shrub/grass hill woodland	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	7.4	Low VI score (less than 15)
290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills	Very Low	No associated TEC	10.2	Low VI score (less than 17)
297	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest	Very Low	No associated TEC	8.2	Low VI score (less than 17)
299	Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest	Very Low	No associated TEC	4.0	Low VI score (less than 17)
301	Drooping Sheoke - Ricinocarpus bowmannii - grasstree tall open shrubland of the Coolac - Tumut Serpentinite Belt	Very Low	Coolac-Tumut Serpentinite Shrubby Woodland	0.4	Low VI score (less than 15)
314	Apple Box - Red Stringybark basalt scree open forest	Very Low	No associated TEC	1.8	Low VI score (less than 17)
316	Nortons Box - Red Box - Red Stringybark +/- Nodding Flax Lily forb-grass open forest	Very Low	No associated TEC	4.3	Low VI score (less than 17)
343	Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates	Very Low	No associated TEC	7.0	Low VI score (less than 17)
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments	Low	White Box Yellow Box Blakely's Red Gum Woodland	13.7	Low VI score (less than 15)
		Very Low		13.1	Low VI score (less than 15)
1191	Snow Gum - Candle Bark woodland on broad valley flats	Very Low	No associated TEC	11.0	Low VI score (less than 17)
Murrumbateman					
266	White Box grassy woodland in the upper slopes	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	0.9	Low VI score (less than 15)
280	Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	6.9	Low VI score (less than 15)

PCT ID	PCT name	Condition	TEC	Current VI Score	Justification
287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	Very Low	No associated TEC	4.8	Low VI score (less than 17)
349	Inland Scribbly Gum - Red Stringybark open forest on hills composed of silicous substrates	Very Low	No associated TEC	15.6	Low VI score (less than 17)
351	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest	Very Low	No associated TEC	10.2	Low VI score (less than 17)
352	Red Stringybark - Blakely's Red Gum hillslope open forest on meta-sediments in the Yass - Boorowa - Crookwell region	Low	White Box Yellow Box Blakely's Red Gum Woodland	14.0	Low VI score (less than 15)
		Very Low		3.6	Low VI score (less than 15)
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	Very Low	No associated TEC	6.8	Low VI score (less than 17)
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands	Very Low	White Box Yellow Box Blakely's Red Gum Woodland	8.6	Low VI score (less than 15)

16.2.1 Ecosystem credit options – like-for-like

Like-for-like ecosystem credit trading rules differ between TECs and other ecosystem credits (refer to Section 6.3 of the BC Regulation 2017).

In the case of impacts on threatened ecological communities, like-for-like biodiversity credits represent:

- the same threatened ecological community located in:
  - the same or an adjoining Interim Biogeographic Regionalisation of Australia subregion as the impacted site
  - any subregion that is within 100 kilometres of the outer edge of the impacted site
- vegetation that contains hollow bearing trees – if the threatened ecological community contains hollow bearing trees.

In the case of impacts on the habitat of threatened species that are ecosystem credit species or other native vegetation (other than impacts on threatened ecological communities), like-for-like biodiversity credits represent:

- the same class of native vegetation located in:
  - the same or an adjoining Interim Biogeographic Regionalisation of Australia subregion as the impacted site
  - any subregion that is within 100 kilometres of the outer edge of the impacted site
- the same or a higher offset trading group
- vegetation that contains hollow bearing trees – if the impacted habitat contains hollow bearing trees.

In circumstances where like-for-like ecosystem credits options are not available, variations rules may be applied for BC Act listed entities only, as outlined in Section 6.4 of the BC Regulation.

The like-for-like ecosystem credit class options for the amended project's biodiversity offset credit obligation is summarised for each IBRA subregion in Attachment 23.

A review of public registers in April 2024 indicates that there is generally a good current supply (registered sites) of the required ecosystem credits for the amended project, from within the required trading areas

(Table 16-2 and Table 16-3). The proportion of credits available on the market is shown in Table 16-2 and Table 16-3, with percentages over 100% indicating that the full credit liability for that trading group for the amended project is available on the market. The analysis did not take into account sites where expressions of interest have been lodged or where a stewardship site is currently under development.

Table 16-2: Proportion of required BAM credits for TEC trade groups currently available at registered sites

TEC	IBRA subregion	Proportion of credits available on market
White Box Yellow Box Blakely's Red Gum Woodland	Bungonia Crookwell Inland Slopes Murrumbateman	480%
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Bondo	0%
	Bungonia	0%
	Crookwell	0%
Coolac-Tumut Serpentinite Shrubby Woodland	Inland Slopes	0%
Monaro Tableland Cool Temperate Grassy Woodland	Crookwell	0%
Montane Peatlands and Swamps	Crookwell Murrumbateman Snowy Mountains	347%

Table 16-3: Proportion of required BAM credits for non-TEC trade groups currently available at registered sites

Offset Trading Group	IBRA subregion	Dem and PCT #	PCT Name	Proportion of credits available on market
Central Gorge Dry Sclerophyll Forests <50%	Bungonia	870	Grey Gum - Thin-leaved Stringybark grassy woodland	1504%
Inland Floodplain Swamps >=70% and <90%	Crookwell	335	Tussock grass - sedgeland fen - - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South-Western Slopes Bioregion	6%
Inland Riverine Forests <50%	Inland Slopes	5	River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains	2161%
Inland Rocky Hill Woodlands >=50% and <70%	Inland Slopes	319	Tumbledown Red Gum - White Cypress Pine hill woodland	15255%
Montane Bogs and Fens >=70% and <90%	Crookwell	1256	Tableland swamp meadow on impeded drainage sites	1040%
Montane Wet Sclerophyll Forests <50%	Bondo	638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	0%
	Snowy Mountains	638	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas	
South East Dry Sclerophyll Forests <50%	Bungonia	1150	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges	0%
South East Dry Sclerophyll Forests >=90%	Crookwell	1151	Silvertop Ash - Broad-leaved Peppermint dry shrub forest	0%
Southern Tableland Dry Sclerophyll Forests <50%	Bondo	953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	105%
	Snowy Mountains	953	Mountain Gum - Snow Gum - Broad-leaved Peppermint shrubby open forest of montane ranges	
Southern Tableland Dry Sclerophyll Forests >=50% and <70%	Bondo	299	Riparian Ribbon Gum - Robertson's Peppermint - Apple Box riverine very tall open forest	100%
	Bungonia	1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	
	Crookwell	727	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest	
		1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	
	Inland Slopes	299	Riparian Ribbon Gum - Robertson's Peppermint - Apple Box riverine very tall open forest	
	Murrumbateman	349	Inland Scribbly Gum - Red Stringybark open forest on hills composed of silicous substrates	
		351	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest	
		1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest	
Southern Tableland Grassy Woodlands >=70% and <90%	Crookwell	731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	13620%
	Inland Slopes	731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	
	Murrumbateman	731	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills	
	Bondo	295	Robertson's Peppermint - Broad-leaved Peppermint - Norton's Box - stringybark shrub-fern open forest	260%

Offset Trading Group	IBRA subregion	Dem and PCT #	PCT Name	Proportion of credits available on market
Southern Tableland Wet Sclerophyll Forests <50%		300	Ribbon Gum - Narrow-leaved (Robertson's) Peppermint montane fern - grass tall open forest on deep clay loam soils	
	Inland Slopes	295	Robertson's Peppermint - Broad-leaved Peppermint - Norton's Box - stringybark shrub-fern open forest	
	Snowy Mountains	300	Ribbon Gum - Narrow-leaved (Robertson's) Peppermint montane fern - grass tall open forest on deep clay loam soils	
Subalpine Woodlands <50%	Snowy Mountains	679	Black Sallee - Snow Gum low woodland of montane valleys, South-Eastern Highlands Bioregion and Australian Alps Bioregion	46%
		1196	Snow Gum - Mountain Gum shrubby open forest of montane areas	
Temperate Montane Grasslands <50%	Snowy Mountains	1224	Sub-alpine dry grasslands and heathlands of valley slopes	0%
Upper Riverina Dry Sclerophyll Forests <50%	Inland Slopes	294	Norton's Box - Red Box - White Box tussock grass open forest	653%
		297	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills	
		306	Red Box - Red Stringybark - Norton's Box hill heath shrub - tussock grass open forest of the Tumut region	
Upper Riverina Dry Sclerophyll Forests >=50% and <70%	Bondo	290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills	92%
	Inland Slopes	290	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills	
		314	Apple Box - Red Stringybark basalt scree open forest in the upper Murray River region	
Upper Riverina Dry Sclerophyll Forests >=70% and <90%	Bondo	285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	0%
	Snowy Mountains	285	Broad-leaved Sally grass - sedge woodland on valley flats and swamps	0%
Western Slopes Dry Sclerophyll Forests <50%	Murrumbateman	322	Inland Scribbly Gum - Red Stringybark - Black Cypress Pine hillslope shrub-tussock grass open forest	72921%
Western Slopes Dry Sclerophyll Forests >=50% and <70%	Inland Slopes	287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	3963%
	Murrumbateman	287	Long-leaved Box - Red Box - Red Stringybark mixed open forest	
Western Slopes Dry Sclerophyll Forests >=70% and <90%	Inland Slopes	343	Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates in the Tarcutta - Gundagai region	0%
Western Slopes Grassy Woodlands >=50% and <70%	Inland Slopes	316	Norton's Box - Red Box - Red Stringybark +/- Nodding Flax Lily forb-grass open forest	26%

16.2.2 Species credit options – like-for-like

In the case of impacts on threatened species that are species credit species, like-for-like biodiversity credits represent the same threatened species (section 6.3 of the BC Regulation). Like for like species may be sourced from anywhere in NSW.

A review of public registers indicates that there is limited supply of species credits within existing stewardship sites. Sites with relevant ecosystem credits may be a target for sourcing species credits given their compatibility at the ecosystem credit level.

16.2.3 Variation rules

Following reasonable steps to obtain like-for-like credits, Transgrid may seek to retire credits under the variation rules for BC Act entities. The variation rules may not be applied for EPBC Act listed biodiversity as detailed above. It is not expected that variations rules would be invoked for a significant portion of the credit requirement.

Under the variation rules (section 6.4 of the BC Regulation), for ecosystem credits, impacts on native vegetation must be offset with vegetation that is:

- in the same vegetation formation
- in the same or a higher offset trading group
- in a location that is in
  - the same Interim Biogeographic Regionalisation of Australia region as the impacted site
  - a subregion that is within 100 kilometres of the outer edge of the impacted site
- if the impacted habitat contains hollow bearing trees—they represent vegetation that contains hollow bearing trees or artificial hollows.

For species credits:

- impacts on threatened plants must be offset with a threatened plant that is the same or more threatened under the BC Act
- impacts on threatened animals must be offset with a threatened animal that is the same or more threatened under the BC Act
- in a location that is in:
  - the same Interim Biogeographic Regionalisation of Australia region as the impacted site
  - a subregion that is within 100 kilometres of the outer edge of the impacted site.

16.3 Establishing Biodiversity Stewardship Sites

Transgrid propose to develop Biodiversity Stewardship Agreements (BSAs) on suitable sites to generate credits to meet the offset needs of the amended project and are investigating possible Biodiversity Stewardship sites within the locality. The potential for co-location of BSAs on properties that would be affected by the amended project, would also be reviewed in light of the potential benefits to local landowners.

Potential properties that support the ecosystem and species credits required to offset impacts of the amended project are in the process of being identified and investigations are ongoing. Preliminary investigations would be undertaken to map PCTs within the sites and confirm credit type and yield. Further, detailed investigations of these sites, including targeted threatened species surveys, would also be required.

Subject to agreements with landowners, Transgrid intends to develop BSAs over sites deemed suitable and supporting the biodiversity values needed to offset the impacts arising from the amended project.

Additional and Appropriate Measures (compensatory measures) may be required to be implemented where impacts to likely SAIIs cannot be further reduced and/ or where likely SAIi risks remain. Compensatory measures will be developed and delivered in consultation with the NSW DCCEEW Environment and Heritage and incorporate and/or support the long-term augmentation, enhancement and protection of native vegetation and/or habitat of the target entity within landscapes local to the impact.

16.4 Payment into the Biodiversity Conservation Fund

Under the BC Act, development proponents may choose to pay into the BCF (the fund) as an alternative to retiring biodiversity credits. As of October 2022, the BCF Charge system was introduced, where proponents are required to obtain a Charge Quote from the Biodiversity Conservation Trust (BCT) prior to making a payment into the fund. Charge Quotes are valid for up to three years.

Proponents may seek a Charge Quote once an application that requires the retirement of credits has been submitted to a consent authority and may pay into the fund once a consent authority has issued conditions of consent that specify the number and type of credits to be retired. Paying into the fund is available as an option as soon as a development has been approved and a legal requirement to retire credits exists.

Payment into the fund may be required for ecosystem and species credits that cannot be sourced from the market or created as part of a Biodiversity Stewardship Site.

16.5 Offsets for impacts to Matters of National Environmental Significance

Under the assessment bilateral agreement, the Commonwealth Minister can use the NSW process to inform an assessment of the impacts of any eligible action. The Commonwealth Government has endorsed the NSW Biodiversity Offsets Scheme (BOS), including the (Commonwealth DCCEEW 2024e):

- Biodiversity Assessment Method (BAM)
- biodiversity credit system
- offset rules set out in the Biodiversity Conservation Regulation 2017 (BC Regulation).

The offset rules in the BC Regulation require either (Commonwealth DCCEEW 2024e):

- like-for-like biodiversity credits
- funding conservation actions that directly benefit the protected matter that an action impacts.

The offset rules in the BC Regulation also allow for variations if there is no like-for-like offset. However, NSW has amended the BC Regulation to stop variation rules applying to projects that need EPBC Act approval or have an offset obligation for an EPBC Act protected matter. This amendment ensures offsets under the BOS for EPBC Act purposes achieve like-for-like outcomes. The NSW Government will also disburse payments into the Biodiversity Conservation Fund for EPBC Act projects in a like-for-like manner (Commonwealth DCCEEW 2024).

Offset obligations for approvals under the EPBC Act can be met under the BOS, meaning the following options are available for offsets required for MNES (Commonwealth DCCEEW 2024e):

- like-for-like credits can be generated and retired through Biodiversity Stewardship Agreements
- credits can be bought and retired directly from the market

- payments can be made into the NSW Biodiversity Conservation Fund to meet your approval conditions.

Offsets for the amended project for significant impacts to MNES (Section 13.8) would be delivered under the BOS where relevant. As detailed above, offsets delivered under the BOS address the requirements of the EPBC Act Environmental Offset Policy through like for like offset trading requirements and the provisions for the establishment and securing into perpetuity of Biodiversity Stewardship Agreements.

Any significant residual impacts to MNES not addressed under the NSW BOS would be addressed in accordance with the EPBC Act Environmental Offsets Policy (DSEWPC, 2012a), which may include delivery of offsets under the BOS where appropriate, in consultation with Commonwealth DCCEEW. For all of the species listed below that are not dual listed under the BC Act, credits are either being generated as species credits or ecosystem credits under the BOS (Attachment 3):

- Swamp Everlasting *(Xerochrysum palustre)* – species credits generated under the BOS
- Southern Whiteface – ecosystem credits generated under the BOS
- Pilotbird – ecosystem credits generated under the BOS
- Fork-tailed Swift – ecosystem credits generated under the BOS
- Sharp-tailed Sandpiper – ecosystem credits generated under the BOS
- Red-necked Stint – ecosystem credits generated under the BOS
- Latham's Snipe – ecosystem credits generated under the BOS
- Common Greenshank – ecosystem credits generated under the BOS
- Marsh Sandpiper – ecosystem credits generated under the BOS.

16.6 Timing of Biodiversity Offset Provision

The biodiversity offset liability for the project required under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) required acquittal timing will be confirmed at project approval. As the design for the project has not yet been finalised, the calculations in this BDAR are based on the updated indicative disturbance area only.

Transgrid will seek approval conditions that require preparation of a Biodiversity Offset Package (BOP), via the Department of Planning Housing and Infrastructure's Major Projects Deferred Offsets Policy, which details the specific biodiversity offset measures to be implemented and delivered in accordance with the EIS, costing for each measure, and their timing. Deferral of offset acquittal is proposed to be secured via a bank guarantee to the value of the biodiversity offset liability. The value of the bank guarantee is equivalent to the amount that would be paid into the Biodiversity Conservation Fund should other offset mechanisms not be achievable within the Condition of approval timeframe.

The project's biodiversity offset liability is proposed to be acquitted via delivery of a range of biodiversity offset measures allowable under the NSW Biodiversity Offset Scheme (BOS), Conditions of Approval, Biodiversity Offset Package, NSW DPHI Deferred Offsets Policy (and/or any negotiated outcome with DPHI), and the Commonwealth Biodiversity Offsets Policy (and/or any negotiated outcome as approved by Commonwealth DCCEEW). The timeframe for delivery of offsets will be outlined in the Biodiversity Offset Package.

A Supplementary Biodiversity Assessment Strategy (SBAS) will guide post approval credit reduction through provision of documented evidence of avoidance during any further detailed design or during construction. Survey, monitoring and reporting requirements will be outlined to facilitate application to NSW DCCEEW for a reduction in the overall credit liability of the project (Refer to section 14.2.2 for details of SBAS).

17. Conclusion

Transgrid proposes to increase the energy network capacity in southern NSW through the development of around 365 kilometres of new 500 kV high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle. The amended project would involve construction of a new substation east of Wagga Wagga (proposed Gugaa 500 kV substation) as well as connection to existing substations at Wagga Wagga and Bannaby and a future substation at Maragle in the Snowy Mountains.

This report provides an assessment of significance on threatened species, ecological communities or their habitats listed under applicable legislation. It specifically:

- provides an assessment of biodiversity values within the amended project footprint and updated indicative disturbance area as it is currently understood for the amended project
- demonstrates the amended project's effort to avoid and minimise impacts on biodiversity values
- provides mitigation and management of impacts on biodiversity values
- calculates the offset requirement for impacts on biodiversity values that are unable to be avoided
- provides an assessment of significance on threatened species, ecological communities or their habitats listed under the FM Act and EPBC Act.

17.1 Avoidance and minimisation

The amended project has been designed to avoid and minimise potential impacts on biodiversity values through:

- co-location with existing transmission lines or areas of disturbance to avoid and minimise additional clearance or fragmentation of vegetation wherever possible
- targeting narrow crossing points of waterways (and their associated riparian habitats)
- use of existing access tracks and roads to minimise additional disturbance to the transmission line easement wherever possible
- inclusion of a partial clearing methodology, thereby retaining some vegetation within the easement during the operational maintenance phase of the amended project, ie Transgrid are not adopting full continuous clearance of the easement, which would have been the 'easier' maintenance option.
- route adjustment which decreased the distance through intact native vegetation in Bago State Forest and diverted the amended project footprint away from areas supporting native vegetation on private land to largely pine plantation within Green Hills State Forest (referred to as the Green Hills corridor amendment), in areas where use of existing access tracks could be maximised. The Green Hills corridor amendment reduces the potential biodiversity impacts, requiring less native vegetation clearing, including reduced impacts to TECs and threatened species
- Detailed design has been progressing in parallel with the preparation of the BDAR and, noting the number of threatened species and SAII species associated with McPhersons Plain, the opportunities for impact avoidance and minimisation through detailed design has been prioritised in this area:
  - The horse-exclusion fencing around the central portion of McPhersons Plain (to prevent impacts to threatened flora species) would be maintained and has been identified as a no-go zone. To avoid impacts to threatened flora species in the no-go zone, an aerial stringing method for the transmission line would be employed between transmission line structures on either side of McPhersons Plain.
  - Given potential habitat for the threatened species associated with McPhersons Plain extends beyond the fenced area, NSW DCCEEW Environment and Heritage has requested that a 30-metre exclusion buffer from the fenceline be applied for project infrastructure. The transmission line span

across McPhersons Plain has been maximised to locate the transmission line structures and associated construction bench outside the 30-metre exclusion buffer.

- Some clearing of tall-growing vegetation would be required within the 30-metre exclusion buffer to meet the vegetation clearing requirements for the transmission line easement and transmission line structures. Clearing methods that minimise ground disturbance will be used. Where there are known locations of recorded threatened species (as identified in the BDAR), the associated buffer areas will be demarcated as a biodiversity exclusion zone (mitigation measure B13, Table 14-1). Any threatened species identified through additional surveys or captured as an unexpected find, will be dealt with in accordance with the BMP (mitigation measure B3, Table 14-1).
- The impact avoidance and minimisation outlined above has not been captured in the assessment outcomes or in the project impacts mapped in Figure 13-2 (map reference 38), which features the preliminary detailed design. However, new mitigation measure B38 has been developed to include the above avoidance and minimisation commitments (refer to Table 14.1).

Ongoing commitment to avoid and minimise impacts on biodiversity values would be further achieved through micro-siting new transmission line structures, brake and winch sites and access tracks during the detailed design phase as part of the Supplementary Biodiversity Assessment Strategy, where practicable. To aid this process, detailed constraints mapping has been developed for the amended project footprint, which identifies CEECs and SAII species/habitat as a priority for design avoidance.

A Supplementary Biodiversity Assessment Strategy (SBAS) will be prepared to guide surveys conducted post BDAR lodgement and post approval to confirm presence/absence of species within the disturbance footprint. Under the SBAS, species identified as at risk of Serious and Irreversible Impact (SAII), Matters of National Environmental Significance (MNES) and high credit liability will be preferentially targeted for survey. Additionally, the SBAS will guide post-approval credit reduction through provision of documented evidence of avoidance during any further detailed design or during construction.

17.2 Impact summary

The impact assessment is based on the current understanding of design and construction methodology and the updated indicative disturbance area for these items. The updated disturbance area is identified based on realistic amended 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.

Potential impacts on biodiversity values resulting from the amended project include:

- direct impacts to 45 native PCTs, including five TECs listed under the BC Act and two TECs listed under the EPBC Act
- direct impacts on native vegetation because of the amended project including:
  - removal of 866.16 hectares of native vegetation (excluding Category 1 exempt lands)
  - removal of up to 470.02 hectares of TECs listed under the BC Act (excluding Category 1 exempt lands) in the form of:
    - 0.92 hectares of Montane Peatlands and Swamps listed as endangered under the BC Act
      - 0.58 hectares aligns to Alpine Sphagnum Bogs and Associated Fens (endangered under the EPBC Act)
    - 1.92 hectares of Monaro Tableland Cool Temperate Grassy Woodland listed as critically endangered under the BC Act
    - 3.38 hectares of Coolac Tumut Serpentine Shrubby Woodland listed as endangered under the BC Act
    - 6.62 hectares of Tableland Basalt Forest listed as endangered under the BC Act

- 457.18 hectares of White Box Yellow Box Blakely's Red Gum grassy woodland and derived native grassland listed as critically endangered under the BC Act
  - 117.15 hectares aligns to White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (critically endangered under the EPBC Act)
- loss of habitat for 46 threatened fauna species identified and/or predicted as ecosystem credit species, 21 of which were recorded and 25 assumed present
- impacts to 46 threatened flora species credit species (detailed in Table 17-1)
- impacts to 30 threatened fauna species credit species and two endangered fauna populations (detailed in Table 17-2).

Table 17-1: Impacts to threatened flora species credit species

Species	Common name	BC Act status	Area of impact (ha)/count (c)	Recorded/assumed present
Acacia ausfeldii	Ausfeld's Wattle	V	15.86 ha	Assumed present
Acacia bynoeana	Bynoe's Wattle	E	3.89 ha	Assumed present
Acacia flocktoniae	Flockton Wattle	V	10.08 ha	Assumed present
Ammobium craspedioides	Yass Daisy	V	8433 c	Part assumed presence / part recorded
Baloskion longipes	Dense Cord-rush	V	1.26 ha	Assumed present
Bossiaea fragrans	Bossiaea fragrans	CE	6.23 ha	Assumed present
Bossiaea oligosperma	Few-seeded Bossiaea	V	2.36 ha	Assumed present
Caesia parviflora var. *minor*	Small Pale Grass-lily	E	1.68 ha	Assumed present
Caladenia concolor	Crimson Spider Orchid	E	31.88 ha	Assumed present
Caladenia montana	Caladenia montana	V	208.60 ha	Assumed present
Commersonia prostrata	Dwarf Kerrawang	E	0.82 ha	Assumed present
Cullen parvum	Small Scurf-pea	E	16.55 ha	Assumed present
Dillwynia glaucula	Michelago Parrot-pea	E	1.26 ha	Assumed present
Diuris aequalis	Buttercup Doubletail	E	42.43 ha	Assumed present
Diuris tricolor	Pine Donkey Orchid	V	1.27 ha	Assumed present
Eucalyptus aggregata	Black Gum	V	7 c	Assumed present
Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	E	12 c	Assumed present
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's Peppermint	V	2 c	Assumed present
Genoplesium superbum	Superb Midge Orchid	E	9.42 ha	Assumed present
Grevillea iaspicula	Wee Jasper Grevillea	CE	8 c	Assumed present
Grevillea wilkinsonii	Tumut Grevillea	CE	21.00 ha	Assumed present
Kunzea cambagei	Cambage Kunzea	V	7.29 ha	Assumed present
Lepidium hyssopifolium	Aromatic Peppercress	E	64.50 ha	Assumed present
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	E	43443 c	Part assumed presence / part recorded
Persoonia marginata	Clandulla Geebung	V	4.26 ha	Assumed present
Persoonia mollis subsp. *revoluta*	Persoonia mollis subsp. revoluta	V	1.37 ha	Assumed present
Phyllota humifusa	Dwarf Phyllota	V	10.50 ha	Assumed present

Species	Common name	BC Act status	Area of impact (ha)/count (c)	Recorded/assumed present
Pimelea bracteata	Pimelea bracteata	CE	4.65 ha	Part assumed presence / part recorded
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	8.08 ha	Assumed present
Pomaderris delicata	Delicate Pomaderris	CE	1.37 ha	Assumed present
Pomaderris pallida	Pale Pomaderris	V	1.16 ha	Assumed present
Prasophyllum bagoense	Bago Leek-orchid	CE	0.04 ha	Recorded
Prasophyllum innubum	Brandy Marys Leek-orchid	CE	0.02 ha	Assumed present
Prasophyllum keltonii	Kelton's Leek-orchid	CE	0.03 ha	Recorded
Prasophyllum petilum	Tarengo Leek-orchid	E	44.75 ha	Assumed present
Pterostylis alpina	Alpine Greenhood	V	2.14 ha	Assumed present
Pterostylis foliata	Slender Greenhood	V	49.96 ha	Assumed present
Pterostylis oreophila	Blue-tongued Greenhood	CE	0.56 ha	Assumed present
Pultenaea humilis	Dwarf Bush-pea	V	18.43 ha	Assumed present
Senecio garlandii	Woolly Ragwort	V	9.88 ha	Assumed present
Solanum armourense	Solanum armourense	V	0.35 ha	Assumed present
Swainsona recta	Small Purple-pea	E	65.37 ha	Assumed present
Swainsona sericea	Silky Swainson-pea	V	109.16 ha	Assumed present
Thelymitra alpicola	Alpine Sun-orchid	V	0.54 ha	Assumed present
Thesium australe	Austral Toadflax	V	141.97 ha	Assumed present
Xerochrysum palustre	Swamp Everlasting	-	0.68 ha	Part assumed presence / part recorded

Table 17-2: Impacts to threatened fauna species credit species

Scientific name	Common name	BC Act status	Area of impact (ha)	Recorded/assumed present
Aprasia parapulchella	Pink-tailed Legless Lizard	V	34.12	Part assumed presence / part recorded
Burhinus grallarius	Bush Stone-curlew	E	54.25	Assumed present
Callocephalon fimbriatum	Gang-gang Cockatoo	V	430.15	Part assumed presence / part recorded
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	40.79	Part assumed presence / part recorded
Cercartetus nanus	Eastern Pygmy-possum	V	229.01	Part assumed presence / part recorded
Chalinolobus dwyeri	Large-eared Pied Bat	V	2.42	Assumed present
Crinia sloanei	Sloane's Froglet	V	0.66	Assumed present
Cyclodomorphus praealtus	Alpine She-oak Skink	E	30.83	Assumed present
Delma impar	Striped Legless Lizard	V	90.07	Assumed present
Haliaeetus leucogaster	White-bellied Sea-eagle	V	2.91	Part assumed presence / part recorded
Hieraaetus morphnoides	Little Eagle	V	89.16	Part assumed presence / part recorded
Keyacris scurra	Key's Matchstick Grasshopper	E	161.89	Part assumed presence / part recorded
Litoria booroolongensis	Booroolong Frog	E	0.06	Assumed present
Litoria castanea	Yellow-spotted Tree Frog	CE	1.17	Assumed present
Lophoictinia isura	Square-tailed Kite	V	37.31	Assumed present
Mastacomys fuscus	Broad-toothed Rat	V	0.03	Assumed present
Mixophyes balbus	Stuttering Frog	E	13.87	Assumed present
Myotis macropus	Southern Myotis	V	57.93	Part assumed presence / part recorded
Ninox connivens	Barking Owl	V	240.79	Part assumed presence / part recorded
Ninox strenua	Powerful Owl	V	227.20	Part assumed presence / part recorded
Petauroides volans	Greater Glider	E	142.58	Part assumed presence / part recorded
Petaurus australis - endangered population	Yellow-bellied Glider population on the Bago Plateau	EP	121.32	Part assumed presence / part recorded
Petaurus norfolcensis	Squirrel Glider	V	60.15	Part assumed presence / part recorded
Petaurus norfolcensis - endangered population	Squirrel Glider in the Wagga Wagga City Local Government Area	EP	10.46	Part assumed presence / part recorded
Petroica rodinogaster	Pink Robin	V	35.26	Assumed present
Phascogale tapoatafa	Brush-tailed Phascogale	V	162.06	Assumed present
Phascolarctos cinereus	Koala	E	441.09	Assumed present
Polytelis swainsonii	Superb Parrot	V	113.60	Part assumed presence / part recorded

Scientific name	Common name	BC Act status	Area of impact (ha)	Recorded/assumed present
Pseudomys fumeus	Smoky Mouse	CE	5.78	Assumed present
Synemon plana	Golden Sun Moth	V	27.39	Assumed present
Tyto novaehollandiae	Masked Owl	V	178.43	Assumed present
Tyto tenebricosa	Sooty Owl	V	63.08	Assumed present

Prescribed impacts relevant to the amended project include:

- karst, caves, crevices, cliffs, rocks, and other geological features of significance
- human-made structures
- non-native vegetation offering habitat for threatened species
- habitat connectivity, including injury or mortality from transmission line collision, entanglement, or electrocution
- waterbodies, water quality and hydrological processes
- vehicle strikes.

The amended project would result in minor impacts on groundwater during construction and negligible impacts on groundwater during operation. Therefore, the amended project is considered unlikely to lead to any adverse impact on the groundwater availability or status for groundwater dependent ecosystems.

Indirect impacts to avifauna and flying mammals from the amended project are likely due to the potential for increased risk of collision with transmission lines and electric and magnetic fields associated with the new infrastructure.

The amended project is considered unlikely to lead to a significant impact on any threatened aquatic species, ecological communities or their habitats.

In terms of impacts on MNES under the EPBC Act, the amended project would:

- impact on two TECs
- impact on known or assumed habitat for 14 threatened flora species
- impact on known or potential habitat for 29 threatened fauna species
- impact on potential habitat or indirect impacts for ten migratory species listed under the EPBC Act.

The impact assessment outcomes for MNES concluded that:

- The amended project is likely or has the potential to lead to a significant impact on 12 threatened flora species and/or their habitat, 22 threatened fauna species and/ or their habitat, six migratory species and one threatened ecological community listed under the EPBC Act.
- For three threatened fauna, five threatened flora and one migratory species, conclusions of potentially significant impacts are driven by a precautionary approach given survey limitations and without being able to state with certainty that impacts could be avoided during detailed design for the amended project. Once additional survey is completed and avoidance measures undertaken the risk of a significant impact would be substantially reduced.
- The amended project would not impact on any wetlands of national or international importance.

17.3 Mitigation and management

The specific performance outcomes for the amended project regarding biodiversity include:

- avoid and minimise impacts to threatened flora and fauna species, and ecological communities listed under the BC Act and EPBC Act through the design refinement and construction methodology refinement processes
- offset impacts to threatened ecological communities and species.

Proposed mitigation measures to minimise residual indirect impacts to native vegetation and threatened species include:

- avoidance of areas of high biodiversity value (such as TEC, SAII candidate species and/or threatened species habitat) through the establishment of 'no go zones' and micro-siting of infrastructure and access tracks during detailed design
- supplementary surveys within areas not previously subject to biodiversity survey (inaccessible lands) to close out survey gaps and assess the condition of vegetation and habitats where threatened biodiversity has conservatively been assumed to be present
- infrastructure and access tracks will be located and constructed to minimise impacts to riparian corridors and waterways
- development and implementation of the following management plans:
  - Biodiversity Management Plan to minimise and monitor impacts of construction and operation of biodiversity
  - Connectivity Strategy to minimise impacts of fragmentation on biodiversity development
  - Biosecurity Management Plan to identify priority weeds, pests and pathogens and stipulate management and monitoring requirements
  - Supplementary Hollow and Nest Strategy to provide alternative roosting and/or nesting habitat for threatened fauna displaced during clearing
  - Adaptive management measures for uncertain impacts as part of the BMP, such as those associated with inaccessible lands and unexpected finds
  - Bush Fire Emergency Management and Evacuation Plan, to manage any increased risk of bushfire
  - SWMP, ESCP and WQMP as part of the CEMP to manage water quality impacts during construction of the amended project.

17.4 Offsetting biodiversity impacts

Residual impacts that are not able to be managed through mitigation would be offset in accordance with BAM calculations for both ecosystem and species credits. The amended project offset obligation based on the updated indicative disturbance area (including 21 threatened species and/ or populations recorded and 77 species assumed present) has been calculated to require the following biodiversity credits:

- Bungonia:
  - 992 ecosystem credits
  - 21,114 species credits
- Crookwell:
  - 1,513 ecosystem credits
  - 59,529 species credits
- Murrumbateman:
  - 1,501 ecosystem credits

  - 32,043 species credits
- Inland Slopes:
  - 4,700 ecosystem credits
  - 35,737 species credits
- Bondo:
  - 799 ecosystem credits
  - 4,830 species credits
- Snowy Mountains:
  - 4,365 ecosystem credits
  - 46,921 species credits.

The calculations in this BDAR are based on current updated indicative disturbance areas only, as design refinement for the amended project has not yet been completed. Accordingly, the final biodiversity offset liability is subject to the timing of design and construction methodology refinements and would be determined at that stage.

Further, calculations in the BDAR are based on assumed presence for some species. Additional survey is planned to fill data gaps prior to amended project approval and post-approval.

The amended project offset obligations would be met through implementing a combination of the following offset delivery options, being:

- establishing biodiversity stewardship site(s) on lands with like for like biodiversity values to those impacted by the amended project
- the purchase and retirement of existing biodiversity credits currently available on the biodiversity credit register
- making a payment into the BCF for residual credits not sourced from the preferred approach to established BSAs.

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