



HumeLink

Biodiversity Assessment Verification Report

Prepared for Transgrid | 29 August 2025



Document control

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Declaration

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method.

Name: Chani Wheeler

Signature:

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Executive Summary

Project Outline

Transgrid propose to construct around 360 kilometres (km) of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle New South Wales (NSW). This project is collectively referred to as HumeLink.

A Biodiversity Development Assessment Report (BDAR) was prepared in June 2023 addressing project requirements under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A revised BDAR was subsequently prepared in May 2024 addressing project submissions and proposed design amendments. Biodiversity impacts and offset requirements were finalised within the Biodiversity Assessment Method (BAM) Calculator in September 2024. Project approval was granted on 13 November 2024 (SSI-36656827). Commonwealth approval under the EPBC Act was granted on 18 December 2024 (2021/9121).

Opportunity for additional survey to reduce the level of assumed presence and provide further data for avoidance and minimisation of impacts to biodiversity was identified following the completion of the BDAR. Transgrid engaged Niche to prepare a supplementary survey proposal, with supplementary surveys commencing in August 2024.

NSW Approval condition B28 required a Supplementary Biodiversity Strategy (SBS) to be prepared to outline the method for additional survey. Condition 29 requires the preparation of a Biodiversity Assessment Verification Report (BAVR) to document the methods and present the results of supplementary biodiversity surveys.

Supplementary surveys undertaken for the project are intended to:

- Address the Supplementary Biodiversity Strategy (SBS) prepared by Transgrid in accordance with condition B28 of the instrument of approval.
- Validate the extent and likelihood of Serious and Irreversible Impacts (SAII)
- Validate the extent and significance of impacts to Matters of National Environmental Significance (MNES)
- Inform additional opportunities for impact avoidance and minimisation (linking to condition B25)
- Inform requirements for the protection and management of biodiversity, to be addressed within a revised Biodiversity Management Plan.
- Inform the reduction in offset liability for the project where feasible.

Requirements of the BAVR are outlined in Section 1.3.

Species were selected for supplementary survey based on a hierarchy outlined in Section 2.1. Due to limitations outlined in Section 2.1, not all species were able to be surveyed.

Summary of supplementary survey and potential impacts

As documented on page 188 and page 242 of the project BDAR, a total of 56 threatened flora and 31 threatened fauna species were identified as candidate species subject to further assessment. Of these threatened species, 32 threatened flora and 17 threatened fauna were subject to further supplementary survey, as outlined in Section 2.1.1 and 2.1.2.



Vegetation validation

Validation of vegetation was undertaken during the supplementary surveys and resulted in amendments to the vegetation mapping in three discrete locations within the project footprint (refer to Section 4.1). As a result, the total impact area of Box Gum Woodland (listed as Critically Endangered under the BC Act and EPBC Act) has been reduced by 2.01 ha.

Threatened flora

Targeted surveys were undertaken to inform the presence/absence of all target flora species listed in Table 11 of the Supplementary Biodiversity Strategy, and further refined in Table 6, with some species being opportunistically subject to targeted survey as discussed in Section 2.1.1. Small adjustments to the vegetation polygons and tidying up of small slithers may result in minor discrepancies of <0.01 ha in the spatial dataset compared to the figures in the tables.

Based on the result of the supplementary surveys, the following threatened species were directly recorded within the 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* (Rice Flower) 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
- *Prasophyllum innubum* (Brandy Marys 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
- *Thelymitra alpicola* (Alpine Sun-orchid) listed as vulnerable under the BC Act

Two species have been completely excluded from the project footprint as a result of the supplementary surveys:

- *Calotis glandulosa* (Mauve Burr-Daisy) listed as vulnerable under the BC Act and EPBC Act
- *Pterostylis oreophila* (Blue-tongued Greenhood) listed as critically endangered under the BC Act and EPBC Act

Updated direct impacts to threatened flora species (based on the approved layout plans) that were subject to supplementary survey are provided in Table 1 below.



Table 1: Impacts to threatened flora species subject to supplementary survey

Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Acacia ausfeldii</i> (Ausfeld's Wattle)	Vulnerable	Not Listed	No	17.67	9.77	0.00	9.77
<i>Acacia bynoeana</i> (Bynoe's Wattle)	Endangered	Vulnerable	No	4.17	4.17	0.00	4.17
<i>Acacia flocktoniae</i> (Flockton Wattle)	Vulnerable	Vulnerable	No	11.25	0.00	0.00	0.00
<i>Ammobium craspedioides</i> (Yass Daisy)	Vulnerable	Vulnerable	No	297.74	252.43	2.57	255.00
<i>Baloskion longipes</i> (Dense Cord-rush)	Vulnerable	Vulnerable	No	1.31	1.31	0.00	1.31
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	Critically Endangered	Critically Endangered	Yes	6.31	4.25	0.00	4.25
<i>Bossiaea oligosperma</i> (Few-seeded Bossiaea)	Vulnerable	Vulnerable	No	2.42	1.86	0.00	1.86
<i>Caesia parviflora</i> var. <i>minor</i> (Small Pale Grass-lily)	Endangered	Not Listed	No	1.71	0.98	0.00	0.98
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Endangered	Vulnerable	Yes	34.66	19.33	0.00	19.33
<i>Caladenia montana</i> (Mountain Spider Orchid)	Vulnerable	Not Listed	No	233.51	81.16	0.00	81.16



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Calotis glandulosa</i> (Mauve Burr-Daisy)	Vulnerable	Vulnerable	Yes	0.00	0.00	0.00	0.00
<i>Commersonia prostrata</i> (Dwarf Kerrawang)	Endangered	Endangered	No	0.82	0.61	0.00	0.61
<i>Cullen parvum</i> (Small Scurf-pea)	Endangered	Not Listed	No	19.05	15.43	0.00	15.43
<i>Dillwynia glaucula</i> (Michelago Parrot-pea)	Endangered	Not Listed	No	1.31	0.77	0.00	0.77
<i>Diuris aequalis</i> (Buttercup Doubletail)	Endangered	Endangered	No	46.05	46.05	0.00	46.05
<i>Diuris tricolor</i> (Pine Donkey Orchid)	Vulnerable	Not Listed	No	1.61	0.59	0.00	0.59
<i>Eucalyptus aggregata</i> (Black Gum)	Vulnerable	Vulnerable	No	0.79	0.30	0.00	0.30
<i>Eucalyptus macarthurii</i> (Paddys River Box, Camden Woollybutt)	Endangered	Endangered	No	2.64	0.66	0.00	0.66
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	Vulnerable	Vulnerable	Yes	0.77	0.61	0.00	0.61
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Endangered	Not Listed	Yes	10.89	1.90	0.00	1.90



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	Critically Endangered	Endangered	Yes	5.19	5.14	0.00	5.14
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	Critically Endangered	Critically Endangered	Yes	22.51	17.60	0.00	17.60
<i>Kunzea cabbagei</i> (Cabbage Kunzea)	Vulnerable	Vulnerable	No	8.27	0.68	0.00	0.68
<i>Lepidium hyssopifolium</i> (Aromatic Peppercress)	Endangered	Endangered	No	67.53	60.96	0.00	60.96
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	Endangered	Endangered	No	186.80	126.47	4.46	130.93
<i>Persoonia marginata</i> (Clandulla Geebung)	Vulnerable	Vulnerable	No	5.03	5.03	0.00	5.03
<i>Persoonia mollis</i> subsp. <i>revoluta</i> (Soft Geebung)	Vulnerable	Vulnerable	No	1.37	1.37	0.00	1.37
<i>Phyllota humifusa</i> (Dwarf Phyllota)	Vulnerable	Vulnerable	No	11.35	1.85	0.00	1.85
<i>Pimelea bracteata</i> (Rice Flower)	Critically Endangered	Critically Endangered	Yes	4.76	1.51	4.04	5.55
<i>Pomaderris cotoneaster</i> (Cotoneaster Pomaderris)	Endangered	Endangered	No	8.96	8.95	0.00	8.95
<i>Pomaderris delicata</i> (Delicate Pomaderris)	Critically Endangered	Critically Endangered	Yes	1.37	1.37	0.00	1.37



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Pomaderris pallida</i> (Pale Pomaderris)	Vulnerable	Vulnerable	Yes	1.17	1.10	0.00	1.10
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Critically Endangered	Critically Endangered	Yes	0.04	0.00	<0.01	<0.01
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Critically Endangered	Critically Endangered	Yes	0.02	0.00	<0.01	<0.01
<i>Prasophyllum keltonii</i> (Kelton's Leek-orchid)	Critically Endangered	Critically Endangered	Yes	0.03	0.00	<0.01	<0.01
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Endangered	Endangered	No	49.67	33.84	0.00	33.84
<i>Pterostylis alpina</i> (Alpine Greenhood)	Vulnerable	Not Listed	No	2.76	0.70	0.00	0.70
<i>Pterostylis foliata</i> (Slender Greenhood)	Vulnerable	Not Listed	No	54.06	29.58	0.00	29.58
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	Critically Endangered	Critically Endangered	Yes	0.65	0.00	0.00	0.00
<i>Pultenaea humilis</i> (Dwarf Bush-pea)	Vulnerable	Not Listed	No	20.21	15.05	0.00	15.05
<i>Senecio garlandii</i> (Woolly Ragwort)	Vulnerable	Not Listed	No	11.56	11.56	0.00	11.56
<i>Solanum armourense</i>	Endangered	Not Listed	Yes	0.40	0.63	0.00	0.63



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Swainsona recta</i> (Small Purple-pea)	Endangered	Endangered	No	69.45	47.99	0.00	47.99
<i>Swainsona sericea</i> (Silky Swainson-pea)	Vulnerable	Not Listed	No	116.45	83.12	0.00	83.12
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	Vulnerable	Not Listed	No	0.63	0.00	0.00	0.00
<i>Thesium australe</i> (Austral Toadflax)	Vulnerable	Vulnerable	No	149.12	116.24	0.00	116.24
<i>Xerochrysum palustre</i> (Swamp Everlasting)	Not Listed	Vulnerable	No	0.77	0.00	0.12	0.12



Threatened fauna

Targeted supplementary surveys were undertaken to inform the presence/absence of targeted candidate threatened fauna species within remaining habitats where species presence was assumed at the BDAR stage. Section 2.2.2 of the SBS further outlines this approach.

Two candidate fauna species were completely excluded from the project footprint through supplementary surveys and habitat constraint mapping:

- *Pseudomys fumeus* (Smoky Mouse) listed as critically endangered under the BC Act and endangered under the EPBC Act
- *Chalinolobus dwyeri* (Large-eared Pied Bat) listed as endangered under the BC Act and EPBC Act

A summary of the results of the fauna impacts are provided in Table 2 below, including extent of occupied habitat and remaining habitats where species presence is assumed.

Some habitats were not subject to supplementary survey due to seasonal constraints, the presence of severely burnt lands or due to land access limitations, as noted in Section 3 of this document and Section 3 of the SBS.

Updated direct impacts to threatened fauna species based on the approved layout plans is given below in Table 2. Small adjustments to the vegetation polygons and tidying up of small slithers may result in minor discrepancies of <0.01ha in the spatial dataset compared to the figures in the tables.

Whilst clearing extents for three raptor species (White-bellied Sea-eagle, Little Eagle and Square-tailed Kite), and Superb Parrot now exceed the approved clearing limits (as shown red in Table 2), the following should be noted:

- The increase is due to changes to the species polygon methods to address CPHR advice as follows:
 - **Raptors**
 - The species polygons proposed for the BDAR (as developed by the species expert Stephen Debus) were abandoned and TBDC prescriptions adopted to delineate the extent of potential habitats in accordance with Section 5.2 of the BAM. This resulted in the:
 - Inclusion of additional habitats previously excluded from consideration as detailed in Section 7.3.4 of the BDAR.
 - A 300 m buffer applied to all stick nests recorded during constraint mapping or assumed through use of the LiDAR data.
 - Supplementary constraint mapping undertaken for these species confirmed an absence of breeding constraints (i.e. stick nests) across many lands where species presence was previously assumed. However, this was not sufficient to compensate for the increase in potential habitat extent resulting from changes to the species polygon methods (as noted above). As such, there is a net increase in potential habitat for raptor species.
 - Fifteen potential stick nests were recorded and have conservatively assumed breeding as surveys were unable to be conducted during peak breeding season for raptors.
 - Additional measures to reduce the extent of clearing and potential impacts to these species are outlined in Chapter 8 of this BAVR.
 - **Superb Parrot**
 - The clearing extent for the Superb Parrot now exceeds the project approved clearing limit as a result of supplementary constraints mapping using advice provided by CPHR.



Table 2: Impacts to threatened fauna species

Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Direct impacts (BAVR)		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	Vulnerable	Vulnerable	No	37.29	20.71	7.25	27.96
<i>Burhinus grallarius</i> (Bush Stone-curlew)	Endangered	Not listed	No	60.87	8.30	0.00	8.30
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Vulnerable	Endangered	No	475.87	24.42	421.00	445.42
<i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	Vulnerable	Not listed	No	45.09	31.87	6.70	38.57
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Vulnerable	Not listed	No	253.39	202.47	48.85	251.32
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Endangered	Endangered	Yes	3.08	0.00	0.00	0.00
<i>Crinia sloanei</i> (Sloane's Froglet)	Endangered	Vulnerable	Yes	0.75	0.75	0.00	0.75
<i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink)	Endangered	Endangered	No	35.15	16.50	0.00	16.50
<i>Delma impar</i> (Striped Legless Lizard)	Endangered	Endangered	No	92.81	90.65	0.00	90.65
<i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle)	Vulnerable	Not listed	No	3.05	8.08	0.11	8.19
<i>Hieraaetus morphnoides</i> (Little Eagle)	Vulnerable	Not listed	No	95.89	114.96	0.00	114.96



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Direct impacts (BAVR)		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Keyacris scurra</i> (Key's Matchstick Grasshopper)	Vulnerable	Not listed	No	173.91	169.59	0.00	169.59
<i>Litoria booroolongensis</i> (Booroolong Frog)	Vulnerable	Not listed	No	0.06	0.06	0.00	0.06
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Endangered	Vulnerable	Yes	1.26	1.26	0.00	1.26
<i>Lophoictinia isura</i> (Square-tailed Kite)	Vulnerable	Not listed	No	39.66	83.87	0.00	83.87
<i>Mastacomys fuscus</i> (Broad-toothed Rat)	Vulnerable	Not listed	No	0.03	0.03	0.00	0.03
<i>Mixophyes balbus</i> (Stuttering Frog)	Endangered	Vulnerable	Yes	15.56	0.46	0.00	0.46
<i>Myotis Macropus</i> (Southern Myotis)	Vulnerable	Vulnerable	No	73.68	57.89	13.46	70.35
<i>Ninox connivens</i> (Barking Owl)	Vulnerable	Not listed	No	265.06	94.61	11.00	105.61
<i>Ninox strenua</i> (Powerful Owl)	Vulnerable	Not listed	No	252.04	180.08	30.18	210.26
<i>Petauroides volans</i> (Southern Greater Glider)	Vulnerable	Vulnerable	No	158.42	81.23	77.12	158.35
<i>Petaurus norfolcensis</i> (Squirrel Glider)	Vulnerable	Not listed	No	66.93	41.43	25.30	66.73
<i>Petroica rodinogaster</i> (Pink Robin)	Vulnerable	Not listed	No	38.77	10.70	0.00	10.70



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Direct impacts (BAVR)		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	Vulnerable	Not listed	No	179.2	157.73	0.00	157.73
<i>Phascolarctos cinereus</i> (Koala)	Endangered	Endangered	No	487.37	313.07	0.00	313.07
<i>Polytelis swainsonii</i> (Superb Parrot)	Vulnerable	Vulnerable	No	127.01	141.30	15.85	157.14
<i>Pseudomys fumeus</i> (Smoky Mouse)	Vulnerable	Vulnerable	No	5.79	0.00	0.00	0.00
<i>Synemon plana</i> (Golden Sun Moth)	Vulnerable	Endangered	No	28.48	27.92	0.00	27.92
<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable	Not listed	No	196.57	103.18	3.08	106.26
<i>Tyto tenebricosa</i> (Sooty Owl)	Vulnerable	Not listed	Yes	68.81	68.81	0.00	68.81
<i>Petaurus australis</i> (Yellow-bellied Glider population on the Bago Plateau)	Endangered	Endangered	No	134.78	69.38	65.38	137.77
<i>Petaurus norfolcensis</i> (Squirrel Glider in the Wagga Wagga City Council Local Government Area)	Endangered	Not listed	No	11.52	6.78	4.46	11.42



Glossary and list of abbreviations

Term or abbreviation	Definition
AMMs	Additional Mitigation Measures
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BAVR	Biodiversity Assessment Verification Report
BC Act	NSW Biodiversity Conservation Act 2016
BC Regulation	Biodiversity Conservation Regulation 2017
BCT	Biodiversity Conservation Trust
BDAR	The Revised Biodiversity Development Assessment Report prepared for the HumeLink project (Niche, June 2024)
BioNet	The repository for biodiversity data products managed by the NSW Government Department of Climate Change, Energy, the Environment and Water.
BMP	Biodiversity Management Plan
BOP	Biodiversity Offset Package
Candidate species	The threatened species identified to be assessed for species credits for a proposal that are automatically populated in the BAM-C. In this report, the candidate species are species subject to supplementary surveys only as outlined in Section 2.1.
CEEC	Critically Endangered Ecological Community
Commonwealth DCCEEW	Commonwealth Department of Climate Change, the Environment, Energy and Water
CPHR	NSW Conservation Programs, Heritage and Regulation Division (formally, NSW Biodiversity Conservation and Sciences [BCS] Division)
CSSI	Critical State Significant Infrastructure
DBH	Diameter at Breast Height
DEC	NSW Department of Environment and Conservation (now CPHR)
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts (now Commonwealth DCCEEW)
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Infrastructure 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))
DSEWPC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (Now Commonwealth DCCEEW)
ECZ	Easement Clearing Zone (ECZ); includes lands within the proposed transmission line easement where clearing and ongoing maintenance of tall growing vegetation would be undertaken. Shrub and



Term or abbreviation	Definition
	Groundcover species can be retained. Earthworks are not required within this zone except in limited circumstances.
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FCNSW	Forestry Corporation of New South Wales
GPS	Global Positioning System
ha	Hectares
HBT	Hollow-bearing tree
HTZ	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.
HumeLink	The CSSI project "HumeLink", which is the subject of the BAVR and inclusive of the proposed amendments and project refinements as described in the EIS.
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometre/s
Koala SEPP 2021	State Environmental Planning Policy (Koala Habitat Protection) 2021
Koala SAT	Koala Spot Assessment Technique
kV	Kilovolt
LGA	Local Government Area
LiDAR	Light Detection and Ranging
Local population	The population of a particular threatened species that occurs in the locality
Locality	The project footprint and surrounds, nominally a 20km radius from the project footprint
m	Metre/s
Matters of biodiversity conservation significance	Biodiversity listed as threatened under the BC and/or EPBC Acts
MNES	Matters of National Environmental Significance (from the Commonwealth Environment Protection and Biodiversity Conservation Act 1999)
Native Vegetation	As described in the BAM (DPIE, 2020): <ol style="list-style-type: none"> Native vegetation means any of the following types of plants native to New South Wales: <ul style="list-style-type: none"> trees (including any sapling or shrub or any scrub), understorey plants, groundcover (being any type of herbaceous vegetation), plants occurring in a wetland. 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



Term or abbreviation	Definition
	<p>plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.</p> <p>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:</p> <ul style="list-style-type: none"> – 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. <p>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.</p>
Niche	Niche Environment and Heritage Pty Ltd
NSW	New South Wales
NSW Approval	The HumeLink project (SSI 36656827) approval, granted on 13 th November 2024
NSW DCCEEW	NSW Department of Climate Change, the Environment, Energy and Water
PCT	Plant Community Type, classified according to the BioNet Vegetation Classification database
Post-BDAR approved mapping	<p>Mapping was updated following completion of the BDAR to feedback from CPHR on the EIS. This process:</p> <ul style="list-style-type: none"> – Incorporated an update the HumeLink clearing zones spatial layer to augment clearing zones and smooth polygon edges. – Provided the basis of the clearing limits set for the project in Appendix 2 of the NSW Approval (Tables 2-1, 2-2 & 2-3).
Project footprint	<p>The area that has been assumed for the purpose of the BAVR 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.</p> <p>The BDAR project footprint has been adopted for the purpose of this BAVR.</p>
QLD	Queensland
RDP	Rapid Data Point
Revised habitat	The extent of potential habitat requiring further assessment under the BAM, following the completion of supplementary constraint mapping and habitat assessment, as outlined in sections 2.3 and 5.1. This term is used interchangeably with 'potential habitat'.
SAII	Serious and Irreversible Impacts
SBS	Supplementary Biodiversity Strategy
SEARs	Planning Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Severely burnt land	Native vegetation and habitats situated within the HumeLink project footprint that were subject to the 2019-20 bushfires and determined to meet the definition of severely burnt vegetation in accordance with the 'Guideline for applying the Biodiversity Assessment Method at severely burnt sites' (DPIE, 2020c).



Term or abbreviation	Definition
SIC Assessment	Assessment made against the Significant impact criteria for MNES
Species polygon	Candidate threatened species habitat overlapping the disturbance area for which species presence was confirmed or assumed present.
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	Refers to lands overlapping the HumeLink disturbance area.
Supplementary surveys	The surveys referenced within the Supplementary Biodiversity Strategy (prepared by Transgrid to meet condition B28 of the instrument of approval), and this BAVR undertaken to meet the condition B29 of the instrument of approval.
Survey extent	Land within the project footprint that was accessed during the assessment for the purpose of field survey. The survey extent is shown in Figure 1 and Figure 2 relative to the project footprint and associated IBRA subregions.
Survey unit	The unit of survey for a threatened species, consisting of IBRA subregion and vegetation formation.
TBDC	BioNet Threatened Biodiversity Data Collection
TCZ	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.
TEC	Threatened Ecological Community
The assessor	The BAM Accredited Assessor responsible for certification of this BAVR.
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. The project is proposed to be undertaken by NSW Electricity Networks Operations Pty Ltd (referred to as Transgrid).
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.
Disturbance area	An indicative area assumed for the purpose of the BAVR that would be temporarily or permanently cleared during project construction and operation. This includes land within and adjacent to the proposed transmission line subject to varying levels of physical disturbance, including the: <ul style="list-style-type: none"> – Total Clearing Zone (TCZ) – Easement Clearing Zone (ECZ) – Hazard Tree Zone (HTZ).



Term or abbreviation	Definition
	The Post-BDAR approved clearance zone mapping has been adopted for the purpose of this BAVR. Disturbance area has the same meaning as 'Development Footprint' as defined by the BAM.
VI	Vegetation Integrity as calculated by the BAM-C



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1. Introduction

1.1 Background and purpose of this report

Transgrid propose to construct around 360 kilometres (km) of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle New South Wales (NSW). This project is collectively referred to as HumeLink.

A Biodiversity Development Assessment Report (BDAR) was prepared in June 2023 addressing project requirements under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A revised BDAR was subsequently prepared in May 2024 addressing project submissions and proposed design amendments. Biodiversity impacts and offset requirements were finalised within the Biodiversity Assessment Method (BAM) Calculator in September 2024. Project approval was granted on 13 November 2024 (SSI-36656827). Commonwealth approval under the EPBC Act was granted on 18 December 2024 (2021/9121).

Niche has been engaged by Transgrid to undertake supplementary biodiversity surveys addressing the scope outlined in Section 1.1. This report documents the outcomes of the supplementary surveys and is intended to satisfy the requirement for a Biodiversity Assessment Verification Report (BAVR) under condition B29 of the CSSI approval (Section 1.3).

1.2 Scope of supplementary surveys

Supplementary surveys undertaken for the project are intended to:

- Address the Supplementary Biodiversity Strategy (SBS) prepared by Transgrid in accordance with condition B28 of the instrument of approval.
- Validate the extent and likelihood of Serious and Irreversible Impacts (SAII)
- Validate the extent and significance of impacts to Matters of National Environmental Significance (MNES)
- Inform additional opportunities for impact avoidance and minimisation
- Inform additional requirements for the protection and management of biodiversity, to be addressed within the Biodiversity Management Plan.
- Reduce the offset liability for the project.

1.3 BAVR requirements

Condition B29 requires that:

- *'Unless otherwise agreed by the Planning Secretary, prior to carrying out any development that would impact on the relevant biodiversity values subject to survey in the SBS (excluding Enabling Works, if the relevant requirements of this condition are adequately addressed in the Enabling Works Management Plan of condition B64), Transgrid must prepare a BAVR in consultation with CPHR and to the satisfaction of the Planning Secretary'.*

Table 3 below documents the BAVR requirements, as outlined in Condition 29 of the CSSI approval, and notes relevant sections of this report where these matters have been addressed.



Table 3: Requirements of Condition B29

Condition B29 requirement	Where addressed in the BAVR
The BAVR must:	
be prepared by a suitably qualified, experienced and independent biodiversity consultant with Biodiversity Assessment Method (2020) (BAM) Accreditation whose appointment has been endorsed by the Planning Secretary;	<p>DPHI approved Niche as the independent Accredited Assessor provided a further suitably qualified, experienced and more independent assessor was appointed to peer review the BAVR.</p> <p>Adam Cavallaro (BAM Assessor Accreditation number BAAS18056) has been approved by DPHI on 23 March 2025 as the peer reviewer and has been engaged to conduct the review.</p> <p>A letter report of Adam's findings is provided in Annex 1 of this BAVR, with a cross-referenced table illustrating how Transgrid have incorporated the peer review feedback into the BAVR.</p>
be prepared in accordance with the Biodiversity Assessment Method (2020) and any other guidance document that is relevant and applicable at the time surveys were undertaken or the BDAR was prepared;	Unless otherwise approved within the SBS, the supplementary survey methods and effort have addressed the BAM 2020, relevant threatened species guidelines, the Threatened Biodiversity Data Collection (TBDC) (NSW DCCEE, 2024b) and feedback from CPHR where relevant. Table 5 addresses compliance with Section 5.2 of the BAM specifically.
be prepared with regard to the final layout plans for the development required under condition C8, including the location of final access routes within each clearing zone and stockpile locations;	<p>The Final Layout Plans are:</p> <ul style="list-style-type: none"> – Being prepared by the HumeLink delivery partners at different stages of construction – Will only become available immediately prior to construction in each relevant location – Will be in draft at the time of preparation, submission and approval of the BAVR <p>As a result, Transgrid will prepare an initial BAVR to resolve the outcomes of surveys undertaken in accordance with conditions B28, within the approved project area. A revised BAVR will be submitted when the final layout plans are available.</p> <p>This approach is outlined in Section 1.4 and has been approved by DPHI in the Condition B28 Supplementary Biodiversity Strategy on 6 June 2025.</p>
include:	Supplementary survey outcomes are documented in Section 4.
– detail of the outcomes of surveys undertaken in accordance with condition B28;	
– where species are found to be present following the surveys undertaken under condition B28 or that are assumed to be present, identify measures to avoid and / or mitigate the impact to those entities for inclusion in a revised version of the Biodiversity Management Plan required under condition B30;	Recommendations for avoiding and mitigating impacts to known and remaining assumed present is provided in Section 9.1. These measures are to be included in an amended version of the Biodiversity Management Plan for the project.
– provide findings and recommendations relating to the matters in (d), including, but not limited to, reducing the relevant credit obligations and calculating credit obligations for unexpected finds.	Recommendations in relation to offsets are provided in Section 9



Condition B29 requirement	Where addressed in the BAVR
Any required changes to biodiversity offset or mitigation measures arising from the Biodiversity Assessment Verification Report must be incorporated into an updated version of the Biodiversity Offset Package under condition B26 in consultation with CPHR and BCT and addressed in a revised version of the Biodiversity Management Plan required under condition B30, in consultation with CPHR and FCNSW, to the satisfaction of the Planning Secretary.	Any updates to the credit liability will be based on survey results from an approved Verification Report/s and corresponding BAM-C case. BOP updates will also include any changes to credit liability for indirect and prescribed impacts based on revised species polygons. Section 9.1 outlines the process for updating the credit liability.

1.4 BAVR Revisions

The initial BAVR presents the outcomes of supplementary surveys undertaken in accordance with the approved Condition B28 Supplementary Biodiversity Strategy. These surveys were completed within the approved project area reported in the BDAR. The results and outcomes, provided as species polygons and supporting spatial data, were reviewed by CPHR and represent the agreed outcomes for all relevant species. The initial BAVR was also subject to independent peer review (refer to Section 1.5) to confirm consistency with the commitments of the Supplementary Biodiversity Strategy.

Accordingly, the initial BAVR includes the following:

- Confirmation of the candidate species subject to supplementary surveys.
- Survey methods, timing, and effort.
- Survey results.
- Assessment of direct and indirect impacts based on the approved project layout as documented in the BDAR, including a comparison to the approved clearing limits referred to in Condition B25.
- Review of the extent and likelihood of Serious and Irreversible Impacts (SII) and impacts to Matters of National Environmental Significance.
- Provide recommendations regarding:
 - additional mitigation measures to be incorporated into the BMP,
 - management of unexpected finds, and
 - finalising project impacts and relevant credit obligations.

Transgrid may identify opportunities for additional supplementary surveys prior to carrying out development that would impact on the relevant biodiversity values. However, additional supplementary surveys may only be undertaken for the purposes of Conditions B28 and B29 where:

- CPHR have been notified of, and agree to, the proposed supplementary surveys.
- Evidence is provided to CPHR confirming that development impacting the relevant biodiversity values has not commenced.
- Surveys have not yet been completed, or were inconclusive, due to one of the following:
 - property access restrictions during a species-specific survey period,
 - unsuitable weather conditions impacting the surveys completed to date, or
 - reference population checks for flowering periods and survey timing were inconclusive.
- Additional surveys are recommended as part of the mitigation measures identified in an approved BAVR.

Where these pre-conditions are satisfied, the outcomes of the additional surveys must be incorporated into an updated version of the BAVR (Approved Project Area) in consultation with CPHR. The updated version of the BAVR must also be peer reviewed and resubmitted to the Planning Secretary for approval prior to development that would impact the relevant biodiversity values.



BAVR Revision (Final Layout Plans)

Once the Condition C8 Final Layout Plans have been submitted for all locations, the BAVR based on the approved project area must be immediately revised to incorporate the Final Layout Plans and to fulfil the requirements of Condition B29.

Accordingly, the revised BAVR will include the following:

- Assessment of direct and indirect impacts based on the Final Layout Plans required under Condition C8, including a comparison to the approved clearing limits referred to in Condition B25, with any proposed increase to clearing limits subject to agreement by the Secretary.
- Revised measures to avoid and/or minimise impacts to recorded and assumed present species, where required.
- BAM-C updates to inform credit liability reductions, calculations for unexpected finds, and subsequent revisions to the Biodiversity Offset Package (BOP).

This revision must be based on the agreed results and outcomes approved in the initial BAVR (approved project area) and must not incorporate the results or outcomes of any new supplementary surveys.

1.5 Additional peer review

Transgrid have commissioned Adam Cavallaro to undertake an additional peer review on the second draft of the BAVR to ensure all comments provided under draft 1 have been adequately addressed & that the BAVR complies with condition B29 & the BAM.

Adam has also conducted a final peer review of Owl polygons which is attached in Annex 1.



1.6 Conservation Programs, Heritage and Regulation Division consultation

Formal (i.e. meetings) and informal (i.e. emails and phone discussions) consultation was carried out with the Conservation Programs, Heritage and Regulation (CPHR) Division (formerly BCS) in relation to the proposed survey approach, methods and effort. An overview of consultation items and outcomes is provided below and formal meeting minutes and email correspondence provided in Annex 3.

Table 4: Formal CPHR consultation log

Meeting Date	Attendees	Objectives	Discussions	Outcomes
28 August 2024	Angie Jenkins (CPHR), Anna Murphy (CPHR), Tuesday Heather (Transgrid), Christine Lussier (Transgrid), Chani Wheeler (Niche), Thea Kane (Niche)	Discuss survey methodology for orchids	It was discussed that not all orchid species will have the same responses to ecological factors and that surveys will be based on the flowering of reference populations. It was also discussed that despite species polygons being created, not enough research has been completed to rule out heavily grazed land.	Survey as per TBDC and survey method to be discussed further with experts.
4 October 2024	Angie Jenkins (CPHR), Chani Wheeler (Niche), Thea Kane (Niche)	<i>Acacia flocktoniae</i>	Niche sought confirmation to undertake survey in October, outside the approved survey period for the species. Advice from expert Steve Douglas was provided by CPHR indicating survey could proceed and could be limited to PCT 870 in Bungonia IBRA subregion provided any potential species were sent to the herbarium for identification confirmation.	October survey for <i>Acacia flocktoniae</i> approved. PCT 1150 and PCT 1330 could be excluded from further consideration with supplementary surveys to be limited to potential habitats within PCT 870.
23 October 2024	Angie Jenkins (CPHR), Nat O'Rourke (CPHR), Damon Oliver (CPHR), Allie Cash	Discuss the reporting format and content and gain feedback on survey	It was discussed that a report detailing supplementary surveys will be provided to CPHR (the BAVR). This report will act as a follow up to the BDAR.	Niche to outline proposed survey methodology for all discussed species and CPHR to provide feedback.



Meeting Date	Attendees	Objectives	Discussions	Outcomes
	(DPIE), Tuesday Heather (<i>Transgrid</i>), Chani Wheeler (<i>Niche</i>), Thea Kane (<i>Niche</i>)	methodology and approach to species polygon.	<p>Supplementary surveys will be located in strategic landholding to cover the most suitable habitat and IBRA subregions. Species and their survey methods discussed in this meeting includes:</p> <p>Koala: SATs, Songmeters, Thermal drones, scat surveys</p> <p>Eastern Pygmy-possum: CPHR to confirm that 100 trap nights/50 ha to be used and more surveys to be completed in poorer condition habitats (where surveyed) to increase chance of detection</p> <p>Brush-tailed Phascogale: Niche were advised by a Brush-tailed Phascogale specialist that one camera/ha for min four nights is an acceptable survey method.</p> <p>Superb Parrot: Meeting minutes 23/10/2024: General advice for projects is one hour of diurnal bird survey per 50ha. For contiguous woodland with suitable hollows this is a reasonable amount of time. Best practice would be within 4 hours of sunrise, and the last few hours before sunset if necessary. Where two or more birds detected, active nesting observed (or fledged young), additional stagwatching survey to be undertaken or breeding assumed in potential roosts intersecting with that location.</p> <p>Gang-gang Cockatoo: 12hours per 4 days/50ha of diurnal surveys proposed</p> <p>South-eastern Glossy Black-Cockatoo: dams and water points to be found and birds to be surveys at dusk and followed back to nest tree</p>	
18 December 2024	Angie Jenkins (CPHR), Nat O'Rourke (CPHR), Damon Oliver (CPHR), Allie Cash (CPHR), Tuesday Heather (<i>Transgrid</i>), Chani Wheeler (<i>Niche</i>), Thea Kane (<i>Niche</i>)	Gain feedback on survey methodology and approach to species polygon.	<p>Further supplementary surveys required for the BAVR and their requirements was discussed and included:</p> <p>Threatened Owls: Surveys confirmed to occur in areas with associated PCTs (woody vegetation present only) where potential suitable breeding habitat was confirmed or assumed present (for inaccessible lands) within the project footprint. It was also confirmed that a 300m buffer will be applied to potential breeding features (i.e. hollows) to delineate the extent of suitable habitats associated with the species polygon.</p> <p>Threatened Raptors: Where gaps in marked HBTs and stick nest was identified, areas that could support stick nests was mapped using LiDAR. HBTs will continue to be marked across the project footprint up until construction begins. Identified suitable stick nests will be revisited during the breeding season to confirm whether the nests are active.</p>	<p>Identified potential raptor nests will be revisited during the breeding season to confirm whether the nests are active or disused.</p> <p>Niche to revise the Brush-tailed Phascogale survey plan and CPHR to provide feedback.</p>



Meeting Date	Attendees	Objectives	Discussions	Outcomes
			<p>Koala: Rapid SATs were not approved and as such, standard SATs were to be implemented as the primary scat-based survey method for Koala.</p> <p>Brush-tailed Phascogale: CHPR rejected one camera per hectare. Given the number of cameras required to meet the TBDC, an alternative approach adopting less cameras but increasing the survey duration was proposed. A survey plan documenting the revised survey effort proposed for 88.1 ha of dry sclerophyll forest habitat was submitted to CPHR for approval (addressing a minimum of two cameras / ha for min four weeks within target habitats).</p>	
19 June 2025	Angie Jenkins (CPHR), Nat O'Rourke (CPHR), Damon Oliver (CPHR), Allie Cash (CPHR), Tuesday Heather (Transgrid), Chani Wheeler (Niche), Thea Kane (Niche)	Review survey methods, discuss data	<p>Severely burnt lands: Relevant fauna (particularly threatened owls) species polygons are not to have a survey effort reduction applied, even where survey effort has been adequate and undertaken in adjacent lands not severely burnt.</p> <p>Access limitations: To be clearly addressed and visualised within the BAVR. It must be clear the proportion of lands that have not been accessed at any time.</p> <p>Orchid specialists: To be included as co-authors on the BAVR to simplify approval processes.</p> <p>Targeted threatened flora surveys: Where surveys targeted greater than five species per growth form, these are to be identified and justified within the BAVR.</p>	Niche have adopted the discussed items within the BAVR.



1.7 BAM Checklist

This BAVR has been developed in accordance with Section 5.2, 5.3, 8.4, 8.5, 9.1 and 10.1.3 of the BAM. All survey methods provided in Section 2.4.2 and Section 2.5.1 of this report have been reviewed and approved within the SBS. Table 5 documents the relevant steps of the BAM and where these have been addressed within this report.

Table 5: BAM checklist

BAM Section	BAM requirement	Where addressed in the BAVR
5.2.1: Identify threatened species for assessment (Step 1)	<p>Step 1 identifies the threatened species that are likely to occur on or use the subject land and thereby predicts the species that require assessment.</p> <p>This step uses information from the TBDC (which is automatically populated in the BAM-C) and can manually apply new relevant geographic limitations, which are based on information from the BioNet Atlas, and accessed through the Department's Threatened biodiversity profile search webpage.</p> <p>The assessor must use the following criteria to identify those threatened species that have or may have, suitable habitat on the subject land:</p> <ul style="list-style-type: none"> – the distribution of the species includes the IBRA subregion within which the subject land is mostly located – the subject land is within any geographic limitations of the species distribution within the IBRA subregion. If no geographic limitations are listed for the species, then this step is not applicable – the species is associated with any of the PCTs occurring within the subject land – the native vegetation cover within the assessment area is equal to, or greater than, the minimum class needed for the species (unless the proposal is, or is part of, a linear-shaped development proposal) – the patch size (associated with the relevant vegetation zone) is equal to, or greater than, the minimum specified for that species – the species is identified as being assessed for ecosystem credits or species credits in the TBDC. <p>Not all of the criteria in (2.a-2.f.) are relevant to every species. A criterion is considered to be not relevant if the species' profile in the TBDC does not contain information for that criterion. For example, native vegetation cover (criterion d) and patch size (criterion e) are generally not relevant criteria for the assessment of threatened flora species.</p> <p>(Note: Geographic limitations are not reported in the TBDC and instead are located on the threatened biodiversity profile webpage. Many threatened species do not have information on geographical limitations.)</p> <p>A threatened species is identified as requiring assessment if all the criteria relevant for the species in (2.a-2.f.) are met. Species that meet all the relevant criteria are automatically populated in the BAM-C to be assessed either for ecosystem credits or species credits.</p> <p>If any one of the criteria (2.a-2.f) relevant to the threatened species is not met, the subject land should be considered as unsuitable habitat for that species. No further assessment is required for that species.</p> <p>If any past surveys of the subject land have recorded the presence of a threatened species or it has been incidentally observed on site, the species must be assessed in accordance with Steps 2-6 below, regardless of whether the relevant criteria in (2.) have been met.</p>	Section 2.1, Section 2.2 and Section 4.1



BAM Section	BAM requirement	Where addressed in the BAVR
	If a vegetation zone covers more than one IBRA subregion, the IBRA subregion in which most of the proposal occurs must be used. For linear-shaped proposals, the assessor must assess the habitat suitability for each IBRA subregion separately	
5.2.2 Assess the habitat constraint and vagrant species on the subject land (step 2)	<p>Where a threatened species meets all relevant criteria in Subsection 5.2.1(2.) or (6.), the assessor may evaluate the habitat constraints required by that species on the subject land, to further refine the list of threatened species for assessment. (Note that dual credit species may have different habitat constraints for each credit class (e.g. habitat constraints for breeding habitat which is a species credit component). The assessor must use the habitat constraints identified for individual threatened species in the TBDC (and automatically populated in the BAM-C). If the TBDC does not list habitat constraints for the species, then this step is not applicable.)</p> <p>The assessor may consider that a threatened species is unlikely to occur on the subject land or in a vegetation zone if:</p> <ul style="list-style-type: none"> – the assessor determines that none of the habitat constraints for the species are present in a vegetation zone. No further assessment is required for that species in that vegetation zone. The assessor must record their reasoning for this determination in the BAR, or – the assessor determines that none of the habitat constraints for the species are present on the entire subject land. No further assessment is required for that species. The assessor must record their reasoning for this determination in the BAR, or – the species is a vagrant in the IBRA subregion. No further assessment is required. The assessor must record their reasoning for this determination in the BAR. – If the assessor determines that one or more of the habitat constraints is present on the subject land or in a vegetation zone, they must assess that threatened species further. <p>All remaining threatened species identified for the proposal in the BAM-C as: ecosystem credit species are considered likely to have suitable habitat on the subject land and must be assessed for the impacts of the proposal in Stage 2 (unless it is a proposed biodiversity stewardship site), including measures taken to avoid, minimise and mitigate impacts. These species are referred to as 'predicted species' in the BAM-C and the assessor must calculate ecosystem credits to offset any residual impacts</p> <p>species credit species are likely to have suitable habitat on the subject land. They are referred to as 'candidate species credit species' in the BAM-C and require further assessment in accordance with Step 3 below.</p>	Section 2.3 and 4.2
5.2.3 Further assessment of candidate species credit species (Step 3)	<p>Further assessment of candidate species credit species is optional for a proposed biodiversity stewardship site; however, to create species credits for a proposed biodiversity stewardship site, Steps 3-6 must be undertaken</p> <p>A candidate species credit species is considered unlikely to occur on the subject land (or specific vegetation zones) if one of the following applies:</p> <p>After carrying out a field assessment:</p> <ul style="list-style-type: none"> – The assessor determines that microhabitats required by a species are absent from the subject land (or specific vegetation zone). The assessor must include a description of the microhabitats assessed as being required by the species in the BAR. This must be based on evidence such as published literature, or 	Section 2.3 and Section 4.3



BAM Section	BAM requirement	Where addressed in the BAVR
	<ul style="list-style-type: none"> – The assessor determines that the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones) – An expert report (prepared as per Box 3) states that the species is unlikely to be present on the subject land or specific vegetation zones – A candidate species credit species that does not have suitable habitat as per (2.a.) or (2.b.) does not require further assessment. – The assessor must provide their reasons for determining a candidate species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) in the BAR. 	
5.2.4 Determine the presence of a candidate species credit species (Step 4)	<p>The assessor must determine whether each remaining candidate species credit species is present on the subject land (or specific vegetation zone).</p> <p>To determine presence, the assessor must:</p> <ol style="list-style-type: none"> assume the species is present. This is permitted for all proposals except a proposed biodiversity stewardship site (assessors cannot assume a species is present on a biodiversity stewardship site), or conduct a threatened species survey, as per Section 5.3, or obtain an expert report, as per Box 3, or for candidate species including dual credit species, where the TBDC indicates that an important habitat map identifies the species credit component, the assessor must confirm whether the subject land is within an area identified on the important habitat map. <p>A species must be assessed further in accordance with Steps 5 and 6 below if:</p> <ol style="list-style-type: none"> the survey, expert report or important habitat map confirms that the species is present or is likely to use suitable habitat on the subject land or specific vegetation zones, or the species assumed to be present (except for a proposed biodiversity stewardship site). <p>A species must be assessed further in accordance with Steps 5 and 6 below if:</p> <ol style="list-style-type: none"> the survey, expert report or important habitat map confirms that the species is present or is likely to use suitable habitat on the subject land or specific vegetation zones, or the species assumed to be present (except for a proposed biodiversity stewardship site). <p>No further assessment is required for a species if the survey or expert report confirms that it is not present, or is unlikely to be present, on the subject land. The expert report must be included in the BAR.</p>	Section 4.4 and Section 5.1
5.2.5 Determine the area or count, and location of suitable habitat for a species credit species (a species polygon) (Step 5)	<p>A species polygon must be prepared in accordance with Box 2 for each species credit species if:</p> <ol style="list-style-type: none"> a survey, expert report or important habitat map confirms that the species is present or is likely to use suitable habitat on the subject land, or the species is assumed to be present (except for a proposed biodiversity stewardship site). <p>For fauna species, and flora species assessed by area (as per the TBDC), the species polygon is used to measure the area of suitable habitat on the subject land.</p> <p>For flora species assessed by a count of individuals (as per the TBDC), the targeted survey or expert report is used to estimate the number of individuals and their location (or the location of a group of individuals) on the subject land. The species</p>	Section 4.4 and Section 5



BAM Section	BAM requirement	Where addressed in the BAVR
	<p>polygon must be established by adding a 30 m buffer around the individuals or groups of individuals on the subject land.</p> <p>Where a species is assumed to be present on the subject land (except for a proposed biodiversity stewardship site), the assessor may use:</p> <ol style="list-style-type: none"> an expert report (as per Box 3) to determine the location and area of the species polygon. The expert report must be used to identify the area of habitat for the species, or for species assessed by count, to identify the likely location and estimated number of individuals, or the area supporting the habitat constraints relevant to the species in the vegetation zone(s) as the species polygon for species assessed by area, or the entire vegetation zone(s) the species is predicted to occur within (based on Steps 1-4) as the species polygon for species assessed by area (when no habitat constraints were identified in Subsections 5.2.1 and 5.2.2). <p>The species polygon for a species identified in Subsection 5.2.4 (2.d.), must include the entire area mapped on the important habitat map that occurs within the subject land.</p> <p>The boundary of the species polygon must be finalised when the species survey or expert report is completed.</p> <p>For proposed biodiversity stewardship sites, the species polygon may be extended to incorporate new areas where appropriate management actions are used to restore suitable habitat for the species.</p> <p>The BAR must include a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon.</p>	
5.2.6 Determine the habitat condition within the species polygon for species assessed by area (Step 6)	<p>The assessor must determine the habitat condition within the species polygon by using the vegetation integrity score for each vegetation zone that is wholly or partially within the species polygon.</p> <p>Different areas of the species polygon may have different habitat conditions if the species polygon encompasses multiple vegetation zones.</p> <p>Where the species polygon contains an area of land that is not part of a vegetation zone, the assessor must not use a vegetation integrity score to determine the habitat condition of this area. Such areas can include non-native vegetation, caves, rock outcrops, rock faces or bridges. These features are assessed in Chapter 6 as prescribed biodiversity impacts for development, activity, clearing or biodiversity certification proposals.</p>	Habitat condition will be assessed in the BAM Calculator according to the vegetation zones that intersect with habitats and their associated vegetation integrity scores. This will be addressed by Revision 1 of the BAVR prepared to the Final Layout Plans.
5.3 Threatened species survey requirements	<ol style="list-style-type: none"> The assessor must perform a targeted species survey for all candidate species credit species identified as likely to occur on the Subject Land (based on Steps 1-3 of Subsection 5.2.1 – 5.2.3) unless: <ol style="list-style-type: none"> an expert report has been obtained for the species, prepared in accordance with Box 3, or the species is assumed to be present. A species can be assumed present on land for all proposals except biodiversity stewardship sites. an important habitat map has been prepared for the threatened species. If undertaking a species survey the assessor must: 	Section 2.4 and Section 2.5



BAM Section	BAM requirement	Where addressed in the BAVR
	<ul style="list-style-type: none"> d. only survey during the time specified for that species in the TBDC, unless there is clear justification to vary the timing and the reasoning is documented in the BAR. e. comply with the Department's threatened species survey guides published by the Secretary of the Department or anyone authorised by the Secretary. f. use best-practice methods that can be replicated for repeat surveys, if the Department has not published any relevant guides. The TBDC often provides information on appropriate survey methods and effort. <p>3. The BAR must describe the timing, methods and effort used for species survey.</p>	
8.4 Mitigate and manage impacts on biodiversity values	<p>1. The proponent must identify measures to mitigate and manage impacts. Guidelines for mitigating and managing impacts on biodiversity values are in Subsections 8.4.1 and 8.4.2.</p> <p>2. The BDAR or BCAR must:</p> <ul style="list-style-type: none"> a. document mitigation measures proposed to manage impacts, including techniques, timing, frequency and responsibility for implementing each measure b. identify any measures for which there is risk of failure c. evaluate the risk and consequence of any impacts likely to remain after mitigation measures are applied d. document any proposed adaptive management strategies, including: <ul style="list-style-type: none"> i. baseline data against which monitoring will occur ii. any seasonal changes to the resource that are relevant to the impacts being monitored iii. monitoring methods, including frequency, timing and reporting iv. trigger values for when adaptive management actions should be initiated v. adaptive management actions proposed to reduce or eliminate the impact, which may include actions to retire additional biodiversity credits vi. information that will be necessary to measure the impact over time vii. how the results of the adaptive management strategy will be applied to the ongoing management of the proposal to reduce the extent of indirect and/or prescribed impacts. 	Section 7.1, Section 9.1 and Annex 12
8.5 Adaptive management for uncertain biodiversity impacts	<p>1. An adaptive management plan can be used to address impacts that are infrequent or difficult to measure. These include indirect or prescribed impacts, or other remaining biodiversity impacts.</p> <p>2. The proponent must develop an adaptive management plan to address any remaining impacts where mitigation measures in Section 8.4 have not been proposed in the BDAR or BCAR.</p> <p>3. Adaptive management plans can be predictive, based on existing literature and a best analysis of the potential biodiversity impacts, including the timing and extent of the impact.</p> <p>4. An adaptive management plan must identify and describe:</p> <ul style="list-style-type: none"> a. the threatened species and/or TECs likely to be impacted b. a monitoring program of sufficient scope and duration to provide data that can inform when direct and indirect impacts on biodiversity occur. For example, a monitoring program for a wind farm development would include survey of aerial and migratory species undertaken across multiple seasons prior to the planning and construction phase. The surveys are then 	Annex 12



BAM Section	BAM requirement	Where addressed in the BAVR
	<p>repeated for the first two years of the operational phase and for another two years at the 10-year mark</p> <ul style="list-style-type: none"> c. thresholds or triggers associated with the monitoring program that identify when a prescribed impact has occurred or is likely to occur. The adaptive management plan should include justification for which of these will trigger the implementation of adaptive management actions d. suite of potential adaptive management actions to be implemented during the construction or operational phases. The management actions can be targeted at minimising or mitigating the prescribed impact, or in response to meeting or exceeding a threshold or trigger. <p>5. An adaptive management plan should also consider, where appropriate:</p> <ul style="list-style-type: none"> a. relevant literature to inform and guide adaptive management, and support predictions about short-term and long-term biodiversity impacts b. that the monitoring program and the implementation of management actions may extend into the construction and/or operational phase of the proposal c. the proposed measures to address the residual prescribed impacts on threatened species or TECs during the construction or operational phases. These measures address uncertain biodiversity impacts and may include the retirement of biodiversity credits to offset the impacts in accordance with Section 10.1 d. any other conservation measures, including the retirement of biodiversity credits. <p>6. An adaptive management plan for impacts related to subsidence and upsurge resulting from underground mining should be in line with the Addendum to NSW Biodiversity Offsets Policy for Major Projects: upland swamps impacted by longwall mining subsidence and include:</p> <ul style="list-style-type: none"> a. measures to secure biodiversity credits to fulfil the maximum predicted offset liability b. a strategy for monitoring changes to groundwater and secondary environmental consequences c. a strategy for delivering offsets that are commensurate with monitoring results d. any other measures proposed to mitigate potential impacts. <p>7. The BDAR or BCAR must outline the adaptive management strategy proposed for minimising uncertain impacts.</p>	
9.1 Assessment for serious and irreversible impacts on biodiversity values	<ul style="list-style-type: none"> 1. The determination of a serious and irreversible impact on biodiversity values is to be made by the decision-maker in accordance with the principles set out in the BC Regulation. 2. To assist the decision-maker, the document Guidance to assist a decision-maker to determine a serious and irreversible impact includes criteria that enable the application of the four principles set out in clause 6.7 of the BC Regulation to identify the species, populations and ecological communities that are likely to be at risk of SALLs. 3. The assessor must identify every threatened entity at risk of an SALL that would be impacted by the proposal. 4. The assessor may identify any other threatened entity impacted by the proposal that is likely to be at risk of an SALL, in accordance with the four principles in the BC Regulation. 	Section 2.1.1, Section 2.1.2 and Section 7



BAM Section	BAM requirement	Where addressed in the BAVR
	<p>5. A decision-maker may require an assessor to include an assessment of additional threatened entities that are at risk of an SAll other than those identified in the BAM-C as part of a proposal.</p> <p>6. To assist the decision-maker to evaluate the extent and severity of the impact on an entity at risk of an SAll, the BDAR or BCAR must contain details of the assessment of SAlls, in accordance with the criteria set out in Subsection 9.1.1 for impacts on each TEC and in Subsection 9.1.2 for each threatened species. All criteria must be addressed for each TEC or threatened species at risk of an SAll and likely to be impacted by the proposal.</p>	
10.1.3 Calculate the required species credits for direct impacts on candidate species	<p>1. The direct impact of the proposal on the candidate species and their habitat determined to be present must be measured using species credits.</p> <p>2. For fauna and flora species assessed by area, the assessor must use Equation 2, within the BAM-C, to calculate the number of species credits, according to the area and condition of suitable habitat identified by the species polygon (Subsection 5.2.5).</p> <p>Equation 2 Determine the number of fauna species credits or flora species credits required for the impact of development, activity, clearing or biodiversity certification</p> <p><i>Number of fauna or flora species credits required = $[\sum_n = (HC_i \times HL_i)] \times BRW \times 0.25$</i></p> <p><i>where:</i></p> <p><i>HC_i = the condition of fauna or flora habitat within each vegetation zone (or portion thereof) which occurs within the ith species polygon</i></p> <p><i>HL_i = the area of habitat within each vegetation zone (or portion thereof) which occurs within the ith species polygon for the development site or biodiversity certification proposal, prepared in accordance with Box 2</i></p> <p><i>HC_i x HL_i is summed for each vegetation zone (or portion thereof) which occurs within the ith species polygon</i></p> <p><i>BRW = the biodiversity risk weighting for the species as set out in the TBDC</i></p> <p>3. For flora species assessed by a count of the number of individuals, the assessor must use Equation 3, within the BAM-C, to calculate the number of species credits, according to the number of individuals in the species polygon (Subsection 5.2.5).</p> <p>Equation 3 Determine the required number of flora species credits for the impact of development, activity, clearing or biodiversity certification</p> <p><i>Number of flora species credits required = HI x BRW</i></p> <p><i>where:</i></p> <p><i>HI = the number of individuals determined to be within the species polygon on the land directly impacted by the proposal, prepared in accordance with Box 2</i></p> <p><i>BRW = the biodiversity risk weighting for the threatened species as set out in the TBDC</i></p> <p>4. If the required number of species credits calculated is not a whole number, it should be rounded to the nearest whole number using conventional rounding rules. If the number being rounded is less than 1, the number of credits should be rounded to 1.</p> <p>5. The BDAR or BCAR must include the number of required species credits for each threatened species.</p> <p>6. The assessor must use the BAM-C to produce a biodiversity credit report. This report sets out the number and class of species credits that measure the direct impact of the proposal on species credit species</p>	This will be included in the revised BAVR once the final footprint has been approved.



2. Methodology

This section outlines the supplementary survey methods and effort. These address the BAM 2020 section 5, relevant threatened species guidelines, the Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW, 2024b) and feedback from CPHR where relevant (Annex 3) and as outlined in Section 3 of the Supplementary Biodiversity Strategy.

2.1 Candidate threatened species

A total of 56 threatened flora species, 31 threatened fauna species and two endangered populations were identified as candidate species subject to further assessment within the BDAR. Of these, 32 threatened flora and 17 threatened fauna were subject to further supplementary survey, as outlined in Section 2.1.1 and 2.1.2. Future reference to candidate species within this report is limited to those threatened flora and fauna species subject to supplementary survey.

Candidate flora and fauna species that will be targeted through supplementary surveys have been prioritised using the following criteria as outlined in Section 3 of the SBS:

1. All SAI entities that may be impacted by the Project
2. All MNES that are likely to be significantly impacted by the Project (as identified in the BDAR)
3. All candidate flora with high offset cost
4. Incidental co-located candidate species with smaller offset liabilities, where possible

2.1.1 Threatened flora species subject to supplementary survey

Species targeted for supplementary surveys as part of this BAVR are documented below. Where habitat for other candidate species was co-located with targeted species, these were also opportunistically subject to targeted surveys. Candidate threatened flora species subject to supplementary survey (initial BAVR) are listed in Table 6. Section 2.4.2 addresses the supplementary survey methods adopted.

Table 6: Candidate flora subject to survey

Species	BC Act	EPBC Act	SAI	MNES likely SIA	Targeted for supplementary surveys
<i>Acacia ausfeldii</i> (Ausfeld's Wattle)	Vulnerable	Not Listed	No	N/A	No ¹
<i>Acacia bynoeana</i> (Bynoe's Wattle)	Endangered	Vulnerable	No	No	No ¹
<i>Acacia clunies-rossiae</i> (Kanangra Wattle)	Endangered	Not Listed	No	No	No ²
<i>Acacia flocktoniae</i> (Flockton Wattle)	Vulnerable	Vulnerable	No	No	Yes
<i>Ammobium craspedioides</i> (Yass Daisy)	Vulnerable	Vulnerable	No	Yes	Yes
<i>Baloskion longipes</i> (Dense Cord-rush)	Vulnerable	Vulnerable	No	N/A	No ¹
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Bossiaea oligosperma</i> (Few-seeded Bossiaea)	Vulnerable	Vulnerable	No	No	No ¹



Species	BC Act	EPBC Act	SAII	MNES likely SIA	Targeted for supplement ary surveys
<i>Caesia parviflora</i> var. <i>minor</i> (Small Pale Grass-lily)	Endangered	Not Listed	No	N/A	No ¹
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Endangered	Vulnerable	Yes	No	Yes
<i>Caladenia montana</i> (Mountain Spider Orchid)	Vulnerable	Not Listed	No	N/A	Yes
<i>Calotis glandulosa</i> (Mauve Burr-daisy)	Vulnerable	Vulnerable	Yes	No	Yes
<i>Calotis pubescens</i> (Max Mueller's Burr-daisy)	Endangered	Not Listed	No	N/A	No
<i>Carex raleighii</i> (Raleigh Sedge)	Endangered	Not Listed	No	N/A	No ²
<i>Commersonia prostrata</i> (Dwarf Kerrawang)	Endangered	Endangered	No	No	No ¹
<i>Cullen parvum</i> (Small Scurf-pea)	Endangered	Not Listed	No	N/A	Yes
<i>Dillwynia glaucula</i> (Michelago Parrot-pea)	Endangered	Not Listed	No	N/A	No ¹
<i>Diuris aequalis</i> (Buttercup Doubletail)	Endangered	Endangered	No	No	Yes
<i>Diuris ochroma</i> (Pale Golden Moths)	Endangered	Vulnerable	Yes	No	No ²
<i>Diuris tricolor</i> (Pine Donkey Orchid)	Vulnerable	Not Listed	No	N/A	Yes
<i>Eucalyptus aggregata</i> (Black Gum)	Vulnerable	Vulnerable	No	No	No ¹
<i>Eucalyptus macarthurii</i> (Paddys River Box, Camden Woollybutt)	Endangered	Endangered	No	No	No ¹
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	Vulnerable	Vulnerable	Yes	No	Yes
<i>Euphrasia scabra</i> (Rough Eyebright)	Endangered	Not Listed	Yes	N/A	No ²
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Endangered	Not Listed	Yes	N/A	Yes
<i>Glycine latrobeana</i> (Clover Glycine)	Critically Endangered	Vulnerable	Yes	No	No
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	Critically Endangered	Endangered	Yes	No	Yes
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Hakea dohertyi</i> (Kowmung Hakea)	Endangered	Endangered	No	No	No ²
<i>Kunzea cambagei</i> (Cambage Kunzea)	Vulnerable	Vulnerable	No	No	Yes
<i>Lepidium hyssopifolium</i> (Aromatic Peppergrass)	Endangered	Endangered	No	No	Yes
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	Endangered	Endangered	No	Yes	Yes
<i>Persoonia marginata</i> (Clandulla Geebung)	Vulnerable	Vulnerable	No	No	No



Species	BC Act	EPBC Act	SAII	MNES likely SIA	Targeted for supplementary surveys
<i>Persoonia mollis</i> subsp. <i>revoluta</i> (Soft Geebung)	Vulnerable	Vulnerable	No	No	No ¹
<i>Phyllota humifusa</i> (Dwarf Phyllota)	Vulnerable	Vulnerable	No	No	No ¹
<i>Pimelea bracteata</i> (Rice Flower)	Critically Endangered	Critically Endangered	Yes	Yes	Yes
<i>Pomaderris cotoneaster</i> (Cotoneaster Pomaderris)	Endangered	Endangered	No	No	Yes
<i>Pomaderris delicata</i> (Delicate Pomaderris)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Pomaderris pallida</i> (Pale Pomaderris)	Vulnerable	Vulnerable	Yes	No	Yes
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Prasophyllum keltonii</i> (Kelton's Leek Orchid)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Endangered	Endangered	No	No	Yes
<i>Pterostylis alpina</i> (Alpine Greenhood)	Vulnerable	Not Listed	No	N/A	Yes
<i>Pterostylis foliata</i> (Slender Greenhood)	Vulnerable	Not Listed	No	N/A	Yes
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Pultenaea humilis</i> (Dwarf Bush-pea)	Vulnerable	Not Listed	No	N/A	Yes
<i>Rutidosia leiolepis</i> (Monaro Golden Daisy)	Vulnerable	Vulnerable	No	No	No ²
<i>Rytidosperma vickeryae</i> (Perisher Wallaby-grass)	Endangered	Not Listed	Yes	N/A	No ²
<i>Senecio garlandii</i> (Woolly Ragwort)	Vulnerable	Not Listed	No	N/A	No ¹
<i>Solanum armourense</i>	Endangered	Not Listed	Yes	N/A	Yes
<i>Swainsona recta</i> (Small Purple-pea)	Endangered	Endangered	No	No	Yes
<i>Swainsona sericea</i> (Silky Swainson-pea)	Vulnerable	Not Listed	No	N/A	Yes
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	Vulnerable	Not Listed	No	N/A	Yes
<i>Thesium australe</i> (Austral Toadflax)	Vulnerable	Vulnerable	No	No	Yes
<i>Xerochrysum palustre</i> (Swamp Everlasting)	Not Listed	Vulnerable	No	Yes	No ¹

¹ Co-located species subject to survey, ² Species excluded during the BDAR.



2.1.2 Threatened fauna species subject to supplementary survey

Candidate threatened fauna species subject to supplementary survey as part of this initial BAVR are denoted in Table 7. Section 3 of the SBS and Section 2.5.1 of this BAVR address the supplementary survey methods adopted.

A number of species were subject to constraint mapping only due to seasonal survey constraints. The species affected are the three raptors, the Glossy Black-Cockatoo and the Large-eared Pied Bat.

Table 7: Candidate fauna subject to survey

Species	BC Act	EPBC Act	SAIL	MNES likely SIA	Targeted for supplementary surveys
<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	Vulnerable	Vulnerable	No	Yes	Yes
<i>Burhinus grallarius</i> (Bush Stone-curlew)	Endangered	Not Listed	No	No	Yes
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Endangered	Endangered	No	No	Yes
<i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	Vulnerable	Vulnerable	No	No	Constraint mapping only
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Vulnerable	Not Listed	No	No	Yes
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Endangered	Endangered	Yes	No	Yes (potential roost survey only)
<i>Crinia sloanei</i> (Sloane's Froglet)	Endangered	Endangered	Yes	No	No
<i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink)	Endangered	Endangered	No	No	Yes
<i>Delma impar</i> (Striped Legless Lizard)	Vulnerable	Vulnerable	No	No	No
<i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle)	Vulnerable	Not Listed	No	No	Constraint mapping only
<i>Hieraaetus morphnoides</i> (Little Eagle)	Vulnerable	Not Listed	No	No	Constraint mapping only
<i>Keyacris scurra</i> (Key's Matchstick Grasshopper)	Endangered	Endangered	No	No	No
<i>Litoria booroolongensis</i> (Booroolong Frog)	Endangered	Endangered	No	No	No
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Critically Endangered	Critically Endangered	Yes	No	Yes
<i>Lophoictinia isura</i> (Square-tailed Kite)	Vulnerable	Not Listed	No	No	Constraint mapping only



Species	BC Act	EPBC Act	SAII	MNES likely SIA	Targeted for supplementary surveys
<i>Mastacomys fuscus</i> (Broad-toothed Rat)	Endangered	Endangered	No	No	No
<i>Mixophyes balbus</i> (Stuttering Frog)	Endangered	Vulnerable	Yes	No	Yes
<i>Myotis macropus</i> (Southern Myotis)	Vulnerable	Not Listed	No	No	No
<i>Ninox connivens</i> (Barking Owl)	Vulnerable	Not Listed	No	No	Yes
<i>Ninox strenua</i> (Powerful Owl)	Vulnerable	Not Listed	No	No	Yes
<i>Petauroides volans</i> (Southern Greater Glider)	Endangered	Endangered	No	No	No
<i>Petaurus australis</i> (Yellow-bellied Glider population on the Bago Plateau)	Endangered	Not Listed	No	No	No
<i>Petaurus norfolcensis</i> (Squirrel Glider)	Vulnerable	Not Listed	No	No	No
<i>Petaurus norfolcensis</i> (Squirrel Glider in the Wagga Wagga City Council Local Government Area)	Endangered	Not Listed	No	No	No
<i>Petroica rodinogaster</i> (Pink Robin)	Vulnerable	Not Listed	No	No	Yes
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	Vulnerable	Not Listed	No	No	Yes
<i>Phascolarctos cinereus</i> (Koala)	Endangered	Endangered	No	Yes	Yes
<i>Polytelis swainsonii</i> (Superb Parrot)	Vulnerable	Vulnerable	No	No	Yes
<i>Pseudomys fumeus</i> (Smoky Mouse)	Critically Endangered	Endangered	Yes	No	Yes
<i>Pseudophryne corroboree</i> (Southern Corroboree Frog)	Critically Endangered	Critically Endangered	Yes	No	No ¹
<i>Synemon plana</i> (Golden Sun Moth)	Vulnerable	Vulnerable	No	No	No
<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable	Not Listed	No	No	Yes
<i>Tyto tenebricosa</i> (Sooty Owl)	Vulnerable	Not Listed	Yes	No	Yes

¹ Species excluded during the BDAR



2.2 Vegetation validation

In accordance with Step 1 of the BAM (Section 5.2), PCT validation was undertaken opportunistically within all lands subject to supplementary survey, prioritising validation on property holdings not subject to survey during the BDAR. Vegetation surveys were also prioritised within PCT 1155, which was required to be re-assigned due to a review of BAM plot data collected during the BDAR, Rapid Data Points and additional BAM plots collected during field verification.

Where vegetation observed on site was consistent with the vegetation mapping adopted for the BDAR, no data was collected. Where vegetation observed on site differed to the approved vegetation mapping, data was recorded to inform vegetation mapping updates. In the first instance, Rapid Data Points (RDPs) were undertaken, to record dominant species and cover within each stratum (canopy, midstorey and understorey). RDPs also captured photos of the vegetation and additional information, listed below:

- IBRA and subregion
- Landform pattern
- Landscape position
- Soil
- Structure (woodland, wetland etc)
- Characteristics of each stratum, including:
 - Height
 - Cover
 - Dominant, sub-dominant and present species
- Attributes in relation to the originally mapped polygon, listed as one of the following four categories to guide polygon updates post-fieldwork:
 1. Vegetation polygon and attributes are correct
 2. Vegetation polygon geometry is correct, but update attributes
 3. Attributes are correct but vegetation polygon needs to be updated
 4. Vegetation polygon and attributes incorrect, new species polygon required.

Where RDPs indicated that vegetation on the ground was different to the mapping in the BDAR, full floristic BAM plots were undertaken in accordance with Section 4.2.1 and 4.3.4 of the BAM (DPIE 2020a), which provided detailed data on species composition, structure and function which contributes to an assessment of the overall integrity of each sampled vegetation zone.

BAM plot data was analysed to determine the PCT in each sampled area, in accordance with Section 4.2 and 4.3 of the BAM, and Section 3.3.1 of the Biodiversity Assessment Method 2020 Operational Manual – Stage 1 (DPIE, 2020). Generally, this involved:

- Review of existing information for the subject land, including previous survey data, vegetation maps and information provided in the BDAR
- Quantitative analysis of the existing and new survey data (Section 4.1), and matching the outputs to a PCT

Vegetation zones were delineated in accordance with Section 5.2 and Appendix B of the BAM. Vegetation zones were defined as spatially contiguous areas of vegetation that occurred within a single PCT and exhibited similar condition, structure and disturbance history. Where variation in condition was observed within a single PCT, zones were delineated spatially and assigned a different vegetation zone.



To help inform the assignment of condition classes and refine zone boundaries, data collected from BAM floristic plots were entered into a preliminary BAM calculator to generate VI scores. Updates to vegetation zones as a result of the above process were subsequently incorporated into the vegetation map (Figure 1).

The results of vegetation validation surveys are presented in Section 4.1.

2.3 Habitat assessment and constraint mapping

Supplementary habitat assessments were undertaken in areas not previously surveyed to assess habitat suitability for subject candidate species with listed BAM habitat constraints, and to assess and map the location of broad condition of habitats and constraints for other candidate species, in accordance Steps 2 and 3 of Section 5.2 of the BAM. Assessments included:

- Hollow-bearing tree (HBT) and stick nest constraint mapping
- Field assessments and desktop review of high-resolution LiDAR data to verify:
 - The presence/ occupation of potential roosts for Large-eared Pied Bat (*Chalinolobus dwyeri*).
 - The extent of suitable rocky habitats for Pink-tailed Legless Lizard (*Aprasia parapulchella*)
- Waterway assessments to record stream and riparian vegetation characteristics and to map suitable stream (ephemeral or permanent) habitats for candidate threatened frog species subject to supplementary survey.
- Rapid habitat assessments undertaken by orchid specialists to note the presence / absence of suitable habitat for target threatened orchids.
- Opportunistic sightings and indirect evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows

More detailed methodology is provided in Table 8, including a list of candidate species for which these assessments have informed the development of species polygons. The results of the assessments are documented in Section 4.2.

Table 8: Supplementary habitat assessment methods

Habitat Assessment	Methodology	Relevant candidate species
Hollow-bearing Tree and stick nest mapping	<p>During site surveys by field ecologists, all hollow-bearing trees and stick nests suitable for the candidate species were mapped, detailing the following information:</p> <ul style="list-style-type: none"> – Tree DBH – Hollow size class – Height of the hollow from the ground – Signs of use – Vegetation information (PCT, condition, vegetation formation) – Photos of hollows/stick nests – Stick nest size <p>Where suitable stick nests were recorded, occupation for the purpose of breeding was assumed. However, it should be noted that no breeding activity was observed during survey.</p> <p>Where field surveys indicated an absence of HBTs or stick nests, a spatial polygon was collected noting the extent of land to which habitat constraints were</p>	<ul style="list-style-type: none"> – Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo) – <i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo) – <i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle) – <i>Hieraaetus morphnoides</i> (Little Eagle) – <i>Lophoictinia isura</i> (Square-tailed Kite) – <i>Polytelis swainsonii</i> (Superb Parrot) – <i>Ninox connivens</i> (Barking Owl) – <i>Ninox strenua</i> (Powerful Owl) – <i>Tyto novaehollandiae</i> (Masked Owl) – <i>Tyto tenebricosa</i> (Sooty Owl)



Habitat Assessment	Methodology	Relevant candidate species
	<p>confirmed absent. This was used to validate remaining HBT gaps as not all lands within the project footprint were accessible for survey. This methodology was only applied to lands that were not severely burnt.</p> <p>LiDAR canopy height mapping was used to address remaining HBT and stick nest data gaps in accordance with Attachment 1 Section 2.2.1 of the BDAR.</p>	
Bat Roost	<p>In accordance with the TBDC, potential breeding habitat for Large-eared Pied Bat is: <i>'PCTs associated with the species within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat.'</i></p> <p>A review of potential breeding habitats conservatively mapped via desktop methods during the BDAR phase was undertaken to inform supplementary survey requirements in accordance with BAM survey guidelines. A desktop analysis using LiDAR high-resolution imagery was first implemented to review potential karst and cliffline mapping and to assign a habitat suitability likelihood. Refinement of these areas were based on a number of factors, including a comparison of known breeding habitat features, including:</p> <ul style="list-style-type: none"> – extent of rocky outcropping – topographic relief – vegetation cover – extent of fragmentation – disturbance – broader landscape formations <p>Where imagery wasn't adequate to confirm the absence of suitable habitat attributes, the habitat was subject to further on-ground assessment (where land access was available). This incorporated visual inspections to confirm the presence/ absence of suitable habitat features and to confirm any signs of use.</p> <p>Acoustic monitoring devices (Anabats) were also deployed in proximity to potential roosts to supplement the habitat assessments. The passive ultrasonic bat detectors (Anabat Swift/ Anabat Express – Titley Scientific, Brendale 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.</p> <p>Calls were analysed using AnalookW (Version 4.7) software with reference to 'Bat Calls of NSW: Region Based Guide to the Echolocation Calls of Microchiropteran Bats' (Pennay et al., 2004).</p>	<ul style="list-style-type: none"> – <i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)



Habitat Assessment	Methodology	Relevant candidate species
Surface Rock	<p>A supplementary desktop review of BDAR surface rock mapping was initially undertaken using high-resolution LiDAR imagery to further delineate lands with suitable surface rock habitat.</p> <p>Field surveys were then carried out to verify the nature and extent of rocky habitats where land access could be facilitated.</p> <p>Where suitable surface rock was identified, opportunistic rock rolling was typically undertaken by field ecologists (subject to weather).</p> <p>An update of the surface rock constraint layer was completed post-field to incorporate field survey data and findings (refer to Section 4.2).</p>	<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)
Stream condition and microhabitat mapping	<p>Desktop analysis using LiDAR high-resolution imagery and a number of data layers such as waterways and waterbody layers and Strahler stream order mapping as per Attachment 1 of the BDAR was used to delineate the extent of potential breeding habitat for candidate amphibians which was then validated by subsequent field surveys.</p> <p>Ecologists completed a series of rapid habitat assessments and traversed accessible areas of the project boundary, along mapped water courses to confirm the presence/ absence of the following microhabitat features:</p> <ul style="list-style-type: none"> Presence of ephemeral or permanent pools Visible pollution present Presence of emerging aquatic vegetation <p>Where access for survey was not achieved, a conservative approach was adopted and its potential breeding habitats were assumed to occur.</p>	<p><i>Litoria castanea</i> (Yellow-spotted Tree Frog)</p> <p><i>Mixophyes balbus</i> (Stuttering Frog)</p>
Microhabitat mapping for threatened orchids	<p>Orchid specialists were commissioned to undertake rapid assessments within mapped habitat for threatened orchids to confirm the presence/ absence of suitable microhabitats based on their expert knowledge of occupied sites, interpretation of approved conservation and/ or listing advice and other field observations where relevant (i.e. weed invasion, erosion, etc).</p> <p>Some mapped habitats for threatened orchids noted here were excluded due to an absence of suitable microhabitat features, detailed in Section 2.4.1</p> <p>Section 3.1.2 of the SBS also addresses orchid habitat assessment, with survey methods outlined in Appendix E.</p>	<p><i>Caladenia montana</i> (Mountain Spider Orchid)</p> <p><i>Thelymitra alpicola</i> (Alpine Sun-orchid)</p> <p><i>Pterosylis oreophila</i> (Blue-tongued Greenhood)</p> <p><i>Prasophyllum bagoense</i> (Bago Leek Orchid)</p> <p><i>Prasophyllum innubum</i> (Brandy Marys Leek Orchid)</p> <p><i>Prasophyllum keltonii</i> (Kelton's Leek Orchid)</p>



2.4 Threatened flora surveys

2.4.1 Survey considerations for threatened orchids

A panel of specialist orchid consultants coordinated by Robert Humphries (EcoPlanning) was established to support with the following tasks in relation to target threatened orchid species:

- Provide strategic direction and input into the survey approach and methodology
- Undertake reference population checks to validate flowering periods and inform appropriate timing for survey (Annex 2) where possible.
- Liaise with other threatened orchid specialists regarding any target species detections or general observations associated with threatened orchid species survey activity and monitoring being undertaken within the broader locality
- Undertake targeted surveys within potential habitats situated within the HumeLink project footprint to verify species presence/ absence.
- Verify the identity of any orchid species detected during field surveys.

2.4.2 Threatened flora survey methods and timing

Threatened flora surveys were undertaken in accordance with BAM Section 5.2.3 & 5.2.4 from September 2024 to February 2025 using the parallel field traverse approach as set out in the BAM *Guideline for Surveying threatened plants and their habitats* (DPIE 2020b) and in Section 3 & Appendix E of the SBS.

Parallel field traverses were limited to the project footprint and prioritised the survey of lands within the easement buffer which comprised the 70m easement area plus an additional 30m buffer either side (i.e. up to 130 metres wide in places where the easement did not abut the edge of the project area) (Plate 1). In some instances, off-easement access tracks were also prioritised for survey. Survey was not conducted in the outer project footprint to maximise coverage of target species within lands subject to highest risk of impact with the field resources and time available.

Each traverse was conducted at a slow, deliberate walking pace (10 meters per minute) by a single ecologist, following BAM (DPIE 2020a) guidelines to ensure accurate plant species recording within the transect. 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). Transect spacing was adjusted based on habitat density and the growth form of candidate flora species being targeted, as noted in Table 9.

A total of 24 of 614 (4% of count, 5% of total traverse length) parallel traverses were undertaken where the total number of species targeted per growth form exceeded the recommended maximum of five species (described in Section 5.1 of the *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method*). In the case of these traverses, multiple species in the same genus (i.e. *Swainsona*) or with very similar morphology (i.e. *Prasophyllum* spp.) were targeted to avoid overloading field teams. Annex 7 presents a list of target flora for each parallel traverse, including justification for where target species exceeded the guideline recommendations. This approach was discussed with CPHR during consultation undertaken on 19 June 2025.

In addition to systematic surveys, field teams were also opportunistically searching and recording any threatened flora species when traversing between sites. In accordance with the approved BDAR methodology, an opportunistic survey reduction has been applied to habitats in proximity to survey tracks, broadly within:

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



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

Flora surveys were generally undertaken in accordance with approved BAM survey periods as outlined in the TBDC. The timing of survey for each flora species is presented in Table 11, including justification for any deviations from TBDC requirements where relevant.

Where threatened flora species were detected, survey principles were consistent with the requirements of Section 5.3 of the BAM and Section 5.2 of the *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020).

Where count species were recorded in low abundance, individual plants were recorded as a point using hand-held GPS to ensure accurate spatial data capture. Where threatened count species were recorded in high density (i.e., greater than 50 stems), the mean density was extrapolated by sampling over the observed area of occupancy in accordance with the method described in Section 5.2.2 of the *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020).

Table 9: Survey distance from traverses by vegetation density and growth form

Growth Form	Open vegetation		Closed vegetation	
	Traverse width	Buffer applied to centerline	Traverse width	Buffer applied to centerline
Tree	40 m	20 m	20 m	10 m
Shrub	20 m	10 m ¹	10 m	5 m
Grass, Forb, Orchid	10 m	5 m	5 m	2.5 m

¹ When surveying for shrubs in open vegetation, a 15m buffer can be applied to the centerline (Annex 3)

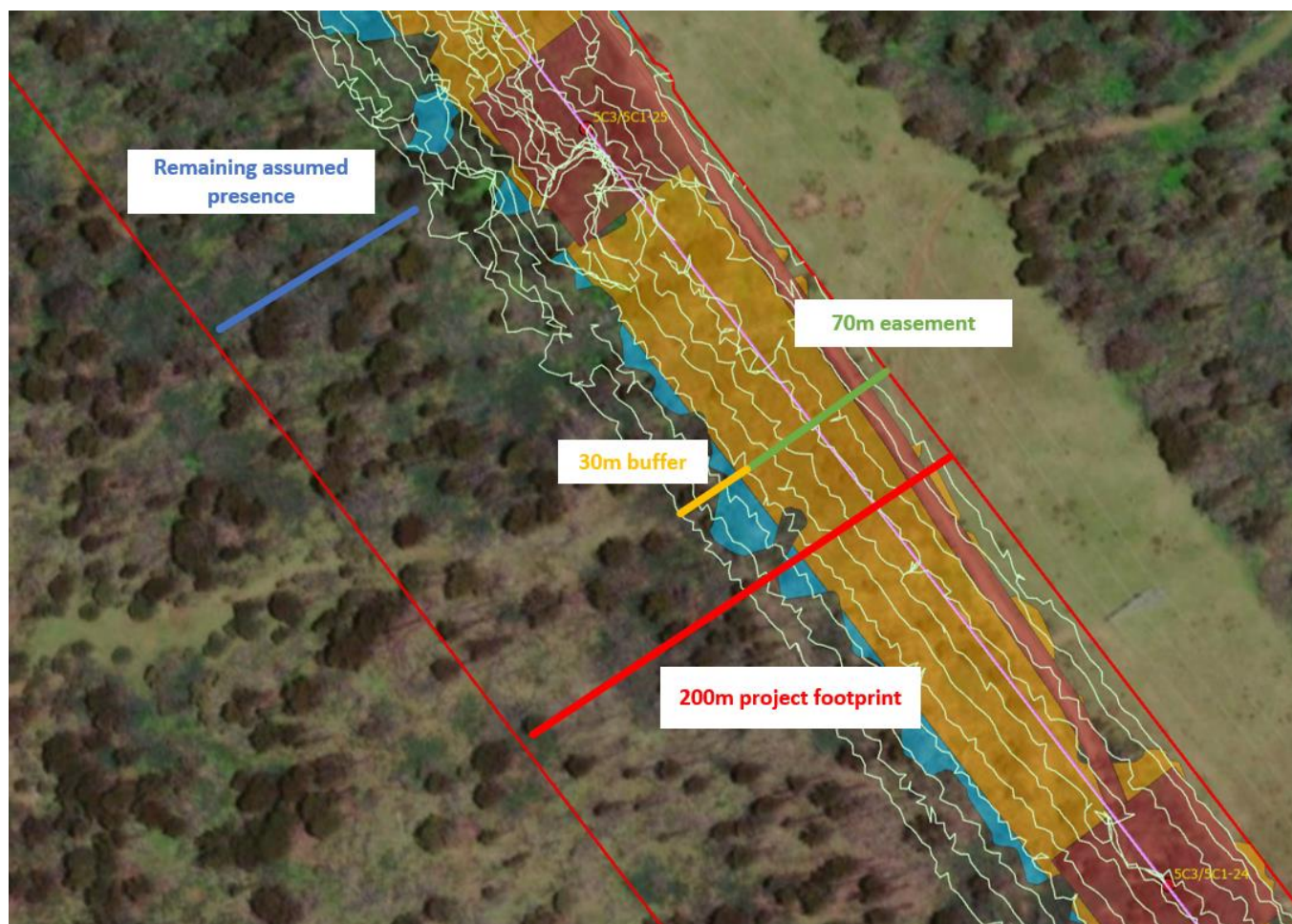


Plate 1: Area subject to threatened flora surveys during the supplementary surveys

Table 10: Threatened flora opportunistic surveys

Species	Description
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Subject to reduction of area assumed present as a result of habitat being found unsuitable, as per advice from orchid specialists.
<i>Caladenia montana</i> (Mountain Spider Orchid)	Subject to opportunistic survey reduction, where: <ul style="list-style-type: none"> – If average width of the polygon (assumed present) is ≤ 10 m, and the neighbouring polygon is survey reduction, then further opportunistic survey reduction is applied – If average width of the polygon (assumed present) is > 10 m and < 15 m, and the neighbouring polygon is survey reduction, then the polygon is reviewed by ecologists to determine whether additional opportunistic reduction can be applied, or if the polygon retains assumed present status.
<i>Pterostylis alpina</i> (Alpine Greenhood)	Subject to reduction of area assumed present as a result of habitat being found unsuitable, as per advice from orchid specialists.



Table 11: Threatened flora survey timing in relation to approved BAM survey periods

Species	Species targeted for post-BDAR surveys?	TBDC survey month	Survey timing	Deviation from TBDC and justification
<i>Acacia ausfeldii</i> (Ausfeld's Wattle)	No	August - October	October - September	No - survey as per the TBDC
<i>Acacia bynoeana</i> (Bynoe's Wattle)	No	All year	November; February	No - survey as per the TBDC
<i>Acacia flocktoniae</i> (Flockton Wattle)	Yes	July - September	October	No - survey as per the TBDC
<i>Ammobium craspedioides</i> (Yass Daisy)	Yes	September - November	October; September; November	No - survey as per the TBDC
<i>Baloskion longipes</i> (Dense Cord-rush)	No	All year	November; February	No - survey as per the TBDC
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	Yes	All year	October; September	No - survey as per the TBDC
<i>Bossiaea oligosperma</i> (Few-seeded Bossiaea)	No	All year	November; February	No - survey as per the TBDC
<i>Caesia parviflora</i> var. <i>minor</i> (Small Pale Grass-lily)	No	October - February	November	No - survey as per the TBDC
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Yes	September	10-27 Sept 2024	No - survey as per the TBDC
<i>Caladenia montana</i> (Mountain Spider Orchid)	Yes	October - November	9 Sept to 1 Nov 2024	Yes - surveys began early, in September, based on results of reference population checks and advice from specialist orchid panel. CPHR confirmation of the proposed survey approach and timing was received via email on 10/10/2024.
<i>Calotis glandulosa</i> (Mauve Burr-daisy)	Yes	January - March	January	No - survey as per the TBDC
<i>Commersonia prostrata</i> (Dwarf Kerauwang)	No	All year	November	No - survey as per the TBDC
<i>Cullen parvum</i> (Small Scurf-pea)	Yes	January; December	January; 1 February - 5 February; December	No - subject to availability of survey teams, surveys overlapped into early February as conditions were considered to still be suitable for survey as they



Species	Species targeted for post-BDAR surveys?	TBDC survey month	Survey timing	Deviation from TBDC and justification
				were consistent with the week prior.
<i>Dillwynia glaucula</i> (Michelago Parrot-pea)	No	September - December	November	No - survey as per the TBDC
<i>Diuris aequalis</i> (Buttercup Doubletail)	Yes	October - November	12 November - 16 November	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Diuris tricolor</i> (Pine Donkey Orchid)	Yes	September - October	21 September - 22 September	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Eucalyptus aggregata</i> (Black Gum)	No	All year	September; November	No - survey as per the TBDC
<i>Eucalyptus macarthurii</i> (Paddys River Box, Camden Woollybutt)	No	All year	October; November; February	No - survey as per the TBDC
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	Yes	All year	November	No - survey as per the TBDC
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Yes	February - March	February	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	Yes	All year	October; September; November	No - survey as per the TBDC
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	Yes	October	October	No - survey as per the TBDC
<i>Kunzea cabbagei</i> (Cabbage Kunzea)	Yes	October - November	October; November	No - survey as per the TBDC
<i>Lepidium hyssopifolium</i> (Aromatic Peppercress)	Yes	October - December	October; November	No - survey as per the TBDC
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	Yes	September - April;	October; September; November; December; January; February	No - survey as per the TBDC



Species	Species targeted for post-BDAR surveys?	TBDC survey month	Survey timing	Deviation from TBDC and justification
<i>Persoonia mollis</i> subsp. <i>revoluta</i> (Soft Geebung)	No	All year	October; November; February	No - survey as per the TBDC
<i>Phyllota humifusa</i> (Dwarf Phyllota)	No	December - January	November; December; January; 1 February - 5 February	No - subject to availability of survey teams, surveys overlapped into early February as conditions were still considered to be consistent with the week prior and suitable for survey.
<i>Pimelea bracteata</i> (Rice Flower)	Yes	All year	October; September; November; December; January; February	No - survey as per the TBDC
<i>Pomaderris cotoneaster</i> (Cotoneaster Pomaderris)	Yes	October - November	October; November; 1 December - 4 December	No - subject to availability of survey teams, surveys overlapped into early December as conditions were still considered to be consistent with the week prior and suitable for survey.
<i>Pomaderris delicata</i> (Delicate Pomaderris)	No	All year	October; November; February	No - survey as per the TBDC
<i>Pomaderris pallida</i> (Pale Pomaderris)	Yes	All year	October; November	No - survey as per the TBDC
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Yes	December	15 December to 19 December 2024	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Yes	February - March	12-15 January 2025	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Prasophyllum keltonii</i> (Kelton's Leek Orchid)	Yes	December	15 December to 19 December	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Yes	September - December	16-20 Oct 2024	No - specific survey dates selected based on reference population



Species	Species targeted for post-BDAR surveys?	TBDC survey month	Survey timing	Deviation from TBDC and justification
				checks and advice from specialist orchid panel.
<i>Pterostylis alpina</i> (Alpine Greenhood)	Yes	November in montane areas	November	No - survey as per the TBDC
<i>Pterostylis foliata</i> (Slender Greenhood)	Yes	October - November	October; November	No - survey as per the TBDC
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	Yes	December - January	1-15 January 2025	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Pultenaea humilis</i> (Dwarf Bush-pea)	Yes	October - December	October	No - survey as per the TBDC
<i>Senecio garlandii</i> (Woolly Ragwort)	No	All year	October; September; January	No - survey as per the TBDC
<i>Solanum armourense</i>	Yes	August - May;	October; November; February	No - survey as per the TBDC
<i>Swainsona recta</i> (Small Purple-pea)	Yes	September - November	October; September; November	No - survey as per the TBDC
<i>Swainsona sericea</i> (Silky Swainson-pea)	Yes	September - November	October; September; November	No - survey as per the TBDC
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	Yes	November - January	15 December to 15 January	No - specific survey dates selected based on reference population checks and advice from specialist orchid panel.
<i>Thesium australe</i> (Austral Toadflax)	Yes	November - February	November; December; January; February	No - survey as per the TBDC
<i>Xerochrysum palustre</i> (Swamp Everlasting)	No	September - May	October; September; November; December; January	No - survey as per the TBDC

2.4.3 Threatened flora survey effort

Total parallel traverse distances for each species are presented below in Table 12 for each IBRA subregion. Threatened flora survey effort was reviewed for each target species according to the extent that buffered traverses (as per Table 9) overlapped with potential habitats. Where the required survey timing was suitable and the species was not detected, the potential habitat was excluded from further consideration. Some opportunistic survey reductions were applied to remaining habitats which were situated immediately adjacent to surveyed areas, as outlined in Section 4.5.3 of the BDAR. Species polygon reductions as a result of targeted or



opportunistic survey, are delineated within the spatial datasets provided, as shown within Figure 1, and described in Table 28.

The TBDC suggests multiple rounds of survey may be required to address *Solanum armourense*. Whilst this was not proposed as a part of the approved SBS, it is understood that the species was recently confirmed present within the locality, suggesting a higher likelihood of species occurrence within the project footprint. Given this, a review of survey effort was undertaken to confirm the extent of habitats subject to multiple rounds of survey (Annex 8). A survey effort reduction was only applied for this species where potential habitats were subject to survey over multiple time periods (Section 4.4.1).

Following consultation with CPHR (as per CPHR Consultation 19/06/2025 and BAVR Page Turn Meeting 04/08/2025), a number of species have been identified as having issues with the survey buffer applied and/or issues with targeting of multiple species in one transect and thus have reverted to assumed presence.

- *Acacia bynoeana* (Bynoe's Wattle)
- *Baloskion longipes* (Dense Cord-rush)
- *Bossiaea oligosperma* (Fragrant Bossiaea)
- *Diuris aequalis* (Buttercup Doubletail)
- *Persoonia marginata* (Clandulla Geebung)
- *Persoonia mollis* subsp. *revoluta* (Soft Geebung)
- *Pomaderris cotoneaster* (Cotoneaster Pomaderris)
- *Pomaderris delicata* (Delicate Pomaderris)
- *Senecio garlandii* (Woolly Ragwort)



Table 12: Flora parallel traverse survey effort

Species	IBRA Subregion						Traverse length (km)
	Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	Total length (km)
<i>Acacia ausfeldii</i> (Ausfeld's Wattle)	-	-	-	148.24	9.2	-	157.44
<i>Acacia bynoeana</i> (Bynoe's Wattle)	-	30.97	39.47	-	-	-	70.44
<i>Acacia flocktoniae</i> (Flockton Wattle)	-	20.77	-	-	-	-	20.77
<i>Ammobium craspedioides</i> (Yass Daisy)	0.33	-	43.38	335.91	155.22	48.98	583.82
<i>Baloskion longipes</i> (Dense Cord-rush)	-	25.36	-	-	-	-	25.36
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	-	-	-	100.56	3.04	-	103.6
<i>Bossiaea oligosperma</i> (Few-seeded Bossiaea)	-	32	-	-	-	-	32.0
<i>Caesia parviflora</i> var. <i>minor</i> (Small Pale Grass-lily)	0.15	-	-	6.85	-	-	7.0
<i>Caladenia concolor</i> (Crimson Spider Orchid)	-	-	-	223.92	43.27	-	267.19



Species	IBRA Subregion						Traverse length (km)
	Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	Total length (km)
<i>Caladenia montana</i> (Mountain Spider Orchid)	12.27	-	-	-	-	468.73	481.0
<i>Calotis glandulosa</i> (Mauve Burr-Daisy)	0.03	-	-	-	-	56.49	56.52
<i>Commersonia prostrata</i> (Dwarf Kerrawang)	-	-	21.4	-	-	-	21.4
<i>Cullen parvum</i> (Small Scurf-pea)	-	-	-	18.95	-	-	18.95
<i>Dillwynia glauca</i> (Michelago Parrot-pea)	-	8.98	-	-	-	-	8.98
<i>Diuris aequalis</i> (Buttercup Doubletail)	-	-	39.47	-	-	-	39.47
<i>Diuris tricolor</i> (Pine Donkey Orchid)	-	-	-	10.67	-	-	10.67
<i>Eucalyptus aggregata</i> (Black Gum)	-	-	23.49	0.81	-	-	24.3
<i>Eucalyptus macarthurii</i> (Paddys River Box, Camden Woollybutt)	-	117.76	-	-	-	-	117.76



Species	IBRA Subregion						Traverse length (km)
	Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	Total length (km)
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	-	-	7.75	-	-	-	7.75
<i>Genoplesium superbum</i> (Superb Midge Orchid)	-	78.45	-	-	-	-	78.45
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	-	-	-	17.49	54.05	-	71.54
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	-	-	-	64.34	-	-	64.34
<i>Kunzea cabbagei</i> (Cabbage Kunzea)	-	54.62	-	-	-	-	54.62
<i>Lepidium hyssopifolium</i> (Aromatic Peppergrass)	-	-	43.28	-	10.48	-	53.76
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	-	132.05	87.56	121.74	153.71	547.14	1042.2
<i>Persoonia mollis</i> subsp. <i>revoluta</i> (Soft Geebung)	-	111.22	-	-	-	-	111.22



Species	IBRA Subregion						Traverse length (km)
	Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	Total length (km)
<i>Phyllota humifusa</i> (Dwarf Phyllota)	-	66.61	-	-	-	-	66.61
<i>Pimelea bracteata</i> (Rice Flower)	21.3	-	-	-	-	254.95	276.25
<i>Pomaderris cotoneaster</i> (Cotoneaster Pomaderris)	2.9	46.35	-	-	-	-	49.25
<i>Pomaderris delicata</i> (Delicate Pomaderris)	-	112.88	-	-	-	-	112.88
<i>Pomaderris pallida</i> (Pale Pomaderris)	-	-	-	-	17.46	-	17.46
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	-	-	-	-	-	29.69	29.69
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	-	-	-	-	-	32.12	32.12
<i>Prasophyllum keltonii</i> (Kelton's Leek Orchid)						29.69	29.69
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	-	-	2.08	18.16	37.19	-	57.43



Species	IBRA Subregion						Traverse length (km)
	Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	Total length (km)
<i>Pterostylis alpina</i> (Alpine Greenhood)	-	-	-	-	-	34.28	34.28
<i>Pterostylis foliata</i> (Slender Greenhood)	9.37	-	-	-	-	215.45	224.82
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	-	-	-	-	-	58.05	58.05
<i>Pultenaea humilis</i> (Dwarf Bush-pea)	-	-	-	43.9	-	-	43.9
<i>Senecio garlandii</i> (Woolly Ragwort)	-	-	-	115.97	-	-	115.97
<i>Solanum armourense</i>	-	39.84	-	-	-	-	39.84
<i>Swainsona recta</i> (Small Purple-pea)	0.14	-	2.08	287.38	145.49	-	435.09
<i>Swainsona sericea</i> (Silky Swainson-pea)	0.14	29.61	2.08	362.43	171.34	-	565.6
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	-	-	-	-	-	7.89	7.89
<i>Thesium australe</i> (Austral Toadflax)	-	94.74	67.29	-	55.55	96.41	313.99
<i>Xerochrysum palustre</i> (Swamp Everlasting)	-	-	-	-	-	234.81	234.81



2.5 Threatened fauna surveys

2.5.1 Threatened fauna survey methods and timing

Threatened fauna surveys were undertaken from August 2024 to April 2025 addressing the target species and survey methods outlined in Table 13.

Fauna surveys were undertaken in accordance with BAM Sections 5.2.3 & 5.2.4 and within approved BAM survey periods as outlined in the TBDC and methods outlined in Section 3 & Appendix F of the SBS. The timing of survey for each candidate fauna species is presented in Table 13 including justification for any deviations from TBDC requirements where relevant.

Field survey methods adopted are consistent with the approved SBS which are largely consistent with the TBDC, with the exception of forest owls. Forest owl survey effort addressed the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (2004 working draft) (DEC, 2004) which were current at the time of supplementary survey commencement.

Where threatened fauna species were detected in the field, a location was collected using a hand-held GPS. Details regarding the observation including sex, number of individuals and observation type (i.e. flyover, breeding behaviour such as begging) was also collected. For species detected through devices such as camera traps, the species' location was logged according to the equipment location.

Survey site spacing for threatened owl surveys ranged from 300m to 800m to ensure representative coverage of suitable habitat across the impact area while targeting habitat of highest suitability, and to accommodate adequate survey spacing within the mosaic of burnt landscapes present in proximity to the target habitats. In areas where habitat features (e.g., hollow-bearing trees, intact canopy structure, proximity to drainage lines) were concentrated, survey sites were placed closer together to maximise detection probability. Wider spacing was adopted to ensure variation across the landscape, and reduce the likelihood of recording the same individual at multiple sites.

Surveys for threatened owls were conducted during both the BDAR and supplementary survey programs. The combined survey effort from all survey events within this period has been considered in assessing survey adequacy for these species which is reflected in the spatial data.



Table 13: Fauna survey methods and months surveyed

Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
Diurnal bird survey	<p>Formal diurnal bird searches were completed by two ecologists. Bird surveys were completed by actively walking through the nominated site (transect) over a period of a minimum 20 minutes. Bird surveys were completed within 4 hours of sunrise or within 3 hours approaching sunset. Bird surveys were undertaken separately for all target candidate birds (single target species per survey). Targeted survey effort achieved for each species is outlined in Table 14.</p> <p>Any birds recorded during the survey were identified to the species level, either through direct observation or identification of calls. Birds were also recorded opportunistically during other surveys.</p> <p>The following criteria was applied to determine potential breeding records for Gang-gang Cockatoo and Superb Parrot:</p> <ul style="list-style-type: none"> – Month recorded – Number of individuals observed – Sex of observed individuals – Proximity to suitable hollows – Breeding behaviours (e.g. begging) <p>Survey guidelines applied:</p> <ul style="list-style-type: none"> – Survey guidelines for Australia's threatened birds (DEWHA 2010) 	<i>Petroica rodinogaster</i> (Pink Robin)	All year	November, April	No – survey as per guideline
		<i>Polytelis swainsonii</i> (Superb Parrot)	September - November	November	No – survey as per the TBDC



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	<ul style="list-style-type: none"> Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004) <p>Additional guidance:</p> <ul style="list-style-type: none"> Appropriate survey method and effort was devised by referring to the two below guidelines and approved by CPHR. For further justification, refer to the SBS. 				
Nocturnal call-playback	<p>Call playback surveys (broadcasting) were conducted in conjunction with spotlight surveys in the hours following sunset. Call playback was conducted during calm and dry weather.</p> <p>Call Playback site selection: Field teams navigated to ecologically suitable locations for owl and Bush Stone-curlew detection in unburnt land, which involved prioritising areas within the species polygon with suitable tree hollows. Call playback surveys were undertaken to target habitats with suitable hollows ensuring good coverage (i.e. generally spaced 300 – 800 metres apart) across the extent of potential habitats for target species where land access could be facilitated. In accordance with the approved SBS, call playback surveys were conducted over a minimum of:</p> <ul style="list-style-type: none"> Eight nights for Masked Owl Six nights for Sooty Owl Five nights for Barking Owl, Powerful Owl and Bush Stone-curlew <p>Playback and spotlighting survey: Call-playback was conducted as per TBDC guidance, including a</p>	<i>Burhinus grallarius</i> (Bush Stone-curlew)	All year	August	No – survey as per the SBS
		<i>Ninox connivens</i> (Barking Owl)	All year	August, April	No – survey as per the SBS
		<i>Ninox strenua</i> (Powerful Owl)	All year	August, April	No – survey as per the SBS
		<i>Tyto novaehollandiae</i> (Masked Owl)	All year	August, April	No – survey as per the SBS



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	<p>minimum of 10 minutes passive listening prior to broadcasting. This was followed by a 15-minute playback sequence per target species where pre-recorded calls of target species were broadcasted for 15 seconds, followed by minimum 30 seconds of listening time, with calls being broadcast at increasing volume each time. Where multiple owl species were targeted (i.e., most call-playback locations), a sequence of species-specific calls was used, as recommended in the TBDC, with the call of the Masked Owl always played last.</p> <p>Following on from the listening period, observers inspected the vicinity with a spotlight to see if non-vocalising fauna were attracted to the calls (for a minimum of 30 minutes over a 1 ha area). Spotlighting time associated with each survey is included in the total survey duration provided.</p> <p>Targeted survey effort for Nocturnal call playback is outlined in Table 14.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004) – Survey guidelines for Australia's threatened birds (DEWHA 2010). <p>Additional guidance:</p> <ul style="list-style-type: none"> – Survey comments for candidate owls identified in the TBDC. Additional guidance was sought from CPHR, as detailed in the SBS. 	<i>Tyto tenebricosa</i> (Sooty Owl)	All year	August, April	No – survey as per the SBS



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
Spotlighting	<p>Spotlighting surveys were completed on foot by ecologists in pairs, targeting nocturnal birds and Koala. At least one person hour of survey effort was completed per survey.</p> <p>Spotlighting survey effort is outlined in Table 14. Note that for forest owls and Bush Stone-curlew, this effort is included with the call playback total effort.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004) – Survey guidelines for Australia's threatened mammals (DSEWPC 2011a) – Koala (<i>Phascolarctos cinereus</i>) Biodiversity Assessment Method Survey Guide (DPE 2022a) 	<i>Ninox connivens</i> (Barking Owl)	All year	August, April	No – survey as per the TBDC
		<i>Ninox strenua</i> (Powerful Owl)	All year	August, April	No – survey as per the TBDC
		<i>Tyto novaehollandiae</i> (Masked Owl)	All year	August, April	No – survey as per the TBDC
		<i>Tyto tenebricosa</i> (Sooty Owl)	All year	August, April	No – survey as per the TBDC
		<i>Phascolarctos cinereus</i> (Koala)	All year	November - January	No – survey as per Koala BAM Survey Guide Note cumulative non-scat survey effort for Snowy Mountains IBRA subregion in Table 25
		<i>Burhinus grallarius</i> (Bush Stone-curlew)	All year	August, April	No – survey as per the TBDC
Remote cameras	<p>Remote baited camera traps (terrestrial and arboreal) were deployed from September and December to March targeting Eastern Pygmy-possum, Smoky Mouse, Brush-tailed Phascogale (Table 13).</p> <p>Cameras were generally baited with peanut butter, honey, and oats. Meat baits were also used in discrete locations as an additional attractant in an</p>	<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	October - March	December - March	No – survey as per CPHR approved survey effort (Section 1.5)
		<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	December - June	December - March	Yes – some meat baits were used to improve efficacy of the surveys. This was discussed with the BOS Helpdesk (ticket number DPE-



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	<p>effort to maximise Brush-tailed Phascogale detection. This approach was adopted based on advice from William Terry, PhD candidate and previously approved Brush-tailed Phascogale species expert for a nearby project.</p> <p>Camera traps targeting Brush-tailed Phascogale were rebaited every 14 days and to ensure compliance with the TBDC. Where there were delays to recessing locations for rebaiting, only survey effort undertaken within 14 days of a baiting event was considered.</p> <p>Furthermore, survey effort was only considered for the target habitats (i.e. vegetation formations) in which the cameras were directly deployed.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Survey guidelines for Australia’s threatened mammals (DSEWPC 2011a) – Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004) <p>Additional guidance:</p> <ul style="list-style-type: none"> – Recommended methodology for Smoky Mouse surveys (Linda Broome via email, dated 15 November 2023). – Relevant articles noting the efficacy of meat baits as an appropriate attractant for Brush-tailed Phascogale: <ul style="list-style-type: none"> – What determines the distribution of a threatened species, the Brush-tailed Phascogale <i>Phascogale tapoatafa</i> (Marsupialia: Dasyuridae), in a highly 				664) – it was determined that “These baits may potentially be effective but are not included in the survey advice provided in the TBDC owing to animal ethics issues.” The cameras baited with meat account for approximately 14% of the total survey effort, which was over 7,000 trap nights.
		<i>Pseudomys fumeus</i> (Smoky Mouse)	February; March; April; September; October; November; December	September	No - survey as per the TBDC



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	modified region? (Lawton et al. 2021)				
Koala Spot Assessment Technique	<p>Koala Spot Assessment Technique (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. Where scats were found that looked similar to Koala scat, a sample was taken and sent to a specialist for analysis.</p> <p>Koala SAT survey effort is outlined in Table 13 with further justification provided in Annex 11.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Koala (<i>Phascolarctos cinereus</i>) Biodiversity Assessment Method Survey Guide (DPE 2022a). 	<i>Phascolarctos cinereus</i> (Koala)	All year	November - December	No - survey as per Koala BAM Survey Guide



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
Koala Drone surveys	<p>Drones paired with thermal sensors were used in areas of the survey area identified as suitable koala habitat. The drones were equipped with a longwave thermal camera and a visual camera and spotlight with enough battery to cover the whole survey area. Pre-assigned flight paths were set over mapped areas of suitable vegetation. The drone flew at approximately 65m above the tree canopy at a maximum speed of 8 m/s. When no koalas were detected after one night, a second night of drone flying was completed to confirm absence of the species.</p> <p>While this method of survey is very efficient, there were some limitations identified that resulted in some patches of vegetation being excluded from survey or subject to one drone pass only. These limitations included:</p> <ul style="list-style-type: none"> – Access to private properties – Maintaining a visual line-of-sight with the drone – Surveying near existing powerlines – Weather constraints, particularly wind, especially in proximity to powerlines – Safety and CASA regulations – Areas of higher connectivity and habitat quality were prioritised over smaller discontinuous patches (including scattered trees) <p>A survey effort reduction was not considered for these unsurveyed or under-surveyed areas and was only applied for habitats subject to a minimum of two drone passes and for which the associated SAT</p>	<i>Phascolarctos cinereus</i> (Koala)	All year	February - March	No - survey as per Koala BAM Survey Guide



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	<p>survey effort was also sufficient (noting an absence of Koala detections associated with survey).</p> <p>Per Section 2.3 of the Koala (<i>Phascolarctos cinereus</i>) Biodiversity Assessment Method Survey Guide (DPE 2022a), the surveyors (Michael Zavattaro and Chad Benarak) undertaking the drone surveys met the criteria listed, and their qualifications have been included in Table 13.</p> <p>Koala Drone survey effort is outlined in Table 14.</p> <ul style="list-style-type: none"> – Survey guidelines implemented: – Koala (<i>Phascolarctos cinereus</i>) Biodiversity Assessment Method Survey Guide (DPE 2022a). 				



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
Acoustic songmeters	<p>Acoustic monitoring devices were used in areas of suitable habitat and programmed to record continuously from sunset to sunrise. Spacing of recording devices were at least double the detection range of the model. Where suitable habitat is discontinuous, survey effort for each area was treated independently but for large, continuous areas of suitable habitat, a grid system was implemented based on the habitat density and the maximum recording range of the recording unit. The devices were also set to double the highest frequency produced by a koala's call. The frequency range of a Koala's call is 80 -750Hz (Ellis et al. 2011), therefore devices were set to record a maximum frequency of 1.5kHz.</p> <p>Koala Acoustic Monitoring survey effort is outlined in Table 13.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Koala (<i>Phascolarctos cinereus</i>) Biodiversity Assessment Method Survey Guide (DPE 2022a). 	<i>Phascolarctos cinereus</i> (Koala)	All year	November - January	No - supplementary survey method only.
Reptile searches	Areas within the project footprint that contained shallow embedded surface rocks and native grassy ground-layer, were subject to active searches (rock	<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	September - November	November	No - survey as per the TBDC



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	<p>rolling) for Pink-tailed 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 2011b). Searches were conducted between spring and early summer on warm days (DSEWPC 2011b). Surveyors ensured rocks, logs and other refugia were placed back in the same position to minimise disturbance.</p> <p>Areas within the project footprint that contained suitable habitat, were subject to active searches with a particular emphasis on grass tussocks for Alpine She-oak Skink (DPE 2022b).</p> <p>Reptile searches and habitat mapping were then used to refine and map habitat for these candidate reptile species within the project footprint.</p> <p>Reptile search effort is outlined in Table 13.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Threatened reptiles Biodiversity Assessment Method survey guide (DPE 2022b). – Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DSEWPC 2011c). 	<i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink)	October - April	February	No - survey as per the threatened reptiles BAM survey guide



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
Elliott trapping	<p>Elliott traps were deployed within Bago State Forest in September targeting Smoky Mouse (<i>Pseudomys fumeus</i>). The traps were placed on the ground and baited with peanut butter, honey, and oats.</p> <p>An infra-red white light camera was deployed at each end of the Elliott trap linet to supplement the trapping survey effort.</p> <p>Smoky Mouse survey effort is outlined in Table 13.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - November 2004 (DEC 2004) – Survey guidelines for Australia's threatened mammals (DSEWPC 2011a). 	<i>Pseudomys fumeus</i> (Smoky Mouse)	February; March; April; September; October; November; December	September	No - survey as per SBS App F & CPHR advice obtained during the BDAR phase (i.e. Elliott trapping supplemented with infra-red white-light cameras)
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	<i>Mixophyes balbus</i> (Stuttering Frog)	September - March	November - February	No - survey as per the Threatened frog survey guide



Survey method	Description	Species targeted	TBDC survey month	Month surveyed	Deviation from guideline or approved method and justification
	<p>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.</p> <p>Aural-visual frog survey effort is outlined in Table 13.</p> <p>Survey guidelines implemented:</p> <ul style="list-style-type: none"> – NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020c). 	<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	November - December	November - December	No - survey as per the Threatened frog survey guide



2.5.2 Threatened fauna survey effort

Threatened fauna survey effort is documented in Section 4.4.2 according to target species and habitats. Threatened fauna survey effort was reviewed for each target species according to the extent of potential habitats, associated stratification methods and adopting the prescribed survey effort outlined in Table 13. Where the required survey effort was met and the species was not detected, the potential habitat was excluded from further consideration. Where target candidate fauna species were detected through survey, the methods for delineating occupied habitats are outlined in Section 5.3.

2.5.2.1 Koala survey effort

A total of 23 of the 195 SAT surveys targeting Koala were conducted in 2021. Of these 23 SAT surveys, 20 were associated with habitats in Bungonia and Murrumbateman (regions that were not affected by the Dunn's Road bushfire). Only three of the 91 SAT surveys completed in the Snowy Mountains IBRA subregion were undertaken in 2021. Given 89 SAT surveys were required to be completed within this region, should these three SATs be excluded from consideration this would result in a survey shortfall of one SAT survey. Given this, the SAT survey effort is still considered adequate.

Spotlighting and acoustic non-scat methods were also used for the Snowy Mountains IBRA subregion.

Spotlighting

In accordance with the Koala BAM Survey Guide, 2 x 200 m (i.e. 20 min) transects are required for two replicates. For the 555.36 ha of habitat, this equates to 148.09 hours of survey. A total of 54 spotlighting transects were completed over 91.47 hours. Of these transects, 25 were completed in 2021 (total of 35.03 hours survey). If these were excluded from consideration, this would result in a spotlighting survey shortfall of 91.65 hours.

Acoustic surveys

In accordance with the Koala BAM Survey Guide, five acoustic recorders are required (with detection range of 300m) to be deployed for 12 nights (i.e. total of 60 nights). A total of five recorders were deployed in December 2024 for a total of 262 nights. This survey effort has addressed the non-scat survey requirements for the Snowy Mountains IBRA subregion.



Table 14: Fauna survey effort adequacy

Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	Bungonia	Grassy Woodlands	Reptile search – rock rolling	68.11	Turn over ≥ 200 rocks for every 5 ha of suitable habitat. 4 survey replicates	≥ 2,724 rocks rolled over minimum 4 surveys	2825 rocks rolled over 6 surveys	Yes	No	Yes
	Crookwell	Grassy Woodlands	Reptile search – rock rolling	107.40		≥ 4,242 rocks rolled over minimum 4 surveys	150 rocks rolled over 2 surveys	No ²	No	No
<i>Burhinus grallarius</i> (Bush Stone-curlew)	Inland Slopes	Grassy Woodlands	Call playback	306.06	5 nocturnal survey transects (incorporating call playback) per 200 ha of suitable habitat	9 nocturnal surveys	9 nocturnal surveys ³	Yes	No	Yes
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Bungonia	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Camera Trapping	10.58	100 trap nights per 50 ha = 2 trap nights per ha	22 trap nights	65 trap nights	Yes	Yes	No – species detected within target habitats

¹ Revised area of habitat classified as 'assumed present', as calculated after revised constraints mapping has been applied – refer to Section 4.2.

² Weather conditions during surveys meant survey effort was unable to be completed adequately as per the BAM guidelines.

³ Includes prior survey effort completed during BDAR.



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
		Dry Sclerophyll Forests (Shrubby sub-formation)	Camera Trapping	91.39		192 trap nights	4313 trap nights	Yes	Yes	No – species recorded across survey unit
		Grassy Woodlands	Camera Trapping	20.06		58 trap nights	193 trap nights	Yes	No	Yes ⁴
<i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink)	Snowy Mountains	Grassy Woodlands	Reptile search – habitat surveys	53.40 ⁵	120 person-minutes per survey, per 50 ha of suitable habitat. 4 survey replicates	129 person-minutes of survey for minimum 4 surveys. Total person-minutes required: 516 (8.6 hours).	880 person-minutes (14.67 hours) of survey across 9 transects over 5 dates.	Yes ⁶	No	Yes
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Crookwell (6.11 ha)	Upstream of Cowpers Creek (Hawkesbury-Nepean South subCMA)	Frog census – Aural visual surveys	2,481 m stream length	120 mins per 500 m of suitable stream habitat.	Total 2,382 survey minutes, with 4 replicates per 500 m of stream.	594 minutes (9.9 hours) of aural visual survey (4 transects) over 3 nights.	No ^{5,7}	No	No

⁴ Note that a survey effort reduction was not applied to grassy woodland habitat situated within 200m of a species detection. As such, a survey effort reduction was only applied to a portion of the grassy woodland habitats and the remaining were classified as known.

⁵ Excludes approximately 50.55 ha of severely burnt habitat.

⁶ Includes prior survey effort completed during BDAR.

⁷ Access restrictions excluded surveys from being conducted.



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
		Melamalong Creek (Hawkesbury-Nepean South subCMA)	Frog census – Aural visual surveys	2,179 m stream length	4 survey replicates	Total 2,092 survey minutes, with 4 replicates per 500 m of stream.	242 minutes (4 hours) of aural visual survey (2 transects) over 1 nights.	No ⁵	No	No
	Snowy Mountains (1.63 ha)	Upstream of Stockmans Creek (Murrumbidgee – Mid East subCMA)	Frog census – Aural visual surveys	676 m stream length		Total 649 survey minutes, with 4 replicates per 500 m of stream.	Nil	No ⁵	No	No
		Long Creek (Murrumbidgee – Mid East subCMA)	Frog census – Aural visual surveys	1,380 m stream length		Total 1,325 survey minutes, with 4 replicates per 500 m of stream.	240 minutes (4 hours) of aural visual survey (2 transects) over 2 nights.	No ^{5,6}	No	No – only 2 nights of survey could be conducted due to land access limitations noted in Chapter 3.
<i>Mixophyes balbus</i> (Stuttering Frog)	Bungonia (35.70 ha)	Bannaby Creek (Hawkesbury-Nepean South subCMA)	Frog census – Aural visual surveys	395 m stream length	480 mins per 500 m of suitable stream habitat.	Total 380 survey minutes, with 4 replicates per 500 m of stream.	Nil	No	No	No



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
		Connors Creek (Hawkesbury-Nepean South subCMA)	Frog census - Aural visual surveys	848 m stream length	4 survey replicates	Total 814 survey minutes, with 4 replicates per 500 m of stream.	2129 minutes of aural visual survey (15 transects) over 12 nights	Yes	No	Yes
		Kerrawary Creek (Hawkesbury-Nepean South subCMA)	Frog census - Aural visual surveys	377 m stream length		Total 362 survey minutes, with 4 replicates per 500 m of stream.	465 minutes of aural visual survey (5 transects) over 5 nights	Yes	No	Yes
<i>Ninox connivens</i> (Barking Owl)	Bondo	Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	13.51	At least 5 surveys (nocturnal call playback and spotlighting) per 200 ha (as per SBS)	1 nocturnal survey	1 nocturnal survey	No	No	No
	Bungonia	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Call playback (includes spotlighting)	10.59		1 nocturnal survey	7 nocturnal surveys	Yes	No	Yes
		Dry Sclerophyll Forests (Shrubby sub-formation)	Call playback (includes spotlighting)	95.86		3 nocturnal surveys	8 nocturnal surveys	Yes	No	Yes
		Grassy Woodlands	Call playback (includes spotlighting)	24.22		1 nocturnal survey	6 nocturnal surveys	Yes	No	Yes



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
	Inland Slopes	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Call playback (includes spotlighting)	78.81		3 nocturnal surveys	6 nocturnal surveys	Yes	No	Yes
		Grassy Woodlands	Call playback (includes spotlighting)	517.51		16 nocturnal surveys	22 nocturnal surveys	Yes	No	Yes
	Snowy Mountains	Dry Sclerophyll Forests (Shrubby sub-formation)	Call playback (includes spotlighting)	247.58		8 nocturnal surveys	13 nocturnal surveys	Yes	No	Yes
		Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	159.43		5 nocturnal surveys	9 nocturnal surveys	Yes	No	Yes
	Bondo	Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	13.54		1 nocturnal survey	1 nocturnal survey	No	No	No
		Bungonia	Dry Sclerophyll Forests (Shrub/grass sub-formation)	10.59		1 nocturnal survey	7 nocturnal surveys	Yes	Yes	Yes. Species detections addressed in accordance with the methods



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
										outlined in Section 2.2
		Dry Sclerophyll Forests (Shrubby sub-formation)	Call playback (includes spotlighting)	95.86		3 nocturnal surveys	8 nocturnal surveys	Yes	No	Yes
		Grassy Woodlands	Call playback (includes spotlighting)	24.57		1 nocturnal survey	6 nocturnal surveys	Yes	No	Yes
	Snowy Mountains	Dry Sclerophyll Forests (Shrubby sub-formation)	Call playback (includes spotlighting)	261.11		8 nocturnal surveys	13 nocturnal surveys	Yes	Yes	Yes. Species detections addressed in accordance with the methods outlined in Section 5.3.
		Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	161.63		5 nocturnal surveys	9 nocturnal surveys	Yes	Yes	Yes. Species detections addressed in accordance with the methods



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
										outlined in Section 5.3.
<i>Petroica rodinogaster</i> (Pink Robin)	Snowy Mountains	Grassy Woodlands	Diurnal bird survey	40.78	Total 12 hours over minimum 4 days per 50 ha of suitable habitat	Total 9.8 hours over minimum 4 days	16.8 hours over 8 days ⁸	Yes	No	Yes
		Wet Sclerophyll Forests (Grassy sub-formation)	Diurnal bird survey	40.96		Total 9.9 hours over minimum 4 days	10.37 hours over 4 days ⁷	Yes	No	Yes
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	Bungonia	Dry Sclerophyll Forests (Shrubby sub-formation)	Camera Trapping	88.05	SBS proposed effort: A total of 141 cameras would be deployed for approximately 4,949 trap nights targeting 88.06 ha of contiguous habitat.		5,096 trap nights	Yes ⁹	No	Yes
<i>Phascolarctos cinereus</i> (Koala)	Bungonia	N/A	Spot Assessment Technique (SAT)	48.15	Minimum 8 SAT surveys per 50 ha of suitable habitat	8 SAT surveys	39 SAT surveys ¹⁰	Yes	No	Yes
			Drone survey	48.15	240 minutes per 100 ha of suitable habitat.	Total 120 minutes of survey over 2 survey replicates.	533 minutes over 16 transects across 5 dates	Yes	No	

⁸ Includes prior survey effort completed during BDAR.

⁹ Of the total 5,096 trap nights, 756 trap nights were conducted with meat baits, while 4,340 were conducted with universal bait.

¹⁰ Includes prior survey effort completed during BDAR.



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
					2 survey replicates					
	Snowy Mountains	N/A	Spotlighting	555.36	2x 20 min transects x two replicates per 5 ha of habitat	148.09 hours of spotlighting	91.47 hours of spotlighting ⁸	Yes	No	Yes
			Spot Assessment Technique (SAT)		Minimum 8 SAT surveys per 50 ha of suitable habitat	89 SAT surveys	91 SAT surveys ⁸	Yes	No	
			Acoustic Monitoring (Songmeter SM4)		Minimum 10 acoustic monitoring devices + 3 devices per additional 200ha over a minimum of 12 nights (for an area >100 ha)	Minimum 16 acoustic devices recording for 12 nights.	5 songmeters recording for 262 recorder-nights. ⁸	No	No	
	Murrumbateman	N/A	Spot Assessment Technique (SAT)	338.53	Minimum 8 SAT surveys per 50 ha of	56 SAT surveys	65 SAT surveys ⁸	Yes	No	Yes ¹¹

¹¹ Survey effort reduction applied to locations where a minimum of two drone passes were undertaken only.



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
					suitable habitat					
			Drone survey		240 minutes per 100 ha of suitable habitat. 2 survey replicates	Total 816 minutes of survey over 2 survey replicates.	564 minutes over 25 survey transects over 9 dates	No	No	
<i>Polytelis swainsonii</i> (Superb Parrot)	Inland Slopes	Dry Sclerophyll Forests (Shrubby sub-formation)	Diurnal bird survey	25.88	Total 12 hours over minimum 4 days per 50 ha of suitable habitat	Total 3.7 hours over minimum 4 days	5.53 hours over 2 days ⁷	No	Yes	No
		Grassy Woodlands	Diurnal bird survey	457.39		Total 85.5 hours over minimum 21 days	73.07 hours over 9 days ⁷	No	Yes	
<i>Pseudomys fumeus</i> (Smoky Mouse)	Bondo	Wet Sclerophyll Forests (Grassy sub-formation)	Elliot Trapping	13.17	100 trap nights per 50 ha.	26 trap nights	One trap line consisting of 25 traps surveyed four consecutive nights (i.e. total of 100 trap nights)	Yes	No	Yes
			Camera Trapping		100 trap nights per 50 ha	N/A - Supplementary method	Two white-light cameras deployed at each end of the Elliot trap	N/A (supplementary method only)	No	Yes



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
							line surveyed for four consecutive nights (i.e. total of 8 trap nights)			
<i>Tyto novaehollandiae</i> (Masked Owl)	Bondo	Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	13.22	At least 8 surveys (nocturnal call playback and spotlighting) per 200 ha (as per SBS)	1 nocturnal survey	1 nocturnal survey	No	No	No
	Bungonia	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Call playback (includes spotlighting)	10.59		1 nocturnal survey	7 nocturnal surveys	Yes	Yes	Yes
		Grassy Woodlands	Call playback (includes spotlighting)	24.21		1 nocturnal survey	6 nocturnal surveys	Yes	Yes	Yes
	Inland Slopes	Grassy Woodlands	Call playback (includes spotlighting)	374.69		15 nocturnal surveys	22 nocturnal surveys	Yes	No	Yes
	Snowy Mountains	Dry Sclerophyll Forests (Shrubby sub-formation)	Call playback (includes spotlighting)	258.89		11 nocturnal surveys	13 nocturnal surveys	Yes	No	Yes



Species	Potential habitat		Survey method applied	Revised habitat - assumed presence (ha) ¹	Survey guideline requirement	Required survey effort	Survey effort conducted	Survey effort met?	Species detected?	Species polygon reduction applied
	IBRA subregion	Vegetation formation/CMA								
		Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	161.63		7 nocturnal surveys	9 nocturnal surveys	Yes	No	Yes
Tyto tenebriosa (Sooty Owl)	Bondo	Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	13.17	At least 6 surveys (nocturnal call playback and spotlighting) per 200 ha (as per SBS)	1 nocturnal survey	1 nocturnal survey	No	No	No
	Snowy Mountain	Wet Sclerophyll Forests (Grassy sub-formation)	Call playback (includes spotlighting)	127.54		4 nocturnal surveys	8 nocturnal surveys	Yes	No	No



3. Survey limitations

3.1 Severely burnt lands

The Dunn's Road bushfire occurred within the project footprint and surrounds during the 2019/2020 summer bushfire season. Approximately 316.43 hectares of native vegetation situated within the Snowy Mountains, Bondo and Inland Slopes IBRA subregions was identified as severely burnt in accordance with the DPIE (2020c) Guideline. A conservative approach was adopted in assigning burn severity to woody vegetation zones at the BDAR stage (as documented in Section 9.2 of the BDAR), given the coarse nature of the Fire Extent Severity Mapping (FESM) (NSW DCCEEW, 2020) and some noted variation in the positioning of vegetation zones within the landscape. All woody vegetation zones intersecting lands with a high or extreme burnt severity according to the FESM were assessed as severely burnt.

The BDAR concluded targeted surveys undertaken within severely burnt lands were insufficient for determining the presence/absence of eleven threatened fauna species that may respond negatively to fire. As such, supplementary survey was not conducted within severely burnt lands supporting habitat for the species listed below, and presence remains assumed.

- | | |
|---|---------------------------|
| – Gang-gang Cockatoo | – Sooty Owl |
| – South-eastern Glossy Black-Cockatoo (not subject to supplementary survey) | – Southern Greater Glider |
| – Barking Owl | – Squirrel Glider |
| – Powerful Owl | – Yellow-bellied Glider |
| – Masked Owl | – Brush-tailed Phascogale |
| – Alpine She-oak Skink | – Koala |

Surveys were undertaken for Koala and forest owls within adjacent unburnt habitats within the Snowy Mountains and Bondo IBRA subregion. Suitable survey locations were strategically chosen prior to field deployment to ensure unburnt habitat patches subject to survey where of a suitable size and offered connectivity to unburnt habitats adjacent to the project footprint. These locations were then ground-truthed by field teams and survey sites shifted where necessary to more suitable locations to maximise the likelihood of species detection. Sites prioritised for survey supported suitable hollows and glider activity and offered good connectivity to unburnt habitats throughout the broader landscape. Despite these efforts to maximise species detection, it is possible that owl numbers have not fully recovered to pre-fire numbers within burnt landscapes and as such, this is noted as a potential survey limitation.

3.2 Private land accessibility

Approximately 5,046.84 ha (57%) of land was subject to supplementary survey across all six IBRA subregions within the project footprint. Land access remained a constraint for supplementary survey by limiting the location, number and timing of field surveys that could be undertaken across the project footprint. In some instances, this meant that potential habitats for seasonally constrained species could not be accessed during critical seasonal windows.

Relevant land access constraints included limitations to private land access, poor weather/impassable lands and a temporary stop works at the time of project approval whilst Transgrid sought clarification from the Planning Secretary regarding the CSSI conditions of approval and any implications for the continuing of supplementary surveys (15 November 2024 to 30 November 2024).

Following completion of the supplementary surveys, the total extent of lands subject to biodiversity survey is approximately 7,823.45 ha (88%), constituting an increase of approximately 754.51 ha (9%) of previously



inaccessible land within the project footprint (Table 15). The extent of lands subject to survey is shown in Figure 1 and Figure 2.

Table 15: Land accessibility

Land accessibility	Area (ha)	% project footprint
Not surveyed	1,044.25	12%
Surveyed (BAVR)	754.51	9%
Surveyed (BDAR and BAVR)	4,292.34	48%
Surveyed (BDAR)	2,776.61	31%
Total	8,867.69	100%

3.3 Seasonal suitability and detection of cryptic species

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). Suitable survey periods for candidate species are prescribed in the TBDC and have been adopted for the purpose of the supplementary surveys. Any deviation from approved BAM survey periods, where approved in consultation with CPHR, has been noted in Section 2.5.2.

A specialist team were engaged with CPHR approval to provide specific advice on cryptic orchid species. Table 16 below documents the approach adopted for each target threatened orchid species to inform appropriate timing for survey. Further details in relation to the outcomes of reference population checks and other evidence to justify survey timing is provided in Annex 2.

Supplementary survey for a number of candidate threatened species was not commissioned due to seasonal survey windows not aligning with the supplementary survey program. For some of these species, additional habitat assessments and constraint mapping was instead prioritised (as noted in Section 2.1).

Table 16: Reference population information to inform survey timing

Species name	Approach to determine survey timing
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Reference population check by orchid specialist panel DCCEEWS SOS Accountable Officer advice
<i>Diuris tricolor</i> (Pine Donkey Orchid)	Advice from orchid specialist panel
<i>Caladenia montana</i> (Mountain Spider Orchid)	Reference population check by Snowy 2.0 advice Reference population checks by orchid specialist panel (multiple visits)
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Reference population checks by orchid specialist panel and Niche subcontractor ecologists
<i>Pterostylis alpina</i> (Alpine Greenhood)	No reliable reference populations – survey timing based on orchid specialist advice
<i>Pterostylis foliata</i> (Slender Greenhood)	No reliable reference populations – survey timing based on orchid specialist advice



Species name	Approach to determine survey timing
<i>Diuris aequalis</i> (Buttercup Donkey Orchid)	Reference population checks by orchid specialist panel
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	No reliable reference populations – survey timing based on orchid specialist advice
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	Reference population checks by orchid specialist panel
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Reference population check by orchid specialist panel
<i>Prasophyllum keltonii</i> (Kelton's Leek Orchid)	Reference population check by orchid specialist panel
<i>Prasophyllum innubum</i> (Brandy Marys Leek Orchid)	Reference population check by orchid specialist panel
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Reference population checks by orchid specialist panel

3.4 Weather

Sub-optimal weather presented a considerable constraint for the duration of the supplementary survey program, limiting the extent of potential habitats that could be safely accessed for survey (due to boggy or hazardous terrain) and restricting survey windows for some species where survey conditions were unfavourable for species detection. A dynamic approach to field survey was employed wherever possible, to maximise survey effort and coverage in suitable conditions. However, this was not possible for some species with restricted habitats (i.e. Yellow-spotted Tree Frog and Stuttering Frog). Where survey effort could not be met for target species, species presence within potential habitats remains assumed.

All weather conditions during undertaken survey periods are summarised in Annex 4.

It is noted that some Koala SAT surveys were undertaken within three days of preceding rainfall. Annex 13 presents a summary of this survey effort including justification for the suitability of survey conditions.

4. Survey Results

A total of 54 field surveys were completed between August 2024 and March 2025. This equated to approximately 8,880 person hours undertaken by 56 ecologists (Annex 5). The targeted surveys undertaken included 11 different survey techniques targeting candidate flora and fauna species. The total length of flora parallel traverses walked was approximately 1,506km. Habitat and vegetation verification, including BAM plots and habitat constraint mapping, were also undertaken in conjunction with targeted surveys.

4.1 Plant community type verification and condition classes subject to mapping updates (BAM step 1)

Mapped PCTs and condition classes were generally consistent with site-based vegetation communities observed within lands not previously accessed, but subject to supplementary survey. Following the supplementary field survey and analysis of additional BAM plot and RDP data, some PCTs and condition classes were subject to mapping updates. The following PCT and condition class updates were applied within the Crookwell IBRA subregion (excluding category 1 lands):



- A total of approximately 59.25 ha of PCT 1151 Silver Ash – Broad-leaved Peppermint dry shrub forest of the South Eastern Highlands Bioregion has been reassigned to PCT 1155 Silvertop Ash – Narrow-leaved Peppermint open forest on ridges of the eastern tableland, South Eastern Highlands Bioregion and South East Corner Bioregion. A breakdown of the PCT, condition classes and associated areas subject to change is detailed in Table 17. A description of PCT 1155 is provided in Section 4.1.1.
- Due to a slight shift in PCT boundaries following ground-truthing, approximately 0.45 ha of PCT 1151 Silver Ash – Broad-leaved Peppermint dry shrub forest of the South Eastern Highlands Bioregion was reassigned to PCT 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion. A breakdown of the PCT, condition classes and associated areas subject to change is detailed in Table 17. PCT 731 does not have an associated threatened ecological community.
- Approximately 11.86 ha of PCT 1330 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion was reassigned to 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. A breakdown of the PCT, condition classes and associated areas subject to change is detailed in Table 17. A description of PCT 351 is provided in Section 4.1.3.

A total of 13 BAM plots were completed during supplementary surveys to inform the updates to vegetation zone mapping. Supplementary BAM plot data was run through a preliminary BAM-C to generate a Vegetation Integrity (VI) score (Annex 9). Where available, this VI score was comparatively assessed against the VI score of existing BAM plot data collected during the BDAR phase. The generation of the VI score and comparative assessment was undertaken to determine the appropriate condition class, as per the condition class criteria in Section 4.4.2 of the BDAR. The following updates to vegetation condition class were informed by the analysis of BAM plot and RDP data:

- 1.40 ha of PCT 1330 was changed from low to very low condition. A supplementary RDP survey confirmed that the area met the very low condition class criteria. A description is provided in Section 4.1.1.
- Approximately 31.85 ha of high condition, 1.17 ha of low condition and 0.48 ha of very high condition areas of PCT 1151 were reassigned to moderate condition PCT 1155. Eight BAM plots were completed, with a VI range of 38.59 to 59.91 and an average VI of 49.37, which aligns more closely to the ranges associated with the moderate condition class.
- 10.90 ha of PCT 1151 was reassigned from very high to high (10.42 ha) and moderate (0.48 ha) condition. The BAM plot completed in this area had a VI score of 61.84, which aligns more closely to a high condition.
- 11.86 ha of low condition PCT 1330 was reassigned to high condition PCT 351. The two BAM plots completed had a VI of 73.64 and 72.83 and an average VI score of 73.24, which aligns with the high condition class.
- 18.70 ha of PCT 1330, which was previously mapped as very low, has been reassigned to low condition, as RDPs completed showed there was high native diversity.
- 0.45 ha of low condition PCT 1151 has been reassigned to low condition PCT 731, due to minor changes in PCT boundaries as a result of ground-truthing.

Table 18 details the BAM plot survey effort for areas subject to vegetation zone mapping updates.

Supplementary surveys undertaken confirmed that a small area of low condition PCT 1330 adopted in the BDAR was confirmed. A description is provided in Section 4.1.1.

All changes to PCT and condition class have been incorporated in the revised species polygons and vegetation zone map. A breakdown of the changes to PCT assignment and condition are given below in Table 17. A full list of flora species, BAM function data and VI scores for each supplementary BAM plot can be found in Annex 9. Please note, the BAM-C case will not be finalised and submitted until the BAVR (Final Layout Plans) revision when final disturbance zones are available.



Table 17: A comparison of PCT and condition classes in the BDAR and the BAVR subject to updates

IBRA subregion	BDAR Result				BAVR Result			
	PCT ID	Formation	Condition	Area of change (ha)	PCT ID	Formation	Condition	Area of change (ha)
Crookwell	1151	Dry Sclerophyll Forests (Shrubby sub-formation)	High	33.06	1155	Dry Sclerophyll Forests (Shrubby sub-formation)	High	1.22
							Moderate	31.85
			Low	14.92	731	Grassy Woodlands	Low	0.45
					1155	Dry Sclerophyll Forests (Shrubby sub-formation)	Low	13.29
							Moderate	1.17
			Very high	10.90	1155	Dry Sclerophyll Forests (Shrubby sub-formation)	High	10.42
							Moderate	0.48
			Very low	0.82	1155	Dry Sclerophyll Forests (Shrubby sub-formation)	Very low	0.82
	1330	Grassy woodlands	Low	11.86	351	Dry Sclerophyll Forests (Shrubby sub-formation)	High	11.86
			Low	1.40	1330	Grassy woodlands	Very low	1.40
			Very low	18.70	1330	Grassy woodlands	Low	18.70



Table 18: BAM plot survey effort for areas subject to vegetation zone mapping updates

BDAR		BAVR		Project footprint (ha)	Disturbance area (ha)	Plots required	Plots completed (BAVR)		Plots completed (BDAR)		Total plots completed
PCT ID	Condition	PCT ID	Condition				No.	Plot ID	No.	Plot ID	
1151	Very high	1155	High	11.64	5.07	3	2	BAM35IG	4	BY03714E	6
	High							BY-037A			
								BAM1IG		BY037F1D	
								BY035D53			
	Very high	1155	Moderate	13.29	5.6	3	8	BAM2 IG	6	BY056C93	14
	High							BAM3 IG		BY-054A	
								BY054-01		BY0369DB	
								BY054-02		BY036053	
								BY054-03		BY0362A1	
								BY054-04		BY-054B	
								BY056-01			
								BY056-02			
	Low	1155	Low	33.49	2.12	2	0	-	3	BY-05C	3
	Very low									BY-05D	
										BY-037B	
Very low	1155	Very low	0.82	0.02	1	0	-	1	BY034D07	1	
1330									Low	351	High
	BY097-02										
Total						11	12	-	14	-	26



4.1.1 Supplementary RDP surveys in PCT 1330

Table 19: Supplementary RDP surveys in PCT 1330

Condition class	Subject to mapping updates	Area (ha)	RDPs	Description
Low changed to Very low	Yes	1.40	One: – BY-101_1 (Figure 4b)	<p>PCT 1330 in very low condition is a cleared paddock with very sparse canopy cover and no midstory species. The ground cover had an 80% cover of exotic species, including <i>Phalaris aquatica</i>, <i>Anthoxanthum odoratum</i>, <i>Dactylis glomerata</i> and <i>Trifolium repens</i>.</p>  <p>Plate 2: Very low condition (photo taken at RDP BY-101_1)</p>



Condition class	Subject to mapping updates	Area (ha)	RDPs	Description
Very Low changed to Low	No	18.70	Five: <ul style="list-style-type: none"> – BY-097-2_2 – BY-097-2_3 – BY-097-2_4 – BY-101_5 – BY-101_6. (Figure 4b)	<p>The area of PCT 1330 in very low condition subject to supplementary surveys occurred on lower slopes in cleared paddocks intersected by intermittent streams. It is flanked by remnant vegetation consistent with PCT 351 in high condition.</p> <p>No regeneration of canopy species was recorded. The midstorey was dominated by common pioneer species, including <i>Cassinia arcuata</i>, <i>Acacia dealbata</i> and <i>Acacia falciformis</i>. The ground layer was mid-dense to dense, and dominated by native perennial grasses, including <i>Poa sieberiana</i>, <i>Themeda triandra</i> and <i>Microlaena stipoides</i>.</p> <p>PCT 351 was considered for this area. This was due to the following:</p> <ul style="list-style-type: none"> – The area was flanked by PCT 351 in high condition – The area occurs on lower slopes which is consistent with the PCT 351 description – Midstory species recorded, including <i>Cassinia arcuata</i>, <i>Acacia dealbata</i>, <i>Acacia falciformis</i>, are consistent with the PCT 351 description – The groundcover was dominated by <i>Poa sieberiana</i> which is consistent with the PCT 351 description. <p>However, PCT 1330 was ultimately assigned to this area. This is due to the following:</p> <ul style="list-style-type: none"> – Vegetation mapping to the east and the west of the area mapped PCT 1330 in the same landscape position – Midstory species present are common pioneer species and do not provide a strong justification for PCT allocation – <i>Poa sieberiana</i> is a hardy native grass that likely proliferates in response to canopy clearing – The absence of PCT 1330 diagnostic canopy and midstory species may be due to disturbance history – The description of PCT 1330 has a low confidence level and lacks sufficient diagnostic detail, and it is therefore challenging to demonstrate its absence where justification is required.



Condition class	Subject to mapping updates	Area (ha)	RDPs	Description
				<div></div> <p>Plate 3: Low condition (photo taken at RDP BY-097-2_3)</p>



4.1.2 PCT 1155 description

Table 20: PCT 1155 description

PCT 1155 - Silvertop Ash - Narrow-leaved Peppermint open forest on ridges of the eastern tableland, South Eastern Highlands Bioregion and South East Corner Bioregion	
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	South East Dry Sclerophyll Forests
Conservation status	PCT 1155 is not associated with a TEC.
% remaining in NSW	80
Extent	PCT 1155 occurs on sandy loams on ridges and dry slopes of the eastern tablelands and Great Dividing Range at 650 to 1200 m altitude, from the western Blue Mountains to Deua National Park.
Area within the project footprint subject to change	Crookwell: <ul style="list-style-type: none"> – Very low: 0.82 ha – Low: 33.49 ha – Moderate: 13.29 ha – High: 11.64 ha Total: 59.00 ha
Diagnostic canopy species for PCT 1155	Diagnostic canopy species for PCT 1155 include <i>Eucalyptus sieberi</i> (Silvertop Ash), <i>Eucalyptus radiata</i> subsp. <i>radiata</i> , <i>Eucalyptus dives</i> (Broad-leaved Peppermint) and <i>Eucalyptus blaxlandii</i> (Blaxland's Stringybark).
Diagnostic midstorey species for PCT 1155	The midstorey is described as open and includes <i>Hibbertia obtusifolia</i> , <i>Leucopogon lanceolatus</i> , <i>Monotoca scoparia</i> and <i>Persoonia linearis</i> .
Diagnostic groundcover species for PCT 1155	The ground stratum is dominated by <i>Dianella revoluta</i> var. <i>revoluta</i> , <i>Gonocarpus tetragynus</i> , <i>Lomandra longifolia</i> , <i>Poa sieberiana</i> and <i>Pteridium esculentum</i> .
Condition and presence of weeds	Within the area subject to mapping updates, PCT 1155 occurs in the project footprint as four condition types: <ul style="list-style-type: none"> – Very low – Low – Moderate – High Exotic species are present throughout all of PCT 1155, with a higher cover in very low and low condition classes.
BAM plots taken during supplementary survey	BAM 35 IG, BAM1 IG, BAM2 IG, BAM3 IG, BY054-01, BY054-02, BY054-03, BY054-04, BY056-01 and BY056-02.
Justification of evidence used to identify the PCT	PCT 1155 occurs on sandy loams on ridges and dry slopes of the eastern tablelands and Great Dividing Range at 650 to 1200 m altitude. Majority of the PCT in the project footprint occurs on the Rockley Plains Mitchell Landscape which is described as low rolling hills on plateau surface some sandstone geology and Towrang Mitchell Landscape described as occurring on strike ridges and aligned hills with folded quartzose sandstone, siltstone, conglomerate shale and slate. Additionally, all of the PCT in the footprint occurs between approximately 850 - 930 m asl. PCT 1155 in the project footprint therefore aligns with the landscape description of PCT 1155.



PCT 1155 - Silvertop Ash - Narrow-leaved Peppermint open forest on ridges of the eastern tableland, South Eastern Highlands Bioregion and South East Corner Bioregion

The canopy of PCT 1155 within the project footprint was dominated by diagnostic canopy species *Eucalyptus sieberi*, *Eucalyptus dives* and *Eucalyptus radiata* subsp. *radiata*. The non-diagnostic canopy species *Eucalyptus rossii* and *Eucalyptus mannifera* were also prevalent throughout this PCT, however these species may be due to ecotonal variation.

The midstorey was typically open which is characteristic of PCT 1155. Diagnostic midstorey species recorded include *Hibbertia obtusifolia*, *Persoonia linearis* and *Monotoca scoparia*.

Plots sampled confirm the presence of groundcover species diagnostic of PCT 1155, including *Poa sieberiana*, *Pteridium esculentum*, *Gonocarpus tetragynus* and *Dianella revoluta*.

A full species list for all BAM plots collected during the original BDAR surveys can be found in Attachment 10 of the BDAR. A full species list for the BAM plots collected during the post-BDAR surveys can be found in Annex 9 and the extent of PCT 1155 within the project footprint is shown in Figure 4b - Flora results - vegetation.

Photos

No access to property - no photo available for PCT 1155 Very low.



Plate 4: Low condition (photo taken at RDP 38-1).



PCT 1155 - Silvertop Ash - Narrow-leaved Peppermint open forest on ridges of the eastern tableland, South Eastern Highlands Bioregion and South East Corner Bioregion



Plate 5: Moderate condition (photo taken at plot BAM2_IG)



Plate 6: High condition (photo taken at plot BAM1_IG)



4.1.3 PCT 351 description

Table 21: PCT 351 description

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	
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Southern Tableland Dry Sclerophyll Forests
Conservation status	Has associated TEC - but does not align with the vegetation present within the project footprint
% remaining in NSW	40
Extent	Occurs on shallow, yellow to red podzolic clay to loam soils derived from sedimentary, metamorphic and igneous substrates on footslopes and hillslopes in hill and plateau landform patterns on the western side of the northern half of the South Eastern highlands Bioregion with some patches in the upper NSW South-western Slopes Bioregion generally between Orange and Yass.
Area within the project footprint subject to change	Crookwell: 11.86 ha
Diagnostic canopy species for PCT 351	Diagnostic canopy species for PCT 351 include <i>Eucalyptus mannifera</i> subsp. <i>mannifera</i> often with <i>Eucalyptus macrorhyncha</i> , <i>Eucalyptus dives</i> , <i>Eucalyptus goniocalyx</i> and occasionally <i>Eucalyptus cinerea</i> . <i>Eucalyptus rossii</i> is also a recorded species.
Diagnostic midstory species for PCT 351	The midstory is sparse and commonly includes <i>Dillwynia phyllicoides</i> , <i>Dillwynia sericea</i> , <i>Daviesia leptophylla</i> , <i>Acacia gunnii</i> , <i>Hibbertia obtusifolia</i> , <i>Monotoca scoparia</i> , <i>Gompholobium huegelii</i> and <i>Pultenaea procumbens</i> . <i>Cassinia arcuata</i> , <i>Cassinia aculeata</i> and <i>Acacia falciformis</i> are also recorded midstory species.
Diagnostic groundcover species for PCT 351	The ground stratum includes the grass species <i>Poa sieberiana</i> var. <i>sieberiana</i> , <i>Joycea pallida</i> , <i>Aristida ramosa</i> , <i>Echinopogon caespitosus</i> var. <i>caespitosus</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i> , <i>Austrodanthonia tenuior</i> and <i>Austrodanthonia eriantha</i> . The mat-rushes <i>Lomandra filiformis</i> subsp. <i>coriacea</i> and <i>Lomandra multiflora</i> subsp. <i>multiflora</i> may be abundant. Forb species include <i>Dianella revoluta</i> var. <i>revoluta</i> , <i>Gonocarpus tetragynus</i> , <i>Stylidium graminifolium</i> , <i>Goodenia hederacea</i> subsp. <i>hederacea</i> and <i>Senecio quadridentatus</i> .
Condition and presence of weeds	PCT 351 occurs in the project footprint as one condition type: – High Exotic species are present with a sparse cover throughout PCT 351.
BAM plots taken during supplementary survey	BY097-01 and BY097-02.
Justification of evidence used to identify the PCT	PCT 351 mapped within the project footprint had a canopy dominated by <i>Eucalyptus rossii</i> and <i>Eucalyptus mannifera</i> . Other canopy species present included <i>Eucalyptus goniocalyx</i> , <i>Eucalyptus dives</i> and <i>Eucalyptus macrorhyncha</i> with a low cover. The midstory was sparse to mid-dense, decreasing in cover in heavily wooded areas, and had a low species diversity. It was dominated by <i>Cassinia arcuata</i> and <i>Cassinia aculeata</i> , with <i>Acacia falciformis</i> and <i>Hibbertia obtusifolia</i> throughout with a lower cover.



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

	<p>The ground cover was mid-dense and dominated by the hardy grasses <i>Poa sieberiana</i> and <i>Microlaena stipoides</i>. Other common groundcover species observed include <i>Pteridium esculentum</i>, <i>Gonocarpus tetragynus</i> and <i>Hydrocotyle laxiflora</i>.</p>
Justification for change from PCT 1330 to PCT 351	<p>The area assigned to PCT 351 from PCT 1330 during the supplementary surveys had a canopy dominated by <i>Eucalyptus rossii</i> and <i>Eucalyptus mannifera</i>. Other canopy species including <i>Eucalyptus goniocalyx</i>, <i>Eucalyptus dives</i> and <i>Eucalyptus macrorhyncha</i> were also present with a low cover. This is consistent with the canopy description of PCT 351. In contrast, species diagnostic of PCT 1330, including <i>Eucalyptus melliodora</i> and <i>Eucalyptus blakelyi</i>, were absent throughout the mapped area.</p> <p>The midstory was sparse to mid-dense and dominated by <i>Cassinia arcuata</i> and <i>Cassinia aculeata</i>, with <i>Acacia falciformis</i> throughout. The relatively high cover of these pioneer species and the lack of shrub diversity observed is likely due to past disturbance. However, the presence of these species throughout the mapped area suggests that they are characteristic of the vegetation. These species are consistent with the midstory description of PCT 351. In contrast, species diagnostic of PCT 1330, including <i>Lissanthe strigosa</i> and <i>Melichrus urceolatus</i>, were absent throughout the mapped area.</p> <p>The ground cover was sparse to mid-dense and dominated by the hardy grasses <i>Poa sieberiana</i> and <i>Microlaena stipoides</i>, which is consistent with groundcover description of PCT 351. In contrast, <i>Poa sieberiana</i> is not listed as a diagnostic species of PCT 1330.</p> <p>The descriptive justification provided above of the area assigned PCT 351 in high condition is supported by the BAM plots BY097-01 and BY097-02, as well as the RDPs 97-4, 97-5, 97-7, 97-8, 97-9, 97-10, 97-12 and 101-1-BB which are stratified throughout the remnant vegetation (Figure 4b).</p> <p>PCT 351 has previously been identified elsewhere within the amended project footprint, with 112.72 ha mapped in the Murrumbateman IBRA subregion. The closest patch of previously mapped PCT 351 is approximately 30 km away from the area described above. PCT 351 is known to occur in the Crookwell IBRA subregion, as noted in the BioNet Vegetation Classification description. Areas of PCT 351 in the Murrumbateman IBRA subregion are similar to the newly assigned areas. These areas are also dominated by the canopy species <i>Eucalyptus mannifera</i>, <i>Eucalyptus macrorhyncha</i>, <i>Eucalyptus dives</i> and <i>Eucalyptus goniocalyx</i>, have a sparse midstorey with dominant species <i>Cassinia aculeata</i> and <i>Hibbertia obtusifolia</i>, and a sparse to mid-dense groundcover dominated by <i>Poa sieberiana</i>. The original justification for PCT 351 can be found in Attachment 10 of the BDAR.</p>



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

Photos



Plate 7: High condition (photo taken at BAM plot BY-097-02).



Plate 8: High condition (photo taken at RDP 97-7).



4.2 Revised habitat constraint mapping (BAM step 2)

A review of habitat constraint mapping was undertaken incorporating the outcomes of supplementary survey, as documented in the following sections.

4.2.1 Hollows & Hollow-bearing trees

A total of 7339 tree hollows have been recorded within and immediately adjacent to the project footprint, as shown in Figure 3b. This includes 5,594 hollows mapped during the BDAR phase and an additional 1,745 hollows recorded as a part of the supplementary surveys.

Table 22 documents the revised hollow constraints for each candidate owl and parrot species. This mapping has informed the development of revised species polygons for all species noted.

As outlined in Section 2.3, LiDAR vegetation heights were used to inform potential habitats for hollow-dependent candidate fauna within inaccessible lands. These locations are noted as remaining hollow-bearing tree (HBT) data gaps in the table below.

Table 22: Habitat constraints for hollow-dependent species

Species	Hollow constraints applied	Total extent of potential habitat within the project footprint (ha)	Total number of tree hollows intersecting habitats	Average hollow density within habitats subject to constraint mapping ¹	Lands where HBT data gaps remain (ha) ²
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	≥7 cm diameter and more than 3 m above the ground plus 200m buffer	1,901.08	4380	3.63 hollows per ha	695.01
<i>Calyptrorhynchus lathamii lathamii</i> (South-eastern Glossy Black-Cockatoo)	>15 cm diameter and more than 8 m above the ground plus 200m buffer	177.78	426	3.21 hollows per ha	44.94
<i>Polytelis swainsonii</i> (Superb Parrot)	≥5 cm diameter and more than 4 m above the ground plus 100m buffer	949.05	2338	3.19 hollows per ha	216.43
<i>Ninox connivens</i> (Barking Owl)	>20 cm diameter and more than 4 m above the ground plus 300m buffer	1,261.13	836	1.12 hollows per ha	514.51
<i>Ninox strenua</i> (Powerful Owl)	>20 cm diameter and more than 4 m above the ground plus 300m buffer	1,255.68	751	1.14 hollows per ha	596.34



Species	Hollow constraints applied	Total extent of potential habitat within the project footprint (ha)	Total number of tree hollows intersecting habitats	Average hollow density within habitats subject to constraint mapping ¹	Lands where HBT data gaps remain (ha) ²
<i>Tyto novaehollandiae</i> (Masked Owl)	>20 cm diameter and more than 4 m above the ground plus 300m buffer	1,013.19	783	1.38 hollows per ha	444.63
<i>Tyto tenebricosa</i> (Sooty Owl)	>20 cm diameter and more than 4 m above the ground plus 300m buffer	140.71	25	2.13	128.97

¹ Calculated across species habitats and excluding any HBT gaps.

² Note- these have been addressed within the species polygons using LiDAR vegetation height data as documented in Section 2.3 of this report.

4.2.2 Stick nests

A total of 15 nests were recorded during supplementary surveys, including two medium and 13 large nests supporting potential breeding opportunities for Little Eagle and Square-tailed Kite raptor species (Figure 3b).

Whilst breeding activity was not observed at these locations, a conservative approach has been adopted given there is potential for these nests to support future breeding opportunities. As such, a 300 m buffer was applied to these stick nest locations and associated habitats included in the species polygons for Little Eagle and Square-tailed Kite. Full methodology for constraints mapping and polygon development for the White-bellied Sea-eagle is detailed below.

Remaining survey gaps have been identified for approximately 754.51 ha (9%) of land within the project footprint, where land access has been limited. LiDAR canopy height mapping was used to address remaining stick nest data gaps in accordance with Attachment 1 Section 2.2.1 of the BDAR.

White-bellied Sea-eagle

A revised methodology has been adopted for White-bellied Sea-eagle constraints/species polygon development, described below:

1. Suitable streams were buffered by 1km either side.
2. All suitable stick nests (correct height from ground and size) within an associated PCT/IBRA subregion that is located within 1km of a suitable White-bellied Sea-eagle stream has been identified and buffered by 500m.
3. Where data gaps remain within the 1 km buffer to the streams, LiDAR data has been used as a proxy for nests, where the LiDAR tree heights are >20 m tall and within an associated PCT.
4. These native vegetation within these areas (suitable stick nest buffer and LiDAR polygons) have been retained and merged to create the species constraints mapping and incorporated into the species polygon as "assumed presence".

An example of step 1 and 2 above is provided in Plate 9. Suitable stick nest is depicted with a green point, the 1 km buffer to suitable streams is shown in blue, the 500 m buffer to the stick nest shown in white, and native vegetation incorporated into the constraints mapping and species polygon shown in purple.

An example of step 1 and 3 above is provided in Plate 10. Suitable LiDAR mapping (height >20 m) shown in yellow, and the 1 km buffer to suitable streams is shown in blue. This plate also shows an example of a suitable



stick nest, shown in green, located outside the suitable stream buffer, which has not been incorporated into the constraint mapping and species polygon.



Plate 9: Stick nests within proximity to streams suitable for White-bellied Sea-eagle

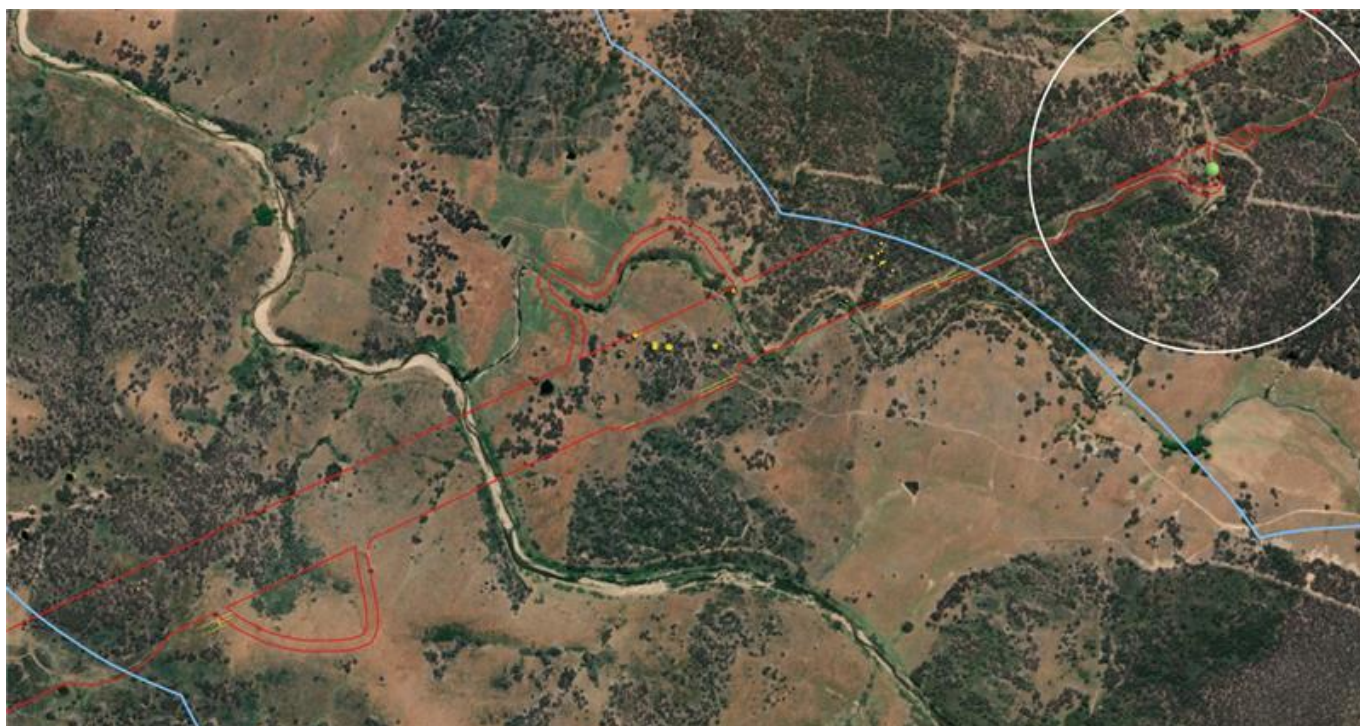


Plate 10: LiDAR tree heights >20m used as a proxy for suitable stick nests

4.2.3 Surface rock

Approximately 1,695.52 ha of rocky habitat offering suitable shelter sites for Pink-tailed Legless Lizard habitat has been identified within the project footprint (Figure 3a). This includes 412.73 ha of habitat subject to ground truthing during supplementary surveys. An abundance of suitably sized flat rocks, approximately 100 – 300 mm wide by 50 – 150 mm deep were identified in these areas. Surface rock within approximately 1,282 ha of remaining lands is assumed to occur based on the interpolation of high-resolution LiDAR imagery, undertaken during the BDAR phase. These lands were not subject to ground-truthing during supplementary surveys due to access limitations and resource constraints.

All confirmed and potential rocky habitats have been buffered by 50m and included in the species polygon for Pink-tailed Legless Lizard.

Surface rock was confirmed absent from another 1,960.69 ha of land subject to supplementary survey. These habitats have been removed from further consideration.

4.2.4 Bat roosts

Approximately 10.57 ha of potential foraging habitat for Large-eared Pied Bat (*Chalinolobus dwyeri*) was assessed as a part of the project BDAR due to the potential presence of roosts within a 2km radius of the project footprint. These potential roosts comprised approximately 13.68 ha of desktop modelled rocky habitat as shown in Figure 3a. Further desktop and field assessment of these features was undertaken during the supplementary survey period to confirm their suitability for Large-eared Pied Bat. A summary of the assessment outcomes is presented below with further detail provided in Annex 11.

Approximately 13.18 ha of rocky habitat was excluded by means of desktop interpolation of aerial imagery and based on factors described in Table 8. The remaining 0.50 ha was subject to further visual field assessments to confirm the presence of suitable habitats (i.e. crevices, overhangs, etc). Whilst the visual assessments indicated an absence of suitable breeding features, two Anabat recorders were conservatively deployed in proximity to these



locations for a total of 14 recorder nights. No suitable roost habitat was observed and no Large-eared Pied Bat species calls were detected through survey. A detailed breakdown of desktop and field assessment results are provided in Annex 10, and further spatial data pertaining to this assessment has been provided (Habitat absence data and Potential bat roost datasets).


Although the Large-eared Pied Bat was included in this assessment in accordance with CPHR guidance, available evidence suggests that suitable habitat for the species is unlikely to occur within the project footprint. The species is primarily associated with sandstone and conglomerate cliffines (OEH, 2014, DERM, 2011, DCCEEW, 2023), particularly within the Bungonia and northern Inland Slopes IBRA subregions where these features are prevalent. The geology of the southern Inland Slopes subregion, where much of the modelled karst habitat within HumeLink footprint lies, is dominated by different landforms and lacks the continuous cliffline structures typically required by the species to support breeding habitat. While some areas assessed contain low-quality karst features, these are considered less ecologically relevant to this species. Additionally, portions of the study area near Wagga Wagga fall outside the endorsed distribution of Large-eared Pied Bat, as mapped by a recognised species experts (Australasian Bat Society: BatMap). As such, while the species was considered during this BAVR, the likelihood of occurrence within the surveyed areas is considered very low based on a combination of desktop analysis, field validation, and current scientific understanding of habitat preferences and distribution.

4.3 Further assessment of microhabitats (BAM step 3)


Potential habitats for candidate species were further assessed in accordance with Step 3 of the BAM. Table 23 outlines the outcomes of these assessments in relation to relevant species. For greater detail on the habitat assessment results for Stuttering Frog (*Mixophyes balbus*), refer to Annex 10.




Table 23: Supplementary habitat assessment results and comparison of potential habitat extent for the project footprint

Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Where suitable habitat features (described in Section 4.3) were not present, these areas were excluded from being considered as potential habitat (Plate 9) Although large areas of habitat were excluded through this process, additional areas of potential habitat were identified, which resulted in the total area of potential habitat increasing compared to the BDAR.	 Plate 11: Habitat not suitable for <i>Litoria castanea</i>	7.06	8.82 (including 7.74ha of native habitats and 1.08ha of non-native habitats)



Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
<i>Mixophyes balbus</i> (Stuttering Frog)	Mapped streams and surrounding areas (up to 100 m away from water) were assessed for presence of ephemeral or permanent pools, visible pollution present, and presence of emerging aquatic vegetation. Habitat considered not suitable for the Stuttering Frog was based primarily on areas with no deep permanent pools or suitable leaf litter/vegetation in surrounds, such as eroded drainage areas with no flowing water, small stagnant pools, or areas neighbouring grassy ground cover (Plate 10).	 Plate 12: Habitat not suitable for <i>Mixophyes balbus</i>	58.85	35.98




Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
<i>Caladenia montana</i> (Mountain Spider Orchid)	<p>Areas within the <i>Caladenia montana</i> species polygon that contained the following microhabitat features were excluded from survey and were removed from the updated species polygon based on the habitat unsuitability of the species as determined by orchid specialists:</p> <ul style="list-style-type: none"> – Dense stands of blackberry severely restricting light penetration to the understory (Plate 11) – Dense post-fire regrowth (Plate 12) – Dense vegetation restricting light penetration to the understory (Plate 13) – Areas of permanently moist, poorly drained soils – Extensive disturbance and weed incursion 	 <p>Plate 13: Dense blackberry not suitable habitat for <i>Caladenia montana</i></p>	633.46	627.55




Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
		 <p>Plate 14: Dense post-fire regrowth restricting light penetration for <i>Caladenia montana</i></p>		




Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
		 <p>Plate 15: Dense vegetation restricting light penetration for <i>Caladenia montana</i></p>		




Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
<i>Calotis glandulosa</i> (Mauve Burr-daisy)	<p>Areas within the <i>Calotis glandulosa</i> species polygon that contained the following microhabitat features were excluded from survey and were removed from the updated species polygon based on habitat unsuitability for the species:</p> <ul style="list-style-type: none">– Dense thickets of blackberry (Plate 14)– Dense soft plantation areas with minimal light penetration and dense pine leaf litter.	 <p>Plate 16: Dense blackberry thickets in mapped <i>Calotis glandulosa</i> potential habitat</p>	12.73	11.33



Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	<p>Areas within the <i>Pterostylis oreophila</i> species polygon that contained the following microhabitat features were excluded from survey and were removed from the updated species polygon based on habitat unsuitability for the species, as determined by orchid specialists:</p> <ul style="list-style-type: none"> – Dry vegetation/soils on upper slopes of creek lines (Plate 15) – Lack of <i>Leptospermum</i> sp. (Plate 16) – Dry soils (Plate 15) – Open areas – Standing water (Plate 16) – Dense cover of native sedges (ie. <i>Carex</i> sp.) (Plate 16) 	 <p>Plate 17: Dry areas on upper banks of creek lines in mapped potential <i>Pterostylis oreophila</i> habitat</p>	2.64	1.55



Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
		 <p>Plate 18: Lack of <i>Leptospermum</i> spp, presence of standing water, open areas and dense cover of sedges</p>		
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	<p>Areas within the <i>Thelymitra alpicola</i> species polygon that contained the following microhabitat features were excluded from survey and were removed from the updated species polygon based on habitat unsuitability for the species, as determined by orchid specialists:</p> <ul style="list-style-type: none"> – Dry vegetation on upper slopes of creek lines (Plate 15) 	See Plate 15	2.04	1.23
<i>Acacia flocktoniae</i> (Flockton Wattle)	Correspondence with CPHR and Steve Douglas (Accountable Officer for <i>Acacia flocktoniae</i>)	N/A	57.02	9.51



Species	Further microhabitat assessment considerations	Plates	Potential habitat BDAR (ha)	Revised potential habitat (ha)
	indicated that suitable habitat for the species should be limited to PCT 870 in the Bungonia IBRA subregion, resulting in removal of all other PCTs within that IBRA subregion.			



4.4 Candidate species survey results (BAM step 4 and 5)

4.4.1 Threatened flora survey results

Targeted surveys were undertaken to inform the presence/absence of all target flora species listed in Table 6, with non-target species being opportunistically surveyed at the same time where habitats coincided and reasonable survey effort could be undertaken. Based on the result of the current surveys, the following threatened species were directly recorded within the 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* (Rice Flower) 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
- *Prasophyllum innubum* (Brandy Marys 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
- *Thelymitra alpicola* (Alpine Sun-orchid) listed as vulnerable under the BC Act
- *Xerochrysum palustre* (Swamp Everlasting) listed as endangered under the EPBC Act.

Two species have been completely excluded from the project footprint as a result of the supplementary surveys:

- *Calotis glandulosa* (Mauve Burr-Daisy) listed as vulnerable under the BC Act and EPBC Act
- *Pterostylis oreophila* (Blue-tongued Greenhood) listed as critically endangered under the BC Act and EPBC Act

A summary of the results of the flora surveys is given below in Table 24 for the project footprint, outlining the extent of occupied habitat and remaining habitats where species presence is assumed. Reasons for the change in Assumed Presence between the BDAR and BAVR have also been included in the table below. Any increase in the extent of known habitat as a result of supplementary survey is shown in red. Comparative calculations are provided in relation to the BDAR results and exclude Category-1 exempt lands.



Table 24: Flora survey results

Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Acacia ausfeldii</i> (Ausfeld's Wattle)	Vulnerable	Not Listed	No	76.30	0.00	44.22	0.00	-32.08	Survey reduction	0.00
<i>Acacia bynoeana</i> (Bynoe's Wattle)	Endangered	Vulnerable	No	45.31	0.00	45.31	0.00	0.00	-	0.00
<i>Acacia flocktoniae</i> (Flockton Wattle)	Vulnerable	Vulnerable	No	57.02	0.00	1.77	0.00	-55.25	Survey reduction Habitat suitability assessment	0.00
<i>Ammobium craspedioides</i> (Yass Daisy)	Vulnerable	Vulnerable	No	1,955.60	10.05	1,740.41	10.54	-215.19	Survey reduction	0.49
<i>Baloskion longipes</i> (Dense Cord-rush)	Vulnerable	Vulnerable	No	5.81	0.00	5.81	0.00	0.00	-	0.00
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	Critically Endangered	Critically Endangered	Yes	31.39	0.00	24.34	0.00	-7.05	Survey reduction	0.00
<i>Bossiaea oligosperma</i> (Few-seeded Bossiaea)	Vulnerable	Vulnerable	No	9.93	0.00	9.93	0.00	0.00	-	0.00
<i>Caesia parviflora</i> var. <i>minor</i> (Small Pale Grass-lily)	Endangered	Not Listed	No	19.32	0.00	17.91	0.00	-1.41	Survey reduction	0.00



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Endangered	Vulnerable	Yes	246.48	0.00	171.71	0.00	-74.77	Survey reduction Habitat suitability assessment	0.00
<i>Caladenia montana</i> (Mountain Spider Orchid)	Vulnerable	Not Listed	No	633.46	0.00	394.47	0.00	-238.99	Survey reduction Habitat suitability assessment	0.00
<i>Calotis glandulosa</i> (Mauve Burr-Daisy)	Vulnerable	Vulnerable	Yes	12.73	0.00	0.00	0.00	-12.73	Survey reduction Habitat suitability assessment	0.00
<i>Commersonia prostrata</i> (Dwarf Kerrawang)	Endangered	Endangered	No	10.09	0.00	6.82	0.00	-3.27	Survey reduction	0.00
<i>Cullen parvum</i> (Small Scurf-pea)	Endangered	Not Listed	No	106.70	0.00	94.19	0.00	-12.51	Survey reduction	0.00
<i>Dillwynia glauca</i> (Michelago Parrot-pea)	Endangered	Not Listed	No	5.81	0.00	3.88	0.00	-1.93	Survey reduction	0.00
<i>Diuris aequalis</i> (Buttercup Doubletail)	Endangered	Endangered	No	278.33	0.00	278.13	0.00	-0.20 ¹²	Spatial typology review only	0.00

¹² This reduction is associated with a spatial typology clean up of the species polygon layer that involved the deletion of some small polygon slithers. No survey reductions have been applied.



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
									(see table footnote)	
<i>Diuris tricolor</i> (Pine Donkey Orchid)	Vulnerable	Not Listed	No	10.90	0.00	5.41	0.00	-5.49	Survey reduction	0.00
<i>Eucalyptus aggregata</i> (Black Gum)	Vulnerable	Vulnerable	No	6.96	0.00	4.99	0.00	-1.97	Survey reduction	0.00
<i>Eucalyptus macarthurii</i> (Paddys River Box, Camden Woollybutt)	Endangered	Endangered	No	16.44	0.00	5.39	0.00	-11.05	Survey reduction	0.00
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	Vulnerable	Vulnerable	Yes	4.53	0.00	3.21	0.00	-1.32	Survey reduction	0.00
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Endangered	Not Listed	Yes	42.20	0.00	16.54	0.00	-25.66	Survey reduction	0.00
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	Critically Endangered	Endangered	Yes	31.16	0.00	30.62	0.00	-0.54	Survey reduction	0.00
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	Critically Endangered	Critically Endangered	Yes	151.50	0.00	124.37	0.00	-27.13	Survey reduction	0.00
<i>Kunzea cabbagei</i> (Cabbage Kunzea)	Vulnerable	Vulnerable	No	38.39	0.00	14.92	0.00	-23.47	Survey reduction	0.00
<i>Lepidium hyssopifolium</i> (Aromatic Peppergrass)	Endangered	Endangered	No	374.37	0.00	352.31	0.00	-22.06	Survey reduction	0.00



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	Endangered	Endangered	No	1,107.75	23.39	927.03	23.86	-180.72	Survey reduction	0.47
<i>Persoonia marginata</i> (Clandulla Geebung)	Vulnerable	Vulnerable	No	30.18	0.00	30.16	0.00	-0.02	Survey reduction	0.00
<i>Persoonia mollis</i> subsp. <i>revoluta</i> (Soft Geebung)	Vulnerable	Vulnerable	No	3.88	0.00	3.88	0.00	0.00	-	0.00
<i>Phyllota humifusa</i> (Dwarf Phyllota)	Vulnerable	Vulnerable	No	45.45	0.00	19.64	0.00	-25.81	Survey reduction	0.00
<i>Pimelea bracteata</i> (Rice Flower)	Critically Endangered	Critically Endangered	Yes	14.97	1.08	5.59	20.56	-9.38	Survey reduction	19.48
<i>Pomaderris cotoneaster</i> (Cotoneaster Pomaderris)	Endangered	Endangered	No	37.22	0.00	37.17	0.00	0.05 ¹³	Spatial typology review only (see table footnote)	0.00
<i>Pomaderris delicata</i> (Delicate Pomaderris)	Critically Endangered	Critically Endangered	Yes	3.89	0.00	3.89	0.00	0.00	-	0.00
<i>Pomaderris pallida</i> (Pale Pomaderris)	Vulnerable	Vulnerable	Yes	6.45	0.00	6.12	0.00	-0.33	Survey reduction	0.00
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Critically Endangered	Critically Endangered	Yes	0.32	0.28	1.02	1.88	0.70	Habitat constraints identified -	1.60

¹³ This reduction is associated with a spatial typology clean up of the species polygon layer that involved the deletion of some small polygon slithers. No survey reductions have been applied.



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
									species habitat re-mapped.	
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Critically Endangered	Critically Endangered	Yes	5.12	0.00	0.00	1.50	-5.12	Survey reduction	1.50
<i>Prasophyllum keltonii</i> (Kelton's Leek-orchid)	Critically Endangered	Critically Endangered	Yes	-	0.20	0.88	1.95	0.88	Habitat constraints identified – species habitat re-mapped	1.75
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Endangered	Endangered	No	303.41	0.00	254.80	0.00	-48.61	Survey reduction	0.00
<i>Pterostylis alpina</i> (Alpine Greenhood)	Vulnerable	Not Listed	No	22.67	0.00	17.77	0.00	-4.90	Survey reduction	0.00
<i>Pterostylis foliata</i> (Slender Greenhood)	Vulnerable	Not Listed	No	124.67	0.00	91.71	0.00	-32.96	Survey reduction	0.00
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	Critically Endangered	Critically Endangered	Yes	2.64	0.00	0.00	0.00	-2.64	Survey reduction Habitat suitability assessment	0.00



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Pultenaea humilis</i> (Dwarf Bush-pea)	Vulnerable	Not Listed	No	141.15	0.00	122.88	0.00	-18.27	Survey reduction	0.00
<i>Senecio garlandii</i> (Woolly Ragwort)	Vulnerable	Not Listed	No	90.16	0.00	89.84	0.00	-0.32 ¹⁴		0.00
<i>Solanum armourense</i>	Endangered	Not Listed	Yes	1.60	0.00	2.49	0.00	0.89	Previous survey effort reductions reverted due to survey requirements not being previously met.	0.00
<i>Swainsona recta</i> (Small Purple-pea)	Endangered	Endangered	No	453.32	0.00	336.26	0.00	-117.06	Survey reduction	0.00
<i>Swainsona sericea</i> (Silky Swainson-pea)	Vulnerable	Not Listed	No	789.69	0.00	599.56	0.00	-190.13	Survey reduction	0.00
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	Vulnerable	Not Listed	No	2.04	0.00	0.00	0.29	-2.04	Survey reduction Habitat suitability assessment	0.29

¹⁴ This reduction is associated with a spatial typology clean up of the species polygon layer that involved the deletion of some small polygon slithers. No survey reductions have been applied.



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Thesium australe</i> (Austral Toadflax)	Vulnerable	Vulnerable	No	1,014.53	0.00	880.66	0.00	-133.87	Survey reduction	0.00
<i>Xerochrysum palustre</i> (Swamp Everlasting)	Not Listed	Vulnerable	No	2.17	0.66	0.00	0.66	-2.17	Survey reduction	0.00



4.4.2 Threatened fauna survey results

Targeted surveys were undertaken to inform the presence/absence of targeted candidate threatened fauna species within the project footprint. The following threatened species were directly recorded within the project footprint during the supplementary surveys:

- *Cercartetus nanus* (Eastern Pygmy-possum) listed as vulnerable under the BC Act
- *Callocephalon fimbriatum* (Gang-gang Cockatoo) listed as vulnerable under the BC Act
- *Tyto novaehollandiae* (Masked Owl) listed as vulnerable under the BC Act
- *Ninox strenua* (Powerful Owl) listed as vulnerable under the BC Act
- *Polytelis swainsonii* (Superb Parrot) listed as vulnerable under the BC Act and EPBC Act

Two candidate fauna species were completely excluded from the project footprint through the supplementary surveys and habitat constraint mapping:

- *Pseudomys fumeus* (Smoky Mouse) listed as critically endangered under the BC Act and endangered under the EPBC Act
- *Chalinolobus dwyeri* (Large-eared Pied Bat) listed as endangered under the BC Act and EPBC Act

A summary of the results of the fauna surveys is given below in Table 25 for the project footprint, including extent of known habitat and remaining habitats where species presence is assumed. Comparative calculations are provided in relation to the post-BDAR results at the time of project approval and exclude Category-1 exempt lands.

In summary:

- Known habitat extent increased for four candidate fauna species as a result of survey detections: Eastern Pygmy-possum, Masked Owl, Powerful Owl, and Superb Parrot. Despite these detections, an overall reduction in the extent of habitat was achieved as a result of survey for all species noted except Superb Parrot.
- The extent of potential habitat has increased for Yellow-spotted Tree Frog, Gang-gang Cockatoo and candidate raptor species, as a result of supplementary habitat assessments and constraint mapping (Section 4.2 and Section 4.3).
- The extent of known habitat has decreased for four candidate fauna species: Pink-tailed Legless Lizard, Gang-gang Cockatoo, Glossy Black-Cockatoo and White-bellied Sea-eagle. This occurred as a result of supplementary habitat assessments and constraint mapping undertaken concurrently with targeted survey.
- The presence of six candidate species continues to be assumed within severely burnt habitats intersecting the project footprint:
 - Koala
 - Barking Owl
 - Powerful Owl
 - Masked Owl
 - Sooty Owl
 - Alpine She-oak Skink



Table 25: Fauna survey results

Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	Vulnerable	Vulnerable	No	257.42	36.15	190.90	36.14	-66.52	Survey reduction	-0.01
<i>Burhinus grallarius</i> (Bush Stone-curlew)	Endangered	Not listed	No	355.53	-	49.11	-	-306.42	Survey reduction	-
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Vulnerable	Endangered	No	81.07	1,940.58	153.73	1,768.57	72.66	Habitat constraint identified (Section 4.2.1)	-172.01
<i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	Vulnerable	Not listed	No	181.25	32.92	150.21	27.40	-31.04	Habitat suitability assessment	-5.52
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Vulnerable	Not listed	No	862.11	62.09	729.00	181.19	-133.11	Survey reduction	119.10
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Endangered	Endangered	Yes	5.30	-	-	-	-5.30	Survey reduction	-
<i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink)	Endangered	Endangered	No	107.48	-	50.55	-	-56.93	Survey reduction	-
<i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle)	Vulnerable	Not listed	No	10.47 ³	0.74 ³	46.09	0.21	35.62	Habitat constraint identified (Section 4.2.2)	-0.53



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Hieraaetus morphnoides</i> (Little Eagle)	Vulnerable	Not listed	No	257.43 ³	0.25 ³	439.87	-	182.44	Habitat constraint identified (Section 4.2.2)	-0.25
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Endangered	Vulnerable	Yes	7.06	-	7.74	-	0.68	Habitat constraint identified (Section 4.3)	-
<i>Lophoictinia isura</i> (Square-tailed Kite)	Vulnerable	Not listed	No	101.17 ³	-	287.81	-	186.63	Habitat constraint identified (Section 4.2.2)	-
<i>Mixophyes balbus</i> (Stuttering Frog)	Endangered	Vulnerable	Yes	58.85	-	3.21	-	-55.64	Survey reduction Habitat suitability assessment	-
<i>Ninox connivens</i> (Barking Owl)	Vulnerable	Not listed	No	1,013.54 ³	26.81 ³	294.85	35.54	-718.69	Survey reduction	8.72
<i>Ninox strenua</i> (Powerful Owl)	Vulnerable	Not listed	No	834.96 ³	20.07 ³	807.46	106.48	-27.50	Survey reduction	86.41
<i>Petroica rodinogaster</i> (Pink Robin)	Vulnerable	Not listed	No	121.41	-	39.18	-	-82.23	Survey reduction	-
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	Vulnerable	Not listed	No	503.88	-	414.68	-	-89.20	Survey reduction	-



Species	BC Act	EPBC Act	SAIL	BDAR result		Supplementary Survey result		Change		
				Assumed present (ha)	Known habitat (ha)	Assumed present (ha)	Known habitat (ha)	Assumed present		Known habitat (ha)
								Area (ha)	Justification	
<i>Phascolarctos cinereus</i> (Koala)	Endangered	Endangered	No	2,130.85	-	1,565.76	-	-565.09	Survey reduction	-
<i>Polytelis swainsonii</i> (Superb Parrot)	Vulnerable	Vulnerable	No	698.71	61.65	850.56	95.93	151.85	Habitat constraint identified (Section 4.2.1)	34.28
<i>Pseudomys fumeus</i> (Smoky Mouse)	Vulnerable	Vulnerable	No	13.17	-	-	-	-13.17	Survey reduction	-
<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable	Not listed	No	662.86 ³	-	323.29	19.18	-343.99	Survey reduction	19.18
<i>Tyto tenebricosa</i> (Sooty Owl)	Vulnerable	Not listed	Yes	140.85 ³	-	68.81	-	-72.04	Habitat constraint identified (Section 4.2.1)	34.28

¹Areas presented here have been calculated using the BDAR provisioned data. Values may not align with BAVR provisioned data.

²Including severely burnt lands

³Species expert areas



5. Species polygon development

Species polygons were prepared for candidate species using the following process:

- The extent of potential habitats was reviewed utilising the outcomes of supplementary habitat constraint mapping and further assessments where relevant (refer to Section 4.2 and 4.3). The methodology applied is documented in Section 5.1.
- The extent of occupied habitat was delineated in accordance with the methods outlined in Section 5.2 for threatened flora and Section 5.3 for threatened fauna.
- Any potential habitats that were not subject to survey were retained (as described in Section 2.3 and Section 5.1). Species presence within these habitats is assumed. The proportion of habitat for which species presence remains assumed is documented in Table 24 and Table 25 in relation to the project footprint.
- All occupied and remaining potential habitats were then overlayed with the approved project impact areas to calculate direct impacts in accordance with the approach outlined in Section 5.2 and Section 5.3.

5.1 Potential habitats subject to targeted survey

The results of the supplementary habitat and constraints assessments were interpreted, and the remaining extent of potential habitat was determined for each candidate species to inform targeted survey requirements in accordance with section 5.2.4 of the BAM.

Table 26 provides an overview of the approach adopted in accordance with Section 5.2.1 to 5.2.3 of the BAM.

Table 26: Summary of approach to delineating potential habitat for flora and fauna subject to targeted survey

BAM 2020	Summary of approach
Section 5.2.1	<p>Step 1: Potential habitats for candidate species were delineated according to TBDC prescriptions (unless variation was approved by CPHR) and using the following data:</p> <ul style="list-style-type: none">– The IBRA subregions, native vegetation cover, patch sizes and vegetation zones as mapped within the approved project footprint.– Vegetation zone map updates resulting from supplementary survey as documented in Section 4.1.– The outcomes of this process were as follows:<ul style="list-style-type: none">– PCT mapping updates in the Crookwell IBRA subregion resulted in a slight increase in habitat for three threatened flora species: <i>Ammobium craspedioides</i>; <i>Diuris aequalis</i> and <i>Leucochrysum albicans</i> subsp. <i>tricolor</i>.– No candidate species were removed or added to the assessment.– Species expert prescriptions for forest owls and raptors were abandoned and TBDC prescriptions adopted.– Potential habitat for <i>Acacia flocktoniae</i> (Flockton's Wattle) was reviewed and PCT 1150 and PCT 1330 within the Bungonia IBRA subregion excluded from consideration following advice received from CPHR on 4 October 2024 (refer to Section 2.2).
Section 5.2.2	<p>Step 2: Applies to candidate species with listed TBDC habitat constraints only. Potential habitats (as per Step 1) were overlayed with revised habitat constraint mapping, as documented in Section 4.2. This included the following steps for owls and raptors:</p> <ul style="list-style-type: none">– Owls:<ul style="list-style-type: none">– Suitable woody PCTs within 300m of suitable hollows (>20cm) were included in the species polygon.



BAM 2020	Summary of approach
	<ul style="list-style-type: none"> – Where HBT gaps were identified, LiDAR vegetation heights >10m were used to map potential habitats in these locations. A 300m buffer was then applied to all vegetation with heights >10m. – Lands where suitable hollows were confirmed absent were excluded from further consideration. – Severely burnt land remains assumed presence for all owls. – Raptors: <ul style="list-style-type: none"> – 15 Stick nests offering potential breeding opportunities for Square-tailed Kite and Little Eagle were buffered by 300m and included in the species polygon. – Two stick nests were located within 1 kilometre of a suitable stream for White-bellied Sea-eagle (as per Attachment 1 of the BDAR). A 500m buffer was applied to these nests and these habitats conservatively mapped within the species polygon. – Within the buffered areas surrounding each stick nest, all woody and non-woody vegetation within associated PCTs was included as part of the species polygons. – Where stick nest constraint mapping gaps were identified, LiDAR vegetation heights >20m were used to map potential habitats for raptor species (see Section 4.2.2). <p>The outcomes of this process were:</p> <ul style="list-style-type: none"> – One species (Large-eared Pied Bat) was removed from the assessment following confirmation of an absence of potential roost habitats within and adjacent to the project footprint (refer to Section 4.2.4). – The extent of habitat for hollow-dependent species was significantly refined within previously inaccessible lands where supplementary HBT mapping able to be collected. – As requested by CPHR, any hollows mapped immediately adjacent to the project footprint were used to inform the extent of potential habitats for hollow-dependent candidate fauna. – The extent of habitat for raptor species was significantly refined across all lands subject to supplementary survey, with many lands removed from consideration due to the confirmed absence of stick-nests. – Surface rock mapping refinements led to a reduction in potential habitat for Pink-tailed Legless Lizard (<i>Aprasia parapulchella</i>). – No other candidate species were added or removed from the assessment.
Section 5.2.3	<p>Step 3: Further habitat assessments were undertaken to confirm the presence/ absence of microhabitat features for several candidate species, in accordance with the methods documented in Section 2.3.</p> <p>The extent of potential habitat for these candidate species was updated to remove any lands from consideration where microhabitat features were confirmed absent, as detailed in 4.3 of this report.</p>



Table 27 summarises the relevant changes to the extent or nature of mapped potential habitats subject to supplementary survey, relative to the BDAR phase.

Table 27: Potential habitat mapping changes and relevant candidate species

Changes to potential habitat mapping applied post-BDAR	Relevant species
No changes to the extent of mapped potential habitats (i.e. consistent with the BDAR). Minor changes to address PCT updates only (where relevant)	<ul style="list-style-type: none"> – <i>Burhinus grallarius</i> (Bush Stone-curlew) – <i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink) – <i>Petroica rodinogaster</i> (Pink Robin) – <i>Pseudomys fumeus</i> (Smoky Mouse) – <i>Cercartetus nanus</i> (Eastern Pygmy-possum) – <i>Phascogale tapoatafa</i> (Brush-tailed Phascogale) – <i>Phascolarctos cinereus</i> (Koala)
Changes to the extent of mapped potential habitats due to the presence/ absence of suitable hollows in lands subject to survey	<ul style="list-style-type: none"> – <i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo) – <i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo) – <i>Polytelis swainsonii</i> (Superb Parrot) – <i>Ninox connivens</i> (Barking Owl) – <i>Ninox strenua</i> (Powerful Owl) – <i>Tyto novaehollandiae</i> (Masked Owl) – <i>Tyto tenbricosa</i> (Sooty Owl)
Changes to the extent of mapped potential habitats due to the presence/ absence of suitable stick nests in lands subject to survey	<ul style="list-style-type: none"> – <i>Hieraaetus morphnoides</i> (Little Eagle) – <i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle) – <i>Lophoictinia isura</i> (Square-tailed Kite)
Changes to the extent of mapped potential habitats due to the presence/ absence of suitable rocky habitats in lands subject to survey	<ul style="list-style-type: none"> – <i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard) – <i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)
Changes to the extent of mapped potential habitats due to the presence/ absence of riparian habitats supporting suitable breeding opportunities in lands subject to survey	<ul style="list-style-type: none"> – <i>Litoria castanea</i> (Yellow-spotted Tree Frog) – <i>Mixophyes balbus</i> (Stuttering Frog)

5.2 Delineating occupied habitats for threatened flora

Where a threatened flora species was recorded, a 30-metre buffer was generally applied to individual plant locations to delineate the extent of occupied habitats, noting the following exceptions:

- Threatened flora recorded in high densities (i.e. Yass Daisy): the extent of these populations was mapped in the field. Where threatened species were recorded in high density, the mean density was extrapolated by sampling over the observed area of occupancy (see Section 2.4).
- Threatened orchids: A conservative approach was developed in consultation with threatened orchid specialists Rob Humphries and Dr Lachlan Copeland addressing feedback from CPHR and Commonwealth DCCEEW consultation. The approach applied for each candidate threatened orchid species is outlined in Table 28 below.

Annex 6 presents record information of candidate flora and fauna species observed during the supplementary surveys.



Table 28: Approach to delineated occupied habitats for threatened orchids

Species	Species polygon method	Supplementary survey species polygon generation methods
<i>Prasophyllum bagoense</i> (Bago Leek Orchid) <i>Prasophyllum keltonii</i> (Kelton's Leek-orchid)	A 30m buffer was applied to the point record. These were incorporated into the remaining species polygons.	<p>Given multiple seasons of survey have been completed within potential habitat for these <i>Prasophyllum</i> species at MacPherson's Plain, historic records are considered to provide a reliable indication of species extent.</p> <p>Based on species conservation and expert advice, occupied habitat was delineated within 30m of all historic records (i.e. Niche, ELA, BCS/SOS, Forestry and Canberra Orchid Society), where the following statements were true:</p> <ul style="list-style-type: none"> – suitable PCTs extending 10 to 50m into adjacent woodland – Excluding lands within frequently inundated drainage depressions.
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Not recorded during the BDAR.	<p>Given potential habitat for this species has not been subject to the same level of inter-seasonal survey as other <i>Prasophyllum</i> species in MacPherson's Plain, a conservative approach to the mapping of occupied habitat has been adopted.</p> <p>Based on species conservation and expert advice, occupied habitat was delineated where the following statements were true:</p> <ul style="list-style-type: none"> – Within suitable areas of adjacent woodland PCTs extending no further than 50m – Supporting historic records (i.e. Niche, ELA, BCS/SOS, Forestry and Canberra Orchid Society) – Comprising a contiguous patch delineated using fine-scale digital elevation data and excluding lands within more frequently inundated drainage depressions.
All other threatened orchids	A 30m buffer was applied to the point record. These were incorporated into the species polygons.	As per the BDAR

5.3 Delineating occupied habitats for threatened fauna

Table 29 outlines the approach adopted to delineate the extent of occupied habitats for threatened fauna detected through supplementary survey. Occupied habitats are considered to comprise potential habitats within proximity to a species detection, as documented further below. The BDAR methods are also noted for context.



Table 29: Approach to delineating known habitats for threatened fauna

Species	BDAR methods	Supplementary survey species polygon generation methods
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	A 1km buffer was applied to breeding records (any records of two or more birds recorded between October to January)	A 1km buffer was applied to breeding records (any records of two or more birds recorded between October to January)
<i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	A 1km buffer was applied to breeding records (any records of two or more birds recorded between April to August)	No species detections
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	A 200m buffer was applied to species records	A review of the location and spread of species records in relation to the survey locations was undertaken following completion of the surveys. This analysis indicated that the species is likely distributed throughout the entire patch of potential habitat directly subject to survey. As such, these habitats were mapped as confirmed habitat.
<i>Ninox connivens</i> (Barking Owl)	A 1km buffer was applied to species records	No species detections
<i>Ninox strenua</i> (Powerful Owl)	A 1km buffer was applied to species records	A 1km buffer was applied to species records
<i>Polytelis swainsonii</i> (Superb Parrot)	A 1km buffer was applied to breeding records (records of 2 or more individuals recorded between September and November)	A review of the location and spread of species records in relation to the survey locations was undertaken following completion of the surveys. This analysis indicated that the species is likely distributed throughout the survey unit. On this basis, the species polygon was updated to reflect the extent of occupied habitat according to the patch extent.
<i>Tyto tenebricosa</i> (Sooty Owl)	No species detections	No species detections

5.4 Approach to assessing direct impacts

Direct impacts to vegetation and habitat for candidate species were informed by the HumeLink disturbance areas, within the approved project layout as documented in the BDAR. Approximately 1,846.00 ha of land will be subject to direct impacts, comprising the zones documented in Section 13.1 of the BDAR and noted in the glossary of this document. Any lands overlapping with the Snowy 2.0 Transmission Connection construction footprint were excluded from consideration.

The Final Layout Plans, as required by Condition C8 will be incorporated into a revised version of the BAVR as described in Section 1.4. A final clearing limit will then be calculated and communicated to Delivery Partners, and the BAM-C updated to calculate the amended credit liability for the project.

Revised clearing limits will be calculated following approval of this BAVR and will be communicated to Delivery Partners. In accordance with Condition B25, the clearing limit must not exceed the vegetation and habitat clearing limits specified in Appendix 2 of the project approval. If the revised clearing limit remains below the approved limits, no notification to the Department is required. If the revised clearing limit would exceed the



approved limits, separate approval under Condition B25 must be obtained from the Planning Secretary before implementation.

5.5 Approach to assessing indirect impacts

In accordance with BAM Section 8.2, an assessment of likely indirect impacts associated with edge effects and connectivity (BAM Section 6) was undertaken prior to project approval, adopting the methods outlined below in Table 30. A review of the revised mapping for relevant biodiversity matters (as documented in this BDAR and within provided spatial datasets) was undertaken adopting this same process and triggers for additional credit obligations and / or conservation measures have been included in Table 30.

The potential for new indirect and prescribed impacts, beyond those assessed in the BDAR, arising from additional clearing and disturbance has also been considered. This has been considered based on the results and outcomes of the surveys presented in this version of the BAVR with reference to the approved disturbance footprint and will be reviewed again in the revised BAVR that incorporates the final layout plans prior to clearing.

If new uncertain or indirect impacts are identified, triggers for additional credit obligations and / or consultation measures must be determined in consultation with CPHR.

The results of the review are documented in Section 6.2.

Table 30: Approach to assessing indirect impacts

Indirect impact consideration	Methodology	Trigger for additional credit obligations and/or conservation measures
Edge effects	<p>A 20 m buffer was applied to the disturbance areas. All ECZ and TCZ polygons were then erased from the buffered layer as woody vegetation within these lands would be subject to clearing. HTZ polygons were not removed from the buffered layer as woody vegetation would largely remain within these areas.</p> <p>The buffer layer was then intersected with the HumeLink native vegetation cover layer to remove non-native vegetation, non-woody vegetation and native vegetation with a total cover less than 10%. This vegetation is not relevant to the assessment of edge effects as it is non-native or subject to existing fragmentation and historic clearing.</p> <p>Aerial imagery was then reviewed in relation to remaining vegetation to identify evidence of existing land use disturbance and locations of likely existing edge effects. These were removed from further consideration.</p>	<p>The additional credit liability for edge effects will be calculated based on the assessment method using the agreed BAVR species polygons and the final layout plans and the average credits/ha for each affected PCT. The process for Edge Effect credit liability calculation and credit retirement is described in the HumeLink Biodiversity Offset Package (BOP) (Transgrid, 2025).</p>
Connectivity	<p>The HumeLink BOP (Transgrid, 2025) outlines the approach to calculating credit liability for residual prescribed impacts of connectivity on species most likely to be impacted.</p> <p>Where residual prescribed impacts due to connectivity loss are likely to remain, proposed offsets have been calculated by applying 5% of the total impact area per impacted species as a proportional connectivity loss. This method has been applied to the total impact area of affected species as a conservative measure, regardless of the species polygon intersection with a major,</p>	<p>The credit liability for connectivity impacts will be subject to recalculation once the Final Layout Plans are available, and the area of impact is known per species, along with the final location of connectivity corridors and degree to which these provide minimisation of impacts per species. The final liability will be reported through the BOP.</p> <p>The BMP Connectivity Strategy will be updated to reflect the BAVR species</p>



Indirect impact consideration	Methodology	Trigger for additional credit obligations and/or conservation measures
	moderate or minor connectivity corridor as identified in the BDAR.	polygons, incorporating the agreed results and outcomes documented in the BAVR.



6. Project Impacts

6.1 Direct impacts

Direct impacts to threatened entities subject to survey are provided in the below sections. The impact areas incorporate the results of the supplementary surveys and are provided with respect to the approved clearing limits.

In some cases, the supplementary survey results have resulted in the remaining known or assumed habitat areas exceeding the approved clearing limits with reference to the approved disturbance area. This was due to a number of factors, including:

- Threatened raptors were previously subject to an expert report during the BDAR, which had final habitat limits carried through to the project approval. The habitat extents have since been subject to a revised species polygon method which incorporates guidance provided in the TBDC for each species. This revision resulted in additional areas of assumed presence which could not be excluded during the supplementary surveys. Additional mitigation measures for these species are proposed, as described in Section 9 and Annex 12.
- Additional targeted orchid surveys and revised species polygon mapping methods (Table 12, Table 28) have identified additional areas habitats for various endangered orchids however the area of impact has reduced in comparison to the Approved Clearing Limit.
- Updates to vegetation mapping resulted in the addition of one PCT not previously mapped in the project footprint or subject to assessment in the BDAR. This change has resulted in exceedances of clearing limits for a number of PCTs, however this is due to no clearing proposed in the area of the new PCT. No additional impacts to TECs as a result of this change are expected.
- Updates to vegetation mapping resulted in the addition of one PCT not previously mapped in the project footprint or subject to assessment in the BDAR. This change has resulted in adjustments to clearing limits for affected PCTs however, the overall clearing limit remains unchanged. No additional impacts to TECs as a result of this change are expected, with impacts to Box Gum Woodland decreasing slightly.
- Any proposed increase to the clearing limits under Condition B25 is subject to the agreement of the Secretary. Approval of the BAVR does not constitute Secretary approval for any increase to these clearing limits.

6.1.1 Direct impacts to vegetation

Direct impacts to vegetation have been revised with consideration to the vegetation mapping updates (Section 4.1). Relevant updated PCTs and clearing extents have been provided below in Table 31. Any PCT clearing extents that exceed the clearing limit set out in the NSW Approval have been highlighted below in red.

Table 31: Change to direct impacts to vegetation

PCT ID	Veg formation	BAVR result (ha)			Project approval clearing limit (ha)		
		Partial clearing ¹	Full clearing ²	Total	Partial clearing ¹	Full clearing ²	Total
351 - Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	2.84	5.78	8.62 (+1.95)	1.46	5.22	6.67



PCT ID	Veg formation	BAVR result (ha)			Project approval clearing limit (ha)		
		Partial clearing ¹	Full clearing ²	Total	Partial clearing ¹	Full clearing ²	Total
731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	Grassy Woodlands	4.32	5.93	10.25 (+0.27)	4.32	5.95	10.27
1151 - Silvertop Ash - Broad-leaved Peppermint dry shrub forest of the South Eastern Highlands Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	0.00	0.00	0.00 ³ (-12.85)	7.40	5.44	12.85
1155 - Silvertop Ash - Narrow-leaved Peppermint open forest on ridges of the eastern tableland, South Eastern Highlands Bioregion and South East Corner Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	7.87	4.90	12.76 (+12.76)	0.00	0.00	0.00 ⁴
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	Grassy Woodlands	25.71	133.68	159.39 (-4.81)	26.99	137.20	164.20

1 Partial clearing comprises the HTZ and the ECZ

2 Full clearing comprises the TCZ only

3 PCT 1151 reassigned to PCT 1155 in the BAVR

4 PCT not recorded during the EIS

6.1.2 Direct impacts to flora

Direct impacts to threatened flora species have been revised with consideration to the results of the supplementary surveys. Updates to relevant flora species clearing extents have been provided below in Table 32. Two species' clearing extent (*Pimelea bracteata* and *Solanum armourense*) now exceeds the clearing limit set out in the NSW Approval. This value has been highlighted below in red and has occurred as a result of additional populations being found during supplementary survey. Justification for remaining assumed presence of SAIL species is identified within the table below.



Table 32: Direct impacts to flora

Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Acacia ausfeldii</i> (Ausfeld's Wattle)	Vulnerable	Not Listed	No	17.67	9.77	0.00	9.77
<i>Acacia bynoeana</i> (Bynoe's Wattle)	Endangered	Vulnerable	No	4.17	4.17	0.00	4.17
<i>Acacia flocktoniae</i> (Flockton Wattle)	Vulnerable	Vulnerable	No	11.25	0.00	0.00	0.00
<i>Ammobium craspedioides</i> (Yass Daisy)	Vulnerable	Vulnerable	No	297.74	252.43	2.57	255.00
<i>Baloskion longipes</i> (Dense Cord-rush)	Vulnerable	Vulnerable	No	1.31	1.31	0.00	1.31
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	Critically Endangered	Critically Endangered	Yes	6.31	4.25 ^{1, 2, 6}	0.00	4.25
<i>Bossiaea oligosperma</i> (Few-seeded Bossiaea)	Vulnerable	Vulnerable	No	2.42	1.86	0.00	1.86
<i>Caesia parviflora</i> var. <i>minor</i> (Small Pale Grass-lily)	Endangered	Not Listed	No	1.71	0.98	0.00	0.98
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Endangered	Vulnerable	Yes	34.66	19.33 ^{1, 2, 5, 6}	0.00	19.33
<i>Caladenia montana</i> (Mountain Spider Orchid)	Vulnerable	Not Listed	No	233.51	81.16 ^{2, 5, 6}	0.00	81.16
<i>Calotis glandulosa</i> (Mauve Burr-Daisy)	Vulnerable	Vulnerable	Yes	0.00	0.00	0.00	0.00



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Commersonia prostrata</i> (Dwarf Kerrawang)	Endangered	Endangered	No	0.82	0.61	0.00	0.61
<i>Cullen parvum</i> (Small Scurf-pea)	Endangered	Not Listed	No	19.05	15.43	0.00	15.43
<i>Dillwynia glaucula</i> (Michelago Parrot-pea)	Endangered	Not Listed	No	1.31	0.77	0.00	0.77
<i>Diuris aequalis</i> (Buttercup Doubletail)	Endangered	Endangered	No	46.05	0.00	0.00	46.05
<i>Diuris tricolor</i> (Pine Donkey Orchid)	Vulnerable	Not Listed	No	1.61	0.59	0.00	0.59
<i>Eucalyptus aggregata</i> (Black Gum)	Vulnerable	Vulnerable	No	0.79	0.30	0.00	0.30
<i>Eucalyptus macarthurii</i> (Paddys River Box, Camden Woollybutt)	Endangered	Endangered	No	2.64	0.66	0.00	0.66
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	Vulnerable	Vulnerable	Yes	0.77	0.61 ^{1, 6, 7}	0.00	0.61
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Endangered	Not Listed	Yes	10.89	1.90 ^{1, 2, 5, 6}	0.00	1.90
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	Critically Endangered	Endangered	Yes	5.19	5.14 ^{1, 2, 7}	0.00	5.14
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	Critically Endangered	Critically Endangered	Yes	22.51	17.60 ^{1, 2, 7}	0.00	17.60



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Kunzea cabbagei</i> (Cabbage Kunzea)	Vulnerable	Vulnerable	No	8.27	0.68	0.00	0.68
<i>Lepidium hyssopifolium</i> (Aromatic Peppergrass)	Endangered	Endangered	No	67.53	60.96	0.00	60.96
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	Endangered	Endangered	No	186.80	126.47	4.46	130.93
<i>Persoonia marginata</i> (Clandulla Geebung)	Vulnerable	Vulnerable	No	5.03	5.03	0.00	5.03
<i>Persoonia mollis</i> subsp. <i>revoluta</i> (Soft Geebung)	Vulnerable	Vulnerable	No	1.37	1.37	0.00	1.37
<i>Phyllota humifusa</i> (Dwarf Phyllota)	Vulnerable	Vulnerable	No	11.35	1.85	0.00	1.85
<i>Pimelea bracteata</i> (Rice Flower)	Critically Endangered	Critically Endangered	Yes	4.76	1.51 ^{1, 3, 6}	4.04	5.55
<i>Pomaderris cotoneaster</i> (Cotoneaster Pomaderris)	Endangered	Endangered	No	8.96	8.95	0.00	8.95
<i>Pomaderris delicata</i> (Delicate Pomaderris)	Critically Endangered	Critically Endangered	Yes	1.37	1.37 ^{1, 2, 4, 6}	0.00	1.37
<i>Pomaderris pallida</i> (Pale Pomaderris)	Vulnerable	Vulnerable	Yes	1.17	1.10 ^{1, 2, 4, 6}	0.00	1.10
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Critically Endangered	Critically Endangered	Yes	0.04	0.00	<0.01	<0.01



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Critically Endangered	Critically Endangered	Yes	0.02	0.00	<0.01	<0.01
<i>Prasophyllum keltonii</i> (Kelton's Leek-orchid)	Critically Endangered	Critically Endangered	Yes	0.03	0.00	<0.01	<0.01
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Endangered	Endangered	No	49.67	33.84	0.00	33.84
<i>Pterostylis alpina</i> (Alpine Greenhood)	Vulnerable	Not Listed	No	2.76	0.70	0.00	0.70
<i>Pterostylis foliata</i> (Slender Greenhood)	Vulnerable	Not Listed	No	54.06	29.58	0.00	29.58
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	Critically Endangered	Critically Endangered	Yes	0.65	0.00	0.00	0.00
<i>Pultenaea humilis</i> (Dwarf Bush-pea)	Vulnerable	Not Listed	No	20.21	15.05	0.00	15.05
<i>Senecio garlandii</i> (Woolly Ragwort)	Vulnerable	Not Listed	No	11.56	11.49	0.00	11.49
<i>Solanum armourense</i>	Endangered	Not Listed	Yes	0.40	0.63 ⁴	0.00	0.63
<i>Swainsona recta</i> (Small Purple-pea)	Endangered	Endangered	No	69.45	47.99	0.00	47.99
<i>Swainsona sericea</i> (Silky Swainson-pea)	Vulnerable	Not Listed	No	116.45	83.12	0.00	83.12
<i>Thelymitra alpicola</i> (Alpine Sun-orchid)	Vulnerable	Not Listed	No	0.63	0.00	0.00	0.00



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Revised impacts		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Thesium australe</i> (Austral Toadflax)	Vulnerable	Vulnerable	No	149.12	116.24	0.00	116.24
<i>Xerochrysum palustre</i> (Swamp Everlasting)	Not Listed	Vulnerable	No	0.77	0.00	0.12	0.12

¹ Land access restrictions (Section 3.2)

² Opportunistic survey reduction not applied

³ Weather restrictions (Section 3.4 and Annex 4)

⁴ Survey effort inadequate (Section 4.4)

⁵ Survey seasonality restrictions (Section 3.3)

⁶ Resource availability

⁷ Teams temporarily stood down due to project approval



6.1.3 Direct impacts to fauna

Direct impacts to threatened fauna species have been revised with consideration to the results of the supplementary surveys. Updates to relevant fauna species clearing extents have been provided below in Table 33.

The clearing extents for three threatened raptor species (White-bellied Sea-eagle, Little Eagle and Square-tailed Kite) now exceed the clearing limits set out in the NSW Approval due to changes to the species polygon methods to address CPHR advice as follows:

- The species polygons proposed for the BDAR (as developed by the species expert Stephen Debus) were abandoned and TBDC prescriptions instead adopted to delineate the extent of potential habitats in accordance with Section 5.2 of the BAM. This resulted in the:
 - Inclusion of additional habitats previously excluded from consideration as detailed in Section 7.3.4 of the BDAR.
 - A 300 m buffer applied to all stick nests recorded during constraint mapping or assumed present through use of the LiDAR data.

Additionally, the clearing extent for the Superb Parrot now exceeds the project approved clearing limit as a result of supplementary constraints mapping.

Whilst supplementary constraint mapping undertaken for these species confirmed an absence of breeding constraints (i.e. stick nests) across many lands where species presence was previously assumed, this was not sufficient to offset the increase in potential habitat due to the above. No active nests have been detected within the project through BDAR or supplementary survey. Additional measures to reduce the extent of clearing and potential impacts to these species are outlined in Chapters 7.1 and 9.1 of this BAVR.

Table 33: Direct impacts to fauna

Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Direct impacts (BAVR)		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	Vulnerable	Vulnerable	No	37.29	20.71	7.25	27.96
<i>Burhinus grallarius</i> (Bush Stone-curlew)	Endangered	Not listed	No	60.87	8.30	0.00	8.30
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Vulnerable	Endangered	No	475.87	24.42	421.00	445.42
<i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	Vulnerable	Not listed	No	45.09	31.87	6.70	38.57
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Vulnerable	Not listed	No	253.39	202.47	48.85	251.32



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Direct impacts (BAVR)		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Endangered	Endangered	Yes	3.08	0.00	0.00	0.00
<i>Crinia sloanei</i> (Sloane's Froglet)	Endangered	Endangered	No	0.75	0.75	0.00	0.75
<i>Cyclodomorphus praealtus</i> (Alpine She-oak Skink)	Endangered	Endangered	No	35.15	16.50	0.00	16.50
<i>Delma impar</i> (Striped Legless Lizard)	Vulnerable	Vulnerable	No	92.81	0.00	0.00	90.65 ⁴
<i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle)	Vulnerable	Not listed	No	3.05	8.08	0.11	8.19
<i>Hieraaetus morphnoides</i> (Little Eagle)	Vulnerable	Not listed	No	95.89	114.96	0.00	114.96
<i>Keyacris scurra</i> (Key's Matchstick Grasshopper)	Endangered	Not listed	No	173.91	0.00	0.00	169.59 ⁴
<i>Litoria booroolongensis</i> (Booroolong Frog)	Endangered	Endangered	No	0.06	0.06	0.00	0.06
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Endangered	Vulnerable	Yes	1.26	1.26 ^{1,2}	0.00	1.26
<i>Lophoictinia isura</i> (Square-tailed Kite)	Vulnerable	Not listed	No	39.66	83.87	0.00	83.87
<i>Mastacomys fuscus</i> (Broad toothed Rat)	Endangered	Endangered	No	0.03	0.00	0.00	0.03
<i>Mixophyes balbus</i> (Stuttering Frog)	Endangered	Vulnerable	Yes	15.56	0.46 ^{1,2,3}	0.00	0.46
<i>Myotis Macropus</i> (Southern Myotis)	Vulnerable	Not listed	No	73.68	57.89	13.46	71.35 ⁴
<i>Ninox connivens</i> (Barking Owl)	Vulnerable	Not listed	No	265.06	94.61	11.00	105.61
<i>Ninox strenua</i> (Powerful Owl)	Vulnerable	Not listed	No	252.04	180.08	30.18	210.26
<i>Petauroides volans</i> (Southern Greater Glider)	Endangered	Endangered	No	158.42	81.23	77.12	158.36 ⁴



Species	BC Act	EPBC Act	SAIL	Project Approved Clearing limit (ha)	Direct impacts (BAVR)		
					Assumed present (ha)	Known habitat (ha)	Total (ha)
<i>Petaurus australis</i> (Yellow-bellied Glider) population in the Bago Plateau	Endangered Population	Not listed	No	134.78	69.38	65.38	134.77 ⁴
<i>Petaurus norfolcensis</i> (Squirrel Glider)	Vulnerable	Not listed	No	66.93	41.43	25.30	66.73 ⁴
<i>Petaurus norfolcensis</i> (Squirrel glider) population in the Wagga LGA	Endangered Population	Not listed	No	11.52	6.78	4.64	11.42 ⁴
<i>Petroica rodinogaster</i> (Pink Robin)	Vulnerable	Not listed	No	38.77	10.70	0.00	10.70
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	Vulnerable	Not listed	No	179.2	157.73	0.00	157.73
<i>Phascolarctos cinereus</i> (Koala)	Endangered	Endangered	No	487.37	313.07	0.00	313.07
<i>Polytelis swainsonii</i> (Superb Parrot)	Vulnerable	Vulnerable	No	127.01	141.30	15.85	157.14
<i>Pseudomys fumeus</i> (Smoky Mouse)	Vulnerable	Vulnerable	No	5.79	0.00	0.00	0.00
<i>Synemon plana</i> (Golden Sun Moth)	Vulnerable	Vulnerable	No	28.48	0.00	0.00	27.92 ⁴
<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable	Not listed	No	196.57	103.18	3.08	106.26
<i>Tyto tenebricosa</i> (Sooty Owl)	Vulnerable	Not listed	Yes	68.81	68.81 ^{1,2}	0.00	68.81

¹ Land access restrictions (Section 3.2)

² Weather restrictions (Section 3.4 and Annex 4)

³ Teams temporarily stood down due to project approval

⁴ As outlined in section 5, minor amendments to correct slithers in mapping was undertaken as part of the species polygon review. This has resulted in minor reductions to a number of species polygons.

6.1.4 Direct impacts to suitable hollows for candidate threatened fauna

Table 34 below presents an estimate of hollow impacts for each hollow-dependent candidate fauna species using mapped HBT data and hollow density estimates for remaining habitats where HBT data gaps remain.



Table 34: Direct impacts to suitable hollows for candidate threatened fauna

Species	Potential habitat subject to direct impacts (ha)	Average hollow density within habitats subject to constraint mapping	Lands within remaining HBT gaps subject to direct impacts (ha)	Estimate of hollows impacted within lands where HBT gaps remain	Direct impacts to mapped HBTs	Total estimate of hollow impacts
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	441.36	3.63 hollows per ha	178.23	646.97	1,233	1,880
<i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	38.57	3.21 hollows per ha	8.82	28.31	121	149
<i>Polytelis swainsonii</i> (Superb Parrot)	157.14	3.19 hollows per ha	33.24	106.04	567	673
<i>Ninox connivens</i> (Barking Owl)	103.10	1.12 hollows per ha	152.29	170.56	253	424
<i>Ninox strenua</i> (Powerful Owl)	207.73	1.14 hollows per ha	162.78	185.57	253	439
<i>Tyto novaehollandiae</i> (Masked Owl)	104.05	1.38 hollows per ha	136.38	188.20	241	429
<i>Tyto tenebricosa</i> (Sooty Owl)	29.26	2.13	63.45	135.15	5	140



6.2 Indirect & prescribed impacts

Following approval of this BAVR and provision of the Final Layout Plans, as well as finalisation of connectivity corridors, the likely species impacts resulting from indirect and prescribed impacts will be addressed in a revised BAVR.

Based on the results and outcomes of the supplementary surveys presented in this version of the BAVR and with reference to the approved disturbance areas, no additional indirect and prescribed impacts were identified occur as a result of the Project.

6.2.1 Edge effects

Table 30 in Section 5.5 outlines the approach to calculating edge effects. The final offset liability for any change to edge effects will be reported through the revised BAVR prepared to the final layout plans.

Table 35: Revised edge effects

IBRA subregion	PCT	Condition	Area (ha)
Bondo	285	High	0.41
	285	Very high	0.00
	299	Moderate	5.47
	300	Moderate	0.63
	638	High	2.62
	953	Moderate	0.27
Bungonia	870	Very high	1.68
	1093	High	0.76
	1093	Moderate	0.01
	1093	Very high	3.35
	1097	Moderate	0.18
	1107	High	0.19
	1150	High	11.36
	1330	High	0.60
	1330	Very high	0.34
Crookwell	280	Moderate	1.35
	283	High	0.96
	283	Low	0.00
	283	Moderate	0.05
	727	Very high	1.14
	731	High	0.36



IBRA subregion	PCT	Condition	Area (ha)
	731	Low	0.00
	731	Very high	0.70
	1093	High	6.65
	1093	Low	0.34
	1155	High	2.23
	1155	Low	0.06
	1155	Moderate	4.66
	1330	High	0.26
	1330	Low	0.03
	1330	Very high	1.75
Inland Slopes	5	Moderate	0.86
	268	High	0.01
	268	Low	0.01
	268	Very high	5.36
	277	High	1.52
	277	Low	0.16
	277	Moderate	0.20
	277	Very low	0.11
	278	High	0.59
	280	High	7.28
	280	Moderate	2.81
	287	High	0.03
	287	Very high	2.83
	290	High	3.29
	290	Low	0.27
	297	Moderate	1.04
	314	Low	0.17
	314	Moderate	1.72
	316	Low	0.64
	316	Very high	7.66
Murrumbateman	280	High	1.41



IBRA subregion	PCT	Condition	Area (ha)
	280	Low	0.00
	283	Very high	1.05
	349	Very high	0.37
	351	Moderate	1.44
	1093	Low	0.09
	1093	Moderate	0.15
	1093	Very high	7.97
	1330	High	1.24
	1330	Low	0.13
	1330	Moderate	0.73
	1330	Very high	0.79
Snowy Mountains	285	Low	0.23
	300	Very high	7.45
	638	High	16.89
	638	Moderate	5.51
	679	High	2.55
	939	High	0.16
	953	High	13.33
	953	Moderate	3.41
	953	Very high	12.51
	1196	High	10.12
Total			172.50



6.2.2 Connectivity

The approach adopted to assess connectivity risks is consistent with that implemented as a part of the HumeLink BOP (Niche, 2024) and documented in Section 5.5. This assessment addresses candidate species subject to potential connectivity risks as outlined in Table 36.

Table 36: Connectivity impacts

Species	Project Approved Impact area	Supplementary Survey potential impact (ha)
<i>Aprasia parapulchella</i> (Pink-tailed Legless-Lizard)	37.29	27.96
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	253.39	253.32
<i>Delma impar</i> (Striped legless lizard)	90.81	90.65 ¹
<i>Mastacomys fuscus</i> (Broad-toothed Rat)	0.03	0.03
<i>Petaurus australis</i> (Yellow-bellied Glider) population on the Bago Plateau	134.78	134.77 ¹
<i>Petaurus norfolcensis</i> (Squirrel Glider)	66.93	66.73 ¹
<i>Petaurus norfolcensis</i> (Squirrel Glider) in the Wagga Wagga Local Government Area (endangered population).	11.52	11.42 ¹
<i>Petauroides volans</i> (Southern Greater Glider)	158.42	158.36 ¹
<i>Phascolarctos cinereus</i> (Koala)	487.37	313.07
<i>Pseudomys fumeus</i> (Smoky Mouse)	5.79	0.00

¹As outlined in Section 5, minor amendments to correct slithers in mapping was undertaken as part of the species polygon review. This has resulted in minor reductions to a number of species polygons.



7. Serious and Irreversible Impacts

A total of four TECs, 15 threatened flora and five threatened fauna species were identified as potential SAI entities within the BDAR. Of these, one TEC (White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland), one threatened flora species (*Pimelea bracteata*) and one threatened fauna species (*Tyto tenebricosa*) were identified as likely SAI.

Based on the supplementary surveys:

- A small reduction (approximately 2.01 ha) in the extent of White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland threatened ecological community within the impact areas occurred as a result of PCT mapping updates (refer to Section 4.1 and Figure 4b).
- Three of the 15 potential SAI flora species were excluded from the assessment as no potential suitable habitat was identified during the supplementary survey (Table 32):
 - *Calotis glandulosa* (Mauve Burr-Daisy) listed as vulnerable under the BC Act and EPBC Act
 - *Pomaderris delicata* (Delicate Pomaderris) listed as critically endangered under the BC and EPBC Act
 - *Pterostylis oreophila* (Blue-tongued Greenhood) listed as critically endangered under the BC Act and EPBC Act
- Four of the 15 potential SAI flora species were directly recorded within the project footprint (refer to Section 4.4.1 and Figure 4a):
 - *Pimelea bracteata* (Rice Flower) listed as critically endangered under the BC Act and EPBC Act
 - *Prasophyllum bagoense* (Bago Leek Orchid) listed as critically endangered under the BC Act and EPBC Act
 - *Prasophyllum innubum* (Brandy Marys Leek Orchid) listed as vulnerable under the BC Act
 - *Prasophyllum keltonii* (Kelton's Leek Orchid) listed as critically endangered under the BC Act.
- Two SAI fauna species were excluded through survey and/or constraints mapping updates (Smoky Mouse and Large-eared Pied Bat) as documented in Section 4.4.2.
- No candidate SAI fauna species were recorded during the supplementary surveys.
- The extent of potential habitat was reduced or excluded for 18 of the 20 potential SAI flora and fauna species, as noted in Table 32 and Table 33.
- Impacts to *Pimelea bracteata* and *Solanum armourense* now exceed the approved clearing limit. For *Pimelea bracteata*, this is due to additional species detections during the supplementary survey period. For *Solanum armourense*, part of the BDAR survey effort has been reverted to 'assumed presence' to satisfy the multiple pass requirement in the TBDC.

Table 37 below summarises the supplementary survey outcomes for each potential SAI entity in relation to the BDAR assessment. Species presence is assumed within remaining habitats for SAI entities. As such, it is likely that the actual impacts as a result of the project would be less than that presented here.



Table 37: Updated impacts to SAll entities

SAll entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAll assessment required?	Additional mitigation measures to reduce SAll likelihood
Threatened ecological communities					
White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland	Known	Known	A reduction of clearing impacts from 476.98 ha to 468.47 ha as a result of PCT mapping updates within the Crookwell IBRA subregion through supplementary surveys. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
Threatened flora species					
<i>Bossiaea fragrans</i> (Fragrant Bossiaea)	Low	Low	A reduction of clearing impacts from 6.31ha to 4.25ha due to the exclusion of habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Caladenia concolor</i> (Crimson Spider Orchid)	Low	Low	A reduction of clearing impacts from 34.66ha to 19.33 ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No Additional mitigation measures required
<i>Calotis glandulosa</i> (Mauve Burr-Daisy)	Low	Absent	The species has been completely excluded through supplementary survey. As such, no update to the SAll assessment is required.	No	N/A



SAll entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAll assessment required?	Additional mitigation measures to reduce SAll likelihood
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)	Low	Low	A reduction of clearing impacts from 0.77 ha to 0.61 ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Genoplesium superbum</i> (Superb Midge Orchid)	Low	Low	A reduction of clearing impacts from 10.89 ha to 1.90 ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Grevillea iaspicula</i> (Wee Jasper Grevillea)	Low	Low	A reduction of clearing impacts from 5.19 ha to 5.14 ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Grevillea wilkinsonii</i> (Tumut Grevillea)	Low	Low	A reduction of clearing impacts from 22.51 ha to 17.60 ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Pimelea bracteata</i> (Rice Flower)	Known	Known	Impacts to habitat for <i>Pimelea bracteata</i> have increased from 4.76 ha to 5.55 ha, including 1.51 ha of assumed presence and 4.04 ha of confirmed habitat. The increase in impact is the result of additional species detections within the clearing footprint.	No	No additional mitigation measures required - increased polygon extent reflects confirmed records of the species, resulting in additional direct impacts. However, the existing mitigation measures for this species are scalable and will be applied consistently across the entire



SAll entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAll assessment required?	Additional mitigation measures to reduce SAll likelihood
					expanded polygon, ensuring that the additional areas are managed under the same framework already committed to. Additional and Appropriate Measures as required by BMP (Condition B30 (d) (xiii) will apply.
<i>Pomaderris delicata</i> (Delicate Pomaderris)	Low	Low	Assumed present habitat remains unchanged at 1.37ha. As such, no update to the SAll assessment is required.	No	N/A
<i>Pomaderris pallida</i> (Pale Pomaderris)	Low	Low	A reduction of clearing impacts from 1.17ha to 1.10ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Known	Known	The total direct impact has reduced from 0.04 ha to <0.01 ha of occupied habitat. Further avoidance will be achieved by means of proposed design amendments in the McPherson's Plain area, as shown in Figure 6. This includes the set-back of proposed tower pad locations to avoid permanent impacts with these habitats subject to easement clearing only (i.e. selective tree removal) which would avoid ground disturbance. Proposed clearing methodologies for these habitats would be addressed within the Threatened Orchid Management Plan required by Condition 3 of the	No	N/A



SAll entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAll assessment required?	Additional mitigation measures to reduce SAll likelihood
			Commonwealth Approval, which will also be incorporated into the BMP.		
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	High	Known	Whilst this species was directly observed in McPherson's Plain, occupied habitats do not overlap the clearing footprint. All remaining potential habitat has been excluded through supplementary survey.	No	Although the species polygon does not overlap with the current layout plans, the HumeLink Commonwealth Orchid Management Plan includes additional avoidance and mitigation measures that apply across the project footprint. These measures, in conjunction with the existing project-wide mitigation framework, are considered sufficient to manage any potential future overlap, and no further measures are required.
<i>Prasophyllum keltonii</i> (Kelton's Leek-orchid)	Known	Known	The total extent of known habitat subject to clearing in the BDAR was 0.03 ha. Following supplementary surveys, impacts to known habitat have decreased to <0.01 ha. Whilst all historic records have been used to map known habitat for <i>Prasophyllum keltonii</i> as a part of the BAVR species polygons, the reason for the reduction in the extent of known habitat is due to a change in methodology applied for delineating these known habitats, as detailed in Section 5.2. As such, no update to the SAll assessment is required.	No	N/A
<i>Pterostylis oreophila</i> (Blue-tongued Greenhood)	High	Absent	The species has been completely excluded through supplementary survey.	N/A	N/A



SAIL entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAIL assessment required?	Additional mitigation measures to reduce SAIL likelihood
			As such, no update to the SAIL assessment is required.		
<i>Solanum armourense</i>	Moderate	Moderate	<p>Supplementary surveys were undertaken within all potential habitats and the species was not detected.</p> <p>However, a meeting held with CPHR on 19/06/2025, we understand a recent confirmed detection was noted in the locality and the likelihood of the species occurrence has increased to moderate. As such, a review of survey effort was undertaken to identify areas that may be considered under-surveyed (i.e. only one survey round). A total 88% of habitat was subject to two or more survey events. Only 2.49 ha of habitat was surveyed once. Species presence has been conservatively assumed within this portion of habitat, of which 0.63 ha would be subject to clearing.</p> <p>No update to the SAIL assessment is required.</p>	No	<p>Increased polygon extent reflects updated habitat mapping and precautionary assumptions, resulting in additional direct impacts. However, the existing mitigation measures for this species are scalable and will be applied consistently across the entire expanded polygon, ensuring that the additional areas are managed under the same framework already committed to.</p> <p>Pre-construction survey will be undertaken within remaining habitats to confirm species presence/absence (MM 11).</p>
Threatened fauna					
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Moderate	Absent	<p>The species has been completely excluded through supplementary survey.</p> <p>As such, no update to the SAIL assessment is required.</p>	N/A	N/A
<i>Litoria castanea</i> (Yellow-spotted Tree Frog)	Moderate	Moderate	There has been no change to the likely clearing impacts associated with this species. A supplementary survey shortfall occurred due to poor weather and land access difficulty. Habitat	No	No additional mitigation measures required



SAll entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAll assessment required?	Additional mitigation measures to reduce SAll likelihood
			mapping resulted in the decrease of the area of assumed presence. The clearing impact of 1.26 ha of potential habitat has been retained. As such, no update to the SAll assessment is required.		
<i>Mixophyes balbus</i> (Stuttering Frog)	Low	Low	A reduction of clearing impacts from 7.23 ha to 0.46 ha due to the exclusion of some habitats through supplementary survey. As such, no update to the SAll assessment is required.	No	No additional mitigation measures required
<i>Pseudomys fumeus</i> (Smoky Mouse)	Moderate	Absent	The species has been excluded through supplementary survey. As such, no update to the SAll assessment is required.	N/A	N/A
<i>Tyto tenebricosa</i> (Sooty Owl)	High	Moderate	Overall, the extent of potential habitat for Sooty Owl has reduced from 140.85 ha to 68.81 ha as a result of supplementary survey. The presence of this species is still assumed within approximately 29.26 ha of severely burnt habitat within the Snowy Mountains IBRA subregion, where survey effort could not be counted towards a species polygon reduction. Based on the hollow density estimates presented in Section 4.2.1, a total of 137 hollows is estimated to be impacted as a result of the project. Due to the unknown recovery of this species post fire, the full area of potential suitable habitat remains as assumed present, with	No	Annex 13 - MM3 and MM4 - Additional and Appropriate Measures as required by BMP (Condition B30 (d) (xiii) will apply). Increased polygon extent reflects updated habitat mapping and precautionary assumptions, resulting in additional direct impacts. However, the existing mitigation measures for this species are scalable and will be applied consistently across the entire expanded polygon, ensuring that the additional areas are managed under



SAll entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SAll assessment required?	Additional mitigation measures to reduce SAll likelihood
			additional mitigation measures proposed in Section 7.1.		the same framework already committed to.



7.1 Additional Mitigation Measures (AMMs)

Additional Mitigation Measures (AMMs) are required under Condition B30 of the Infrastructure Approval to minimise likely impacts to entities at risk of serious and irreversible impact (SAIL). The BDAR indicated a likely SAIL to Box Gum Woodland, *Pimelea bracteata* and Sooty Owl (*Tyto tenebricosa*).

An AMM proposal was presented to CPHR and conceptually approved on 2 September 2024. The proposal included the following:

- Preparation and execution of a Local Action Management Plan (LAMP) which would provide a regional conservation focus for Box Gum Woodland;
- Collaboration with the Botanic Gardens of Sydney on a genomic seed collection and translocation project for *Pimelea bracteata*.
- Restoration of Sooty Owl habitat on Biodiversity Stewardship Agreement or Conservation Agreement site.

Supplementary survey has confirmed the presence of *Pimelea bracteata*. Whilst not detected during survey, the presence of Sooty Owl is still assumed within approximately 29.26 ha of severely burnt habitat within the Snowy Mountains IBRA subregion, where survey effort could not be applied to severely burnt lands. As the recovery of the species is unknown in this region post fire, areas where the species was not detected in accordance with BAM surveys have also remained as assumed present (total 68.81 ha).

Current mitigation measures have been reviewed for SAIL species identified in Table 37. In some cases, species polygons have been expanded due to confirmed records or precautionary assumptions. These changes represent refinements to the understanding of species habitat distributions rather than the introduction of new or different impact pathways. The nature of the project impacts remains the same, and has been addressed through the existing suite of mitigation measures, which are scalable and will be applied consistently across the expanded areas. In addition, for some orchid species, the HumeLink Commonwealth Orchid Management Plan provides a further layer of targeted avoidance and mitigation measures that will be implemented across the project footprint. Collectively, these frameworks are considered adequate to manage the updated species polygons and no additional mitigation measures, aside from those proposed in the AMM proposal (discussed above) are proposed.

Condition B30 requires that these measures are delivered within 3 years of the date of the Project Approval. The AMM proposal will be finalised with CPHR within 3 months of approval of the revised BAVR (Final Layout Plans).

8. Matters of National Environmental significance

An assessment of amended project impacts to EPBC listed threatened flora is presented in Attachment 3 of the BDAR. The assessment found that the project would potentially impact on 14 threatened flora species and 29 threatened fauna species listed under the EPBC Act. The supplementary surveys have resulted in changes to the extent of habitat for a number of MNES entities as a result of the species being confirmed absent within many areas where species presence was assumed at the BDAR stage. For this reason, the risk of a likely significant impact to these species has reduced.

These changes have been summarised in Table 38 below.



Table 38: Updated impacts to MNES

MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
Threatened ecological communities					
White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland)	Present	Present	<p>In the BDAR, the impact was considered likely to be significant.</p> <p>As identified in the BDAR, the direct impacts of the amended project on Box Gum Woodland includes the removal of approximately 129.89 ha of habitat.</p> <p>After supplementary survey, the area of Box Gum Woodland identified to be removed has decreased to 128.71 ha.</p>	No	No additional mitigation measures required
Threatened flora species					
<i>Ammobium craspedioides</i> (Yass Daisy)	Present	Present	<p>In the BDAR, the impact was considered likely to be significant.</p> <p>Approximately 295.22 ha of potential habitat and 2.52 ha of known habitat was identified to be directly impacted during the BDAR.</p> <p>As a result of supplementary survey, the area of known habitat has increased to 2.57 ha and the extent of potential habitat where species presence is assumed has decreased to 252.43ha. A total</p>	No	No additional mitigation measures required



MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
			255.00 ha of habitat is now subject to direct impacts.		
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> (Hoary Sunray)	Present	Present	<p>In the BDAR, the impact was considered likely to be significant. Approximately 182.44 ha of potential habitat and 4.36 ha of known habitat was identified to be directly impacted during the BDAR.</p> <p>As a result of supplementary survey during the BAVR, the area of known habitat has increased by 0.1ha to 4.46 ha in total. The extent of potential habitat where species presence is assumed has decreased to 126.47 ha. A total 130.93 ha of habitat would be subject to direct impacts.</p>	No	No additional mitigation measures required
<i>Pimelea bracteata</i> (Rice Flower)	Present	Present	<p>In the BDAR, the impact was considered likely to be significant. Approximately 4.48 ha of potential habitat and 0.28 ha of known habitat was identified to be directly impacted during the BDAR.</p> <p>As a result of supplementary survey during the BAVR, the area of known habitat has increased to 4.04 ha. The extent of potential habitat where species presence is</p>	No	No additional mitigation measures required



MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
			assumed has reduced to 1.51 ha. Therefore, a total 5.55 ha of habitat would be removed.		
<i>Prasophyllum bagoense</i> (Bago Leek Orchid)	Present	Present	<p>In the BDAR, the impact was considered to potentially be significant.</p> <p>Approximately 0.04 ha of potential habitat was identified to be impacted during the BDAR.</p> <p>Supplementary survey undertaken by orchid experts have resulted in a revised species polygon being developed, addressing a change in the extent of potential habitats and incorporating additional detections, as documented in Section 4.4.1. A total of <0.01 ha of known habitat is now subject to impact. However, proposed design amendments in the MacPherson's Plain area would provide additional setbacks to this population, as shown in Figure 6. As such, direct impacts would be avoided and proposed easement clearing would be subject to strict management in accordance with the Threatened Orchid Management Plan.</p>	No	Prepare and implement a Threatened Orchid Management Plan addressing proposed easement clearing methodologies ensuring these limit any ground disturbance.



MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
<i>Prasophyllum innubum</i> (Brandy Marys Leek-orchid)	Assumed present	Present	<p>In the BDAR, the impact was considered to potentially be significant.</p> <p>Approximately 0.02 ha of potential habitat for the Brandy Marys Leek-orchid was identified to be impacted during the BDAR.</p> <p>As a result of supplementary survey during the BAVR, <0.01 ha of habitat was confirmed to be occupied. The species was confirmed absent within remaining potential habitat.</p> <p>Known habitats within the project footprint would not be subject to direct impacts.</p>	No	No additional mitigation measures required
<i>Prasophyllum keltonii</i> (Kelton's Leek-orchid)	Assumed present	Present	<p>In the BDAR, the impact was considered to potentially be significant.</p> <p>Suitable habitats for the species are within the project footprint and approximately 0.03 ha of this habitat was identified to be impacted during the BDAR.</p> <p>Supplementary survey undertaken by orchid experts have resulted in a revised species polygon being developed, addressing a change in the extent of potential habitats and incorporating additional detections, as documented in</p>	No	No additional mitigation measures required



MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
			Section 4.4.1. A total of <0.01 ha of known habitat is now subject to impact. However, proposed design amendments in the MacPherson's Plain area would provide additional setbacks to this population, as shown in Figure 6. As such, direct impacts would be avoided and proposed easement clearing would be subject to strict management in accordance with the Threatened Orchid Management Plan.		
Threatened fauna					
<i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard)	Present	Present	In the BDAR, the impact was considered likely to be significant. The BDAR projected the removal of 42.74 ha of habitat for the Pink-tailed Legless Lizard (including 5.44 ha of Category 1 land subject to prescribed impacts). Species presence was known to occur within approximately 7.41 ha of this impacted habitat. After supplementary survey during the BAVR, the area of known habitat has not increased. A total 27.96 ha of potential habitat (comprising 5.45 ha of	No	No additional mitigation measures required



MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
			Category 1 land) would be impacted.		
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Present	Present	<p>In the BDAR, the impact was considered to potentially be significant.</p> <p>The BDAR projected the removal of approximately 475.87 ha of potential and known habitats used by this species.</p> <p>As a result of supplementary survey during the BAVR, the extent of impacted habitat has reduced by 30.45 ha. A total 445.42ha of habitat would be removed (excluding 0.79 ha of Category 1 land).</p>	No	No additional mitigation measures required
<i>Polytelis swainsonii</i> (Superb Parrot)	Present	Present	<p>In the BDAR, the impact was considered to potentially be significant.</p> <p>The BDAR projected the removal of 240.23 ha of foraging and 116.82 ha of potential breeding habitat within the project footprint.</p> <p>As a result of supplementary survey during the BAVR, the extent of potential breeding habitat subject to direct impacts has increased to 157.14 ha. Species presence has now been</p>	No	Yes, as noted in Annex 12



MNES entity	Likelihood of occurrence (BDAR)	Likelihood of occurrence (BAVR)	Change to potential impacts	Updated SIC Assessment required?	Additional mitigation measures to reduce impact
			confirmed within 15.85 ha of this habitat (comprising 0.49 ha of category 1 land).		



9. Recommendations

In accordance with condition B29(e), this chapter presents recommendations relating to:

- Revised mitigation and management measures to be implemented prior to, during and post-construction to address the project impacts and verify any remaining biodiversity risks where relevant for inclusion in a revised BMP.
- Unexpected finds.
- The finalisation of project impacts and offset requirements
- Additional supplementary surveys to address remaining data gaps and survey effort shortfalls for candidate species.

9.1 Additional mitigation measures and revised BMP

Revised management and mitigation measures are provided in Annex 12 addressing the outcomes of supplementary survey, including any species-specific management requirements. This includes:

- Additional design avoidance and species-specific protocols in relation to remaining SAI and MNES entities including threatened orchid species within the McPhersons Plain area.
- Additional pre-clearing survey requirements for candidate owls, cockatoos and raptors to verify the extent of breeding habitats, ensuring these risks are effectively managed during the construction phase.

It is noted that increased direct impacts have been identified for two flora species and four fauna species as a result of updated species polygon extents (Table 32 and Table 33). Final layout plans have not been made available for the current revision of this BAVR, which limits the ability to confirm the extent to which additional avoidance can be achieved. A clear commitment is made that further consideration of avoidance and mitigation measures for these species will be undertaken once the final layout plans are confirmed, and these will be incorporated into the next revision of the BAVR. Any additional mitigation measures required at that time will be adopted to ensure impacts are managed appropriately. In the interim, construction activities will continue to be guided by the existing mitigation framework, including targeted measures outlined in the HumeLink Commonwealth Orchid Management Plan, which are considered sufficient to manage potential impacts until layout refinement is complete.

Condition B29 (d) (ii) requires that 'where a species is found to be present following the surveys undertaken under Condition B28 or that are assumed to be present, identify measures to avoid and or mitigate the impact to those entities for inclusion in a revised version of the Biodiversity Management Plan required under condition B30'.

Revisions to the respective BMP's for Humelink East and Humelink West will be updated to address the revised mitigation measures as presented within Annex 12. The timeframe for BMP updates will be commenced within one month of approval of a BAVR Notification will be provided to CPHR & DPHI in writing at the commencement of updates and will give an estimated time frame for agency consultation and approval.

- As agreed with DPHI (meeting 4 July 2025) and outlined in Section 2.6 & 4.1 of the SBS, early notification of relevant key datasets (i.e. Hollow Bearing Trees) to Delivery Partners will be provided upon approval from CPHR, prior to BAVR approval by DPHI. This is to ensure all relevant information to protect biodiversity values can be incorporated into construction planning and pre-clearance as early as possible whilst the BAVR is within the approval process.



- Also as agreed with DPHI (meeting 4 July 2025), the BMPs will be updated to include an adaptive process to incorporate the revised clearing limits and updated mitigation measures ahead of the BAVR revision to incorporate the Final Layout Plans.

The BMP's must be updated to address the additional considerations in relation to supplementary survey outcomes as outlined in Table 39: Further survey - candidate species.

9.2 Unexpected Finds

An unexpected find is defined in Section 4.4 of the SBS and includes any threatened biodiversity values detected during the supplementary biodiversity surveys or pre-clearance that requires offsets which were not assessed in the BDAR and/or the BAVR.

Proposed measures to be implemented in the event of an unexpected find are provided in Annex 12. This includes specific measures to establish and report on the extent of the impacted population in consultation with CPHR.

In the event of an unexpected find, the following approach would be adopted to calculate a suitable offset credit liability for any impacted entities:

- The vegetation integrity loss would be established for the extent of impacted habitat using the vegetation zone map and disturbance area VI loss assumptions as documented in Section 13.2 of the BDAR.
- Impacted habitats would be added to the BAM Calculator and a species credit liability determined.
- The updated credit liability and offset mechanism would be reported through the BOP.

9.3 Finalising project impacts and relevant credit obligations

The following process would be adopted to determine the final impacts and reducing the relevant credit obligations for the project:

- As per the BAVR revision process as outlined in Section 1.4, the Biodiversity Assessment Method Calculator (BAM-C) must be updated to calculate the credit liability reduction once the Final Layout Plans are available, and mapping updates and BAM-C entries can be completed using the data collected from supplementary surveys. This process must commence immediately upon Transgrid's receipt of the complete Final Layout Plans from the HumeLink Delivery Partners, encompassing both full and partial impact areas across the east and west delivery packages. CPHR and DPHI must be notified of the commencement of this process.
- As agreed with DPHI (meeting 4 July 2025):
 - Should Transgrid not reach an agreement with CPHR on a reduction of the species polygon for any threatened entity, the species polygon would revert to assumed presence and Transgrid would not seek a credit reduction for that entity until agreement could be reached and a revised BAVR approved.
 - An analysis of updated clearing limits will be undertaken immediately following submission of the Final Layout Plans. The updated clearing limits will then be provided to Delivery Partners and notified to DPHI. It should be noted that the BAVR may not yet be approved by DPHI. The Final Layout Plans will then be used to run BAM-C updates and the BAVR revised and resubmitted to reflect changes to the credit liability. Any increased clearing limits would be subject to secretary approval, in accordance with Condition B25.

These results will inform the final construction impact areas, as defined in Condition B25 (a) of the Project Approval, during detailed design within the project footprint without the need to re-assess all biodiversity values.



Thereafter, further avoid and minimise opportunities can be taken during final design and construction and the impacts as detailed in Table 32 and Table 33 would be updated in the revised BAVR to reflect these outcomes.

An update to the Biodiversity Offset Package (BOP) as required by Condition B26 (d) of the Project Approval is required and will include any application for a credit reduction.

9.4 Further survey & reporting

Further survey is recommended to address remaining data gaps and survey effort shortfalls for candidate species that were not subject to supplementary surveys due to seasonal constraints. This would include the species and survey units (where applicable) outlined in Table 39 and prioritise SAI entities.

In addition to targeted flora and fauna surveys, additional habitat constraint mapping is recommended to close gaps in data, including further hollow-bearing trees and stick nests, surface rock, and vegetation validation, as shown in Figure 3b.

Further survey timing would be subject to constraints including construction schedule, survey windows and approval timeframes for subsequent BAVRs.

If further surveys are proposed for the purposes for Condition B28 and B29, they must also satisfy the pre-condition requirements outlined in Section 1.4, namely:

- CPHR have been notified of, and agree to, the proposed supplementary surveys.
- Evidence is provided to CPHR confirming that development impacting the relevant biodiversity values has not commenced.
- Surveys have not yet been completed, or were inconclusive, due to one of the following:
 - property access restrictions during a species-specific survey period,
 - unsuitable weather conditions impacting the surveys completed to date, or
 - reference population checks for flowering periods and survey timing were inconclusive.
- Additional surveys are recommended as part of the mitigation measures identified in an approved BAVR.

The results of further surveys may be incorporated into an updated version of the BAVR (Approved Project Area) in consultation with CPHR and or used to inform the application of BMP avoid and minimise mitigation measures or monitoring programs. In either case, the results and outcomes must be agreed to by CPHR prior to use.

Table 39: Further survey - candidate species

Species	Survey unit		Area remaining assumed present within the project footprint (ha)
	IBRA Subregion	Vegetation formation	
Fauna			
<i>Calyptrorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo)	Bungonia	All	99.01
	Crookwell	All	51.20
<i>Petroica rodinogaster</i> (Pink Robin)	Bungonia	Wet Sclerophyll Forests (Shrubby sub-formation)	2.73
Flora			
<i>Acacia bynoeana</i> (Bynoe's Wattle)	N/A		36.61



Species	Survey unit		Area remaining assumed present within the project footprint (ha)
	IBRA Subregion	Vegetation formation	
<i>Baloskion longipes</i> (Dense Cord-rush)	N/A		3.72
<i>Bossiaea fragrans</i> *	N/A		24.34
<i>Bossiaea oligosperma</i>	N/A		7.41
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> (Robertson's Peppermint)*	N/A		3.21
<i>Grevillea iaspicula</i> *	N/A		30.62
<i>Pimelea bracteata</i> *	N/A		5.59
<i>Pomaderris pallida</i> *	N/A		6.12
<i>Senecio garlandii</i> (Woolly Ragwort)	N/A		89.84
<i>Solanum armourense</i> *	N/A		2.49

* SAll entity

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Annex 1

Peer Review Findings report

24 July 2025

Tuesday Heather
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Transgrid

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Dear Tuesday

RE: Peer Review of HumeLink Stage 1 Biodiversity Verification Assessment Report

Umwelt was engaged by Transgrid to undertake a peer review of the HumeLink Stage 1 Biodiversity Assessment Verification Report (BAVR). Transgrid received NSW Infrastructure Approval (SSI 36656827) (November 2024) for the HumeLink Transmission Project (the Project) under Part 5 Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) (CSSI approval).

1.0 Conditions of Approval

The Project Infrastructure Approval, Condition B29, includes a requirement to develop a BAVR.

The Condition states:

Unless otherwise agreed by the Planning Secretary, prior to carrying out any development that would impact on the relevant biodiversity values subject to survey in the Supplementary Biodiversity Strategy in condition B28 (excluding Enabling Works, if the relevant requirements of this condition are adequately addressed in the Enabling Works Management Plan of condition B64), the Proponent must prepare a Biodiversity Assessment Verification Report in consultation with BCS and to the satisfaction of the Planning Secretary. The Report must:

- a. be prepared by a suitably qualified, experienced and independent biodiversity consultant with Biodiversity Assessment Method (2020) (BAM) Accreditation whose appointment has been endorsed by the Planning Secretary;
- b. be prepared in accordance with the Biodiversity Assessment Method (2020) and any other guidance document that is relevant and applicable at the time surveys were undertaken or the BDAR was prepared;
- c. be prepared with regard to the final layout plans for the development required under condition C8, including the location of final access routes within each clearing zone and stockpile locations;

- d. include:
 - i. detail of the outcomes of surveys undertaken in accordance with condition B28;
 - ii. where species are found to be present following the surveys undertaken under condition B28 or that are assumed to be present, identify measures to avoid and / or mitigate the impact to those entities for inclusion in a revised version of the Biodiversity Management Plan required under condition B30;
- e. provide findings and recommendations relating to the matters in (d), including, but not limited to, reducing the relevant credit obligations and calculating credit obligations for unexpected finds

Any required changes to biodiversity offset or mitigation measures arising from the Biodiversity Assessment Verification Report must be incorporated into an updated version of the Biodiversity Offset Package under condition B26 in consultation with BCS and BCT and addressed in a revised version of the Biodiversity Management Plan required under condition B30, in consultation with BCS and FCNSW, to the satisfaction of the Planning Secretary

2.0 Scope of Works

Umwelt were requested to provide a suitably qualified, experienced and independent biodiversity consultant with Biodiversity Assessment Method (2020) (BAM) Accreditation whose appointment has been endorsed by the Planning Secretary, to undertake the peer review of the BAVR in accordance with Condition B29 (a).

2.1 Independent Assessor Approval

The independent assessor endorsed for this peer review was Umwelt Principal Ecologist Adam Cavallaro. Adam holds a Bachelor of Environmental Science (Conservation Ecology), is a Biodiversity Assessment Method (BAM) Accredited Assessor under the Biodiversity Conservation Act (BAAS18056) and has over 20 years' experience in the environmental industry. Adam was approved as the independent assessor by the Director of Energy Assessment as the nominee of the Planning secretary on the 23 March 2025.

3.0 Peer Review: Stage 1 BAVR

The Peer Review of the BAVR (Stage 1) was carried out to ensure general compliance with condition B29 of the Instrument of Approval by implementing a staged approach adopted by Transgrid to the preparation of the BAVR.

The initial Stage 1 BAVR peer review was to focus on the following:

- An assessment of targeted survey details and effort since submission of the BDAR. Including areas where access has been granted, or further survey was required.
- Review any revisions of species polygons based on survey results within the currently approved project footprint.
- Reviewed updated survey data in relation to SAI impacted entities.
- Review additional mitigation measures required.
- Assess the findings and recommendations for credit reductions and credits for unexpected finds.

An early version of the BAVR was provided to Umwelt on the 12 May 2025 which included relevant components of the spatial package. The peer review was commenced using this early version of the report and data. On the 22 May 2025 Umwelt provided a high-level review identifying some of the higher priority items which required further clarifications.

On the 10 June 2025 Umwelt received BAVR Stage 1 Version R0 with supporting spatial data. Umwelt commenced the review of the new document with initial works focusing on comparison of previously identified items for review and then a complete review of spatial data and report. Additional information was requested (spatial data) on the 18 June 2025.

The updated BAVR Stage 1 Version R2 was provided to Umwelt on the 17 July 2025. This version addressed comments from the original peer review and included addressing CHPR comments from their review of the document which was carried out in parallel.

A summary of the two rounds of peer review findings has been presented in **Table 3.1 and Attachment A**, specifically how the BAVR (Stage 1) has met the requirements of condition B29 and where additional information is required.

Table 3.1 Summary of Compliance with Condition B29

Condition B29 Requirements	BAVR Stage 1 Scope of Works	Summary of Findings
(a) be prepared by a suitably qualified, experienced and independent biodiversity consultant with Biodiversity Assessment Method (2020) (BAM) Accreditation whose appointment has been endorsed by the Planning Secretary	N/A	Refer to Section 2.1 of the Letter Report
(b) BAVR be prepared in accordance with the Biodiversity Assessment Method (2020) and any other guidance document that is relevant and applicable at the time surveys were undertaken or the BDAR was prepared;	<ul style="list-style-type: none"> • An assessment of targeted survey details and effort since submission of the BDAR. Including areas where access has been granted, or further survey was required. • Review any revisions of species polygons based on survey results within the currently approved project footprint. • Reviewed updated survey data in relation to SAIL impacted entities. 	<p>The BAVR has been prepared to ensure compliance with the BAM, other guidance documents and the Supplementary Biodiversity Strategy (SBS). In Attachment A, a detailed review of the BAVR Version R0 and R2 has been itemised addressing requests for additional information to ensure compliance. Generally, the feedback relates to requests for additional justification to support survey methods, efforts and final impacts on biodiversity. In addition, there are minor administrative items that require updates to ensure completeness of survey and ensure the supporting information is compliant with survey requirements.</p> <p>Where survey method and effort, species polygons and supporting information has been communicated and observed as generally in accordance with the BAM or SBS no further information has been requested.</p>

Condition B29 Requirements	BAVR Stage 1 Scope of Works	Summary of Findings
(c) be prepared with regard to the final layout plans for the development required under condition C8, including the location of final access routes within each clearing zone and stockpile locations;	Will be addressed in BAVR Stage 2	It is understood that BAVR – Stage 2 will be developed prior to construction once the final layout plans are available ready for construction.
(d) include: <i>i detail of the outcomes of surveys undertaken in accordance with condition B28;</i> <i>ii where species are found to be present following the surveys undertaken under condition B28 or that are assumed to be present, identify measures to avoid and / or mitigate the impact to those entities for inclusion in a revised version of the Biodiversity Management Plan required under condition B30;</i>	<ul style="list-style-type: none"> As per above Review additional mitigation measures required. 	<p>Attachment A has been provided to address areas of the BAVR that require further information to ensure compliance with the BAM, SBS and condition B18.</p> <p>At the time of undertaking the peer review it was still unclear whether NSW DCCEEW Conservation Programs, Heritage and Regulation (CPHR) division had approved the SBS therefore, information in the review has conservatively reviewed surveys in accordance with the BAM where previous approvals from CPHR for deviations from survey guidelines has not been approved.</p> <p>Mitigation measures including avoidance, pre-clearance surveys, micro sitting and translocation opportunities have been listed in the supplied mitigation measures spreadsheet.</p> <p>There are still species which have no mitigation measures specifically presented in the table which have still been assumed present. Further information has been provided in Attachment A to address this information gap.</p>

Condition B29 Requirements	BAVR Stage 1 Scope of Works	Summary of Findings
(e) provide findings and recommendations relating to the matters in (d), including, but not limited to, reducing the relevant credit obligations and calculating credit obligations for unexpected finds.	Assess the findings and recommendations for credit reductions and credits for unexpected finds.	The additional mitigation measures and proposed methods to address unexpected finds are satisfactory to ensure biodiversity impacts are further minimised, mitigated and where unavoidable are offset in accordance with the Biodiversity Offset Scheme (BOS). This included the measures proposed for unexpected finds to be offset in accordance with the BOS.

If you require any further information relating to this peer review, please do not hesitate to contact the author

Kind regards

Adam Cavallaro

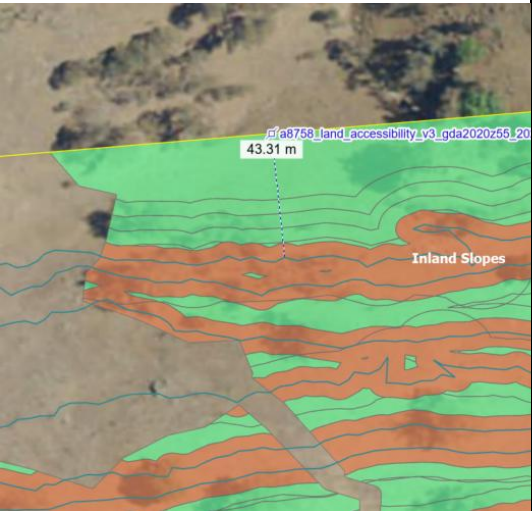
Principal Ecologist (BAAS 18056)

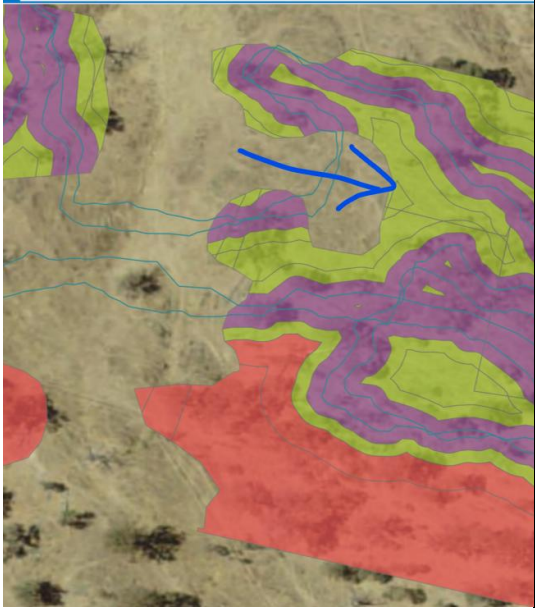
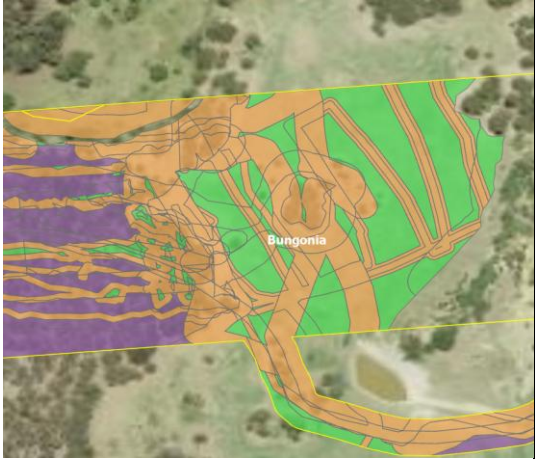
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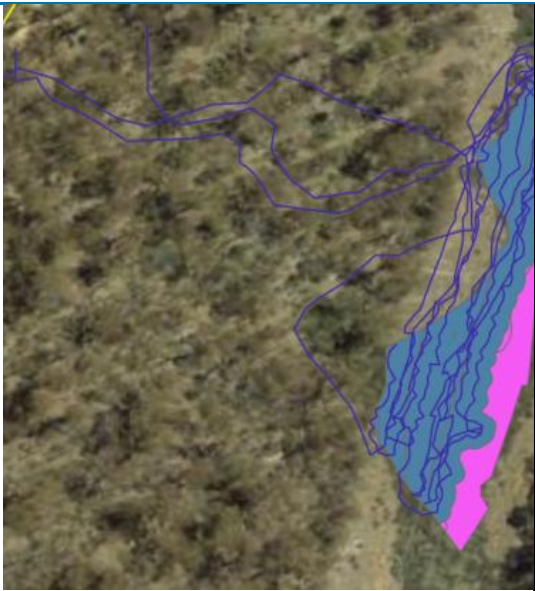
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Attachment A: Peer Review Findings and Recommendations

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
1	Section 2.3: Habitat Assessment and Constraints: Eastern pygmy possum	The Eastern pygmy possum has been included in the habitat assessment for hollow bearing trees (HBTs). It is acknowledged that this species may utilise HBTs but it is not recognised as a habitat constraint in accordance with the threatened biodiversity data collection (TBDC). It is not clear if this habitat constraint has been used to reduce areas previously considered assumed presences in the Amended BDAR.	Refer to CPHR comment 12 response: Section 2.4 of the BAVR updated for clarity. No change to the extent of EPP habitat as a result of habitat constraint mapping. A small patch of habitat was removed due to PCT change from 1330 to 351	Habitat constraints have been revised and further clarification of the reduction to area previously assessed as assumed present has been identifying (species association due to PCT amendments). No further feedback.	Noted. No action required.
2	Section 2.5.2: Threatened flora survey methods and timing	<p>The BAVR states <i>Although there is no official guideline, per best practices, the number of flora species being targeted at any one time were limited to ensure detectability by the field ecologists undertaking the surveys.</i></p> <p>In Section 5 of the <i>BAM Guideline for Surveying threatened plants and their habitats</i> it states: <i>To ensure detectability is not compromised it is recommended that multi-species searches be restricted to a maximum of five species in the same stratum (i.e. search for five ground species, five mid-layer species or five canopy species) per traverse.</i></p> <p>There are examples in the spatial data where there has been between 8-11 species survey at any one time across multiple strata. The reviewer recommends providing a justification as to why more than five species were surveyed to support this variation to the relevant guidelines. The reviewer does agree that a competent ecologist with knowledge of the target species is capable to survey for more than five (5) especially if the species in question are found in the same strata.</p>	Refer to Section 2.5.2 and Annex 6 of the BAVR addressing flora traverses: A total of 24 of 614 (4% of count, 5% of total traverse length) parallel traverses were undertaken where the total number of species targeted per growth form exceeded the recommended maximum of five species (described in Section 5.1 of the Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method). In the case of these traverses, multiple species in the same genus (i.e.. Swainsona) or with very similar morphology (i.e. Prasophyllum spp.) were targeted to avoid overloading field teams. Annex 6 presents a list of target flora for each parallel traverse, including justification for where target species exceeded the guideline recommendations	Section 2.4.1 of the BAVR R2 provides a suitable survey justification for >5 species where all species are within the same growth form or strata. It is also acknowledged that only a small number of transects were identified where the maximum number of species was exceeded. No further feedback.	Noted. No action required.
3	Section 2.5.2: Threatened flora survey methods and timing	A review of spatial data for threatened flora (survey effort) identified the use of “opportunistic survey reduction” (OSR) to reduce assumed presences for flora species. There is no explanation of what	Section 2.5.2 of the BAVR has been updated to capture the approved approach to OSRs: In addition to systematic surveys, field teams were also opportunistically	In accordance with the scope of condition B29 (b) (BAVR prepared in accordance with the BAM and other guidance documents) the current opportunistic survey reduction is not	We acknowledge that there are some issues with buffers, as identified by CPHR. We undertook a targeted review of these between the R0 and R2 provision and made updates/corrections

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>this survey method entails in the BAVR and no data to support the inclusion of the method (tracks or data points) in the spatial data package. Furthermore, there is no justification associated with any of the species it has been included to reduce assumed presences. Additional information should be provided in the BAVR to support the removal of areas previously considered potential habitat for threatened flora or otherwise should be surveyed in accordance with the BAM and relevant guidelines. Where this cannot be undertaken assume presences for the target threatened flora species. A sample of flora species which all have an increased in OSR in the spatial data since the BDAR results has been included in Attachment B. No justification for the exclusion of these areas from potential habitat for species has been included in the BAVR.</p>	<p>searching and recording any threatened flora species when traversing between sites. In accordance with the approved BDAR methodology, an opportunistic survey reduction has been applied to habitats in proximity to survey tracks, broadly within:</p> <ul style="list-style-type: none"> - 40 m of traverses in open vegetation and 20 m in closed vegetation for tree growth forms - 20 m of traverses in open vegetation and 10 m in closed vegetation for shrub growth forms - 10 m of traverses in open vegetation and 5 m in closed vegetation for grass, forb and orchid growth forms. <p>This approach is consistent with Section 4.5.3 of the Amended BDAR and feedback from CPHR received via email from Angela Jenkins on 9 February 2024.</p>	<p>considered in line with the BAM or threatened flora guidelines. It is acknowledged that this method was previous approved in the approved BDAR.</p> <p>There has been an effort to reduce the extent of OSR across a number of the threatened flora species polygons. It is recommended that further revision is undertaken to ensure the survey is compliant with the BAM and guidelines and where possible guidance provided by CPHR as shown in Table 9 of the BAVR R2.</p> <p>There are still examples where OSR outside the guidance provided is still maintained, this includes the SAIL species <i>Caladenia concolor</i> where there are buffers of transects >20m. In this example there is no other data to suggest further survey or opportunistic walkovers have occur.</p>  <p>The following is an example of <i>Caladenia montana</i></p>	<p>to a total of 16 flora species (including those raised by this peer review comment) considered to be higher risk based on intersection with the clearing zones. Other species updates were not progressed due to time constraints, and where widths were considered generally consistent and beyond the clearing extents. As this update requires significant spatial analysis, we are not in a position to make these changes prior to submission of the BAVR, and propose to address these within an RFI. It is also important to clarify that reviews of the opportunistic survey reductions (OSR) should be restricted to polygons where the "Results_BAVR1" field indicates an OSR has been adopted at the BAVR stage. Where OSRs were adopted and approved during the BDAR assessment, this is recorded in the "Results_BDAR" column. The "Results_combined" field reflects the most current outcome, with any BAVR updates overriding BDAR results. Where no update has occurred since the BDAR, the original BDAR result is retained in the combined field.</p> <p>SR is considered appropriate for <i>C. montana</i>, with some areas of additional OSR opportunities being identified and incorporated through further updated.</p>

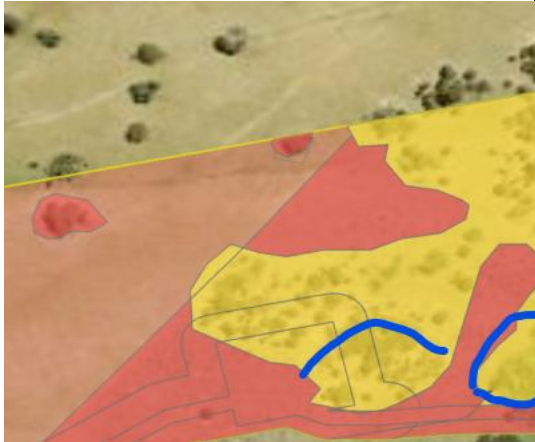
Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
				<div><p>Example of OSR that needs to be reconsidered (Green) for <i>Genoplesium superbum</i></p><p>Example of OSR that needs to be reconsidered (pink) for <i>Pterostylis oreophila</i>. Noting that this area is not currently within any proposed impact areas.</p></div>	

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
					
4	Section 2.5.2: Threatened flora survey methods and timing	<p>In Section 2.5.2 it states <i>Where threatened flora species were detected, the location of individual plants was collected using a hand-held GPS. Where threatened count species were recorded in high density (i.e., greater than 50 stems), the mean density was extrapolated by sampling over the observed area of occupancy.</i></p> <p>When reviewing spatial data, the flora file shows multiple individuals marked by a single GPS. The following table shows the number of individuals versus number individual points for threatened flora species. It is recognised that some extrapolation has occurred, but it is not understood how a single point location can represent species such as <i>Pimelea bracteata</i> when there are 300 individuals at a single location. Further information should be provided for all threatened flora where a single point represents more than a single individual. This should be of greater importance for species where the creation of species polygons have relied on the species count method of buffering individuals by 30m.</p> <p>Row Labels</p> <p>Ammobium craspedioides</p>	<p>Occupied patch extents were mapped in the field for all BAVR species detections where species were recorded to occur in high densities. A 30m buffer has been applied to all point and patch records and these have been used to inform the extent of known habitats within the species polygons.</p>	<p>No additional GPS points have been provided for species such as <i>Pimelea bracteata</i>. It is noted that the consultant states occupied patch extents were mapped in the field for all BAVR species detections recorded to occur in high densities. When reviewing the polygons (mapped extent) for <i>P. bracteata</i> there are 23 polygons that have a creation date of July 2025 and are coarsely drawn.</p> <p>It is not clear if these polygons have been mapped in the field or via desktop, or if all individuals of this SAll entity have been buffer by 30m or are located within the 30m buffer of the polygon.</p> <p>Further detail should be provided on how this was generated and whether additional buffers are required to provide a more conservative buffer for this species to account for the number of individuals at a single point.</p> <p>All listed species in the adjacent table should have species polygons reviewed based on the above information.</p>	<p>For all threatened flora species recorded, field methodology applied was such that occupied patch extents were mapped in the field. However, following receipt of peer review comments, it was identified that some records for <i>P. bracteata</i> with an abundance of >1 did not include a corresponding patch. In these instances, the responsible field staff have been consulted and an appropriate patch extent has been delineated by desktop methods via cross-ref to field based data and observations.</p> <p>No further updates to these species polygons are proposed.</p>

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response		Peer Review Findings BAVR - R2	Niche Response – R2
		<p>Leucochrysum albicans var. tricolor</p> <p>Pimelea bracteata</p> <p>Prasophyllum bagoense</p> <p>Prasophyllum innubum</p> <p>Prasophyllum keltonii</p> <p>Thelymitra alpicola</p> <p>Grand Total</p>	<p>1330</p> <p>1456</p> <p>21</p> <p>8</p> <p>22</p> <p>8</p> <p>2983</p>	<p>11</p> <p>38</p> <p>10</p> <p>6</p> <p>16</p> <p>1</p> <p>86</p>		
5	Section 2.5.2: Threatened flora survey methods and timing Terrestrial orchids	<p>Spatial data illustrates buffers of transects inconsistent with Table 2-5 in the BAVR. There are examples in the data that show 10m buffers applied (for a 20m wide transect) to the outside transect for growth forms such as orchids where a buffer of 2.5- 5m should be applied. Examples include <i>Diuris tricolor</i>, <i>D. aequalis</i> and <i>Caladenia concolor</i>. No further justification was provided in the BAVR therefore these buffers should be reviewed and ensure they are applied consistent with Table 2-5.</p>	<p>A review of flora traverse buffers was undertaken for candidate flora species, with some habitats reassigned from survey effort reduction to either assumed presence or opportunistic survey reductions. Traverse buffers applied to flora species are considered to appropriately reflect the extent of survey coverage in accordance with the BAM Flora survey guidelines.</p> <p>These updates to the flora species polygons have been carried across Table ES-1, Table 4.4.1 and Section 5.1.2 of the BAVR</p> <p>Updated flora species polygons have been reprovisioned for all flora species.</p>		<p>It is noted that there has been a significant effort to review and amend species polygons based on the original peer review feedback. Areas that have been reassigned to OSR must be reviewed to ensure they have been assigned based on the parameters already noted in item 3.</p>	<p>Refer to Item 3. No additional updates proposed.</p>
6	Section 2.5.2: Table 2-6	<p>Table 2-6 shows <i>Acacia flocktoniae</i> was surveyed as per threatened biodiversity data collection (TBDC). Survey period is July- September according to the TBDC, however targeted surveys were carried out in October. It is recommended that a justification be provided to outline why surveys were completed outside the standard survey period detailed in the TBDC. The inclusion of this information will ensure completeness for the exclusion of this species. Information could include flowering observed at references sites.</p>	<p>Refer to Section 1.5 of the BAVR. CPHR approval received via email from Angela Jenkins dated 4 October 2024</p>		<p>CHPR email received in October 2024 does not state this species can be surveyed in October, rather it may be implied based on the date of the email. No further feedback</p>	<p>Noted. No action required.</p>
7	Section 2.5.2: Table 2-6	<p>According to spatial data, surveys for <i>Caladenia concolor</i> have been</p>	<p>Survey was completed 10-27 Sept as per the provisioned flora traverse dataset.</p>		<p>No further feedback</p>	<p>Noted. No action required.</p>

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		undertaken during September (up to the 27 th), and not up to the 4 th October (outside survey period) as per Table 2-6. No indication of reference population checks in Annexure 2 occur late in the flowering season to support further survey outside the recommended survey period.	Table 2-7 will be updated to address this inconsistency.		
8	Section 2.5.2: Table 2-6	Reference population check dates for <i>Diuris tricolor</i> do not correspond to 2024. Update as required.	According to orchid experts, the species typically starts flowering in north of its range and then goes south. As per Annex 2, <i>Diuris tricolor</i> was observed flowering in Piliga 6/9/24. It has been previously recorded flowering in Coolamon on 24/9/23. Survey was undertaken within the project footprint over two days during this known flowering period: 21-22 September 2024.	Dates still not updated. Understand it may be an administrative error (2025). Southern records for this species should have been checked as it was known to be flowering in the Hunter and Dubbo regions the last week of August and first week of September in 2024 (based on reference checks for other projects undertaken by Umwelt).	Noted. No action required.
9	Section 2.5.2: Table 2-6	Reference population check dates for <i>Prasophyllum bagoense</i> and <i>P. keltonii</i> 16-17 December 2024, with the second survey effort nearly four weeks later (12-15 January 2025). No indication of whether the reference population was re-checked for observable plant material to identify this species in areas surveyed later in the season.	Survey for <i>P. bagoense</i> and <i>P. keltonii</i> was undertaken over three days in December: 16, 17 and 19 December 2024. Individuals were recorded during this time period suggesting survey timing was appropriate. The below also outlines the conservative approach adopted by orchid experts with regard to species identification. 7 <i>P. bagoense</i> and 11 <i>P. keltonii</i> could be identified to species level by orchid experts. Another 12 <i>Prasophyllum</i> individuals were recorded that had either finished flowering or were in young bud. Following consultation with orchid experts: <ul style="list-style-type: none"> Plants that had finished flowering were assigned to <i>P. bagoense</i> (i.e. 3 of the 12) Plants in early bud were conservatively assigned to both <i>P. keltonii</i> and <i>P. innubum</i> (5 of the 12) Another 4 of the 12 were identified as 	Noted the January 2025 transects have been removed from both species survey effort.	Dates in the annexure have been reviewed and amended.

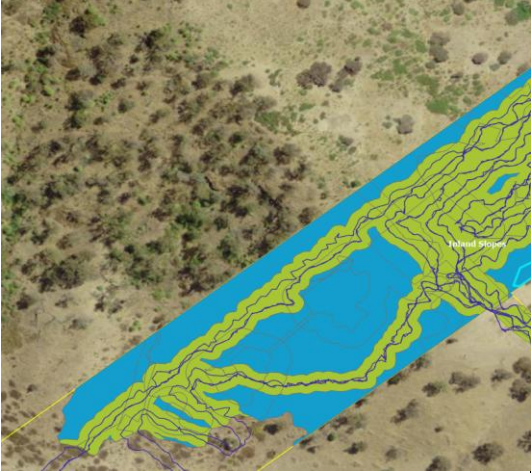

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
			P.candidum based on morphology.		
10	Section 2.5.2: Table 2-6	Survey dates for <i>Prasophyllum petilum</i> don't have a year. Corresponding Annexure for reference site check dates also do not have year listed. Add additional information to support survey being carried out and reference sites flowering.	Noted. All BAVR surveys were undertaken from 1Aug 2024 to Feb 2025. As per the provisioned flora traverse layer, P.petilum was subject to survey from 16-20 October 2024. The BAVR will be updated to address this inconsistency.	No further feedback	Noted. No action required.
11	Section 2.6.1: Table 2.8	In Table 2-8, the survey method for the four forest owls indicates there is no deviation from the TBDC. The method for call playback is not in accordance with current TBDC (Survey requirements updated in February -March 2024). The survey method does not detail the requirement of repeated surveys at least six times at each of the survey stations (per 100ha). Survey method should include the required repetition of survey effort in accordance with the guidelines for forest owls in the <i>Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)</i> (NSW DEC 2004).	Refer to BAVR R1 Table 2-9. Owls surveys undertaken in accordance with SBS approved methods.	A full review of Forest owl data has been placed on hold until further information can be supplied for peer review.	Threatened owls will be reviewed post-submission.

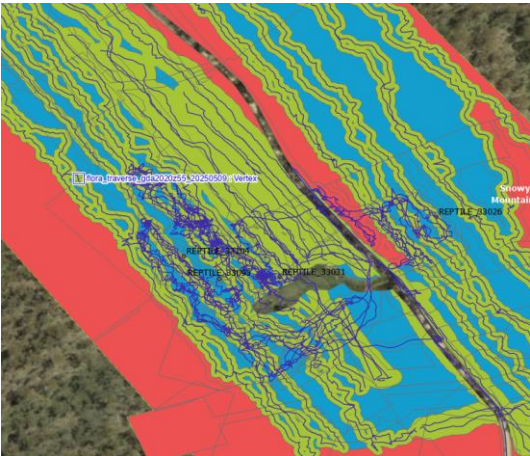
12	<p>Section 4.1: PCT verification and mapping updates</p>	<p>Plant Community Type 1151 Plant community type (PCT) 1151 has been changed to PCT1155 with no justification why it is considered a better fit PCT (comparison analysis). On review of the initial amended BDAR there were 14 plots that informed the PCT and the addition of 10 plots has now changed the vegetation to a different PCT. As this is a change post-approval a robust justification should be provided regarding the decision-making process, especially how the addition of BAM Plots to the analysis has shifted the PCT of best fit.</p> <p>Plant Community Type 1330 The proposed changes to PCT 1330 have been reviewed, including a review of data from the two BAM plots within the woody remnants. The current justification supported by the data suggest the change to PCT 351 is valid, particularly within the vegetated areas where the BAM plot data was collected based on canopy attributes and the lower strata. The lower slopes and drainage line that is now assigned to lower condition vegetation types of PCT 351 has not been justified sufficiently considering the landscape position of these patches would likely support PCT 1330. There is no Rapid Data Point (RDP) information available or photographic information to review to understand the changes in these areas and without additional floristics data in these areas it is difficult to see how these areas can be assigned to PCT 351 rather than PCT 1330. In addition, when reviewing aerial imagery and adjacent vegetation mapping carried out by the consultant, the presences of PCT1330 seems consistent within the drainage lines east and west of the current location in question (outside category one land). The assignment of these areas previously to the critically endangered ecological community (CEEC) Box Gum Woodland needs the proposed changes of the PCT in the lower slopes and</p>	<p>PCT 1151: Refer to Table 4-3 in the BAVR in relation to PCT justification. Whilst it is noted that PCT1151 still offers a good fit (as does 1155), 1155 was ultimately chosen due to a lack of suitable OTGs for 1151. The reassignment offers a suitable fit and addresses the OTG issues.</p> <p>PCT 1330: The intact remnants in the 351_High lack <i>E.melliodora/rubida/bridgesiana</i> and are justified. Further data is needed to distinguish/ justify between these PCTs in the low condition areas overlapping lower slopes/ drainage lines. As such, a conservative approach has been adopted and 1330 mapped for low condition areas.</p>	<p>For PCT 1151/1155: a justification of the change should have been part of the PCT profile table, rather than a reliance on just the limited offset trading group associated with the PCT.</p> <p>In regard to PCT 1330/351 there was no question relating to the reassignment of intact vegetation as data showed enough floristic similarities to support a change to the PCT. The feedback was specific to the lower slopes and drainage lines. It is acknowledged the grasslands have been reassigned back to PCT 1330. Further consideration of reassigning areas to PCT 1330 should be given to areas circled in blue as these are found on the lower slopes and no RDPSs present to suggest otherwise.</p>  <p>Section 4.1 (BAVR R0) had a justification for the change of 1330 to 351 that supported the change and part of the decision pathway taken. I would suggest reintroducing this to further support the justification of intact areas assignment to PCT 351.</p>	<p>This change has been further justified within the BAVR with additional RDPS used to determine the change being added to the figures and provisioned data.</p>
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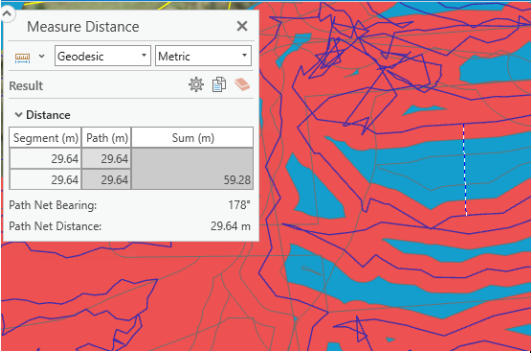
Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		drainage lines to be further justified to support the removal of the entire area from the mapped extent of CEEC.			

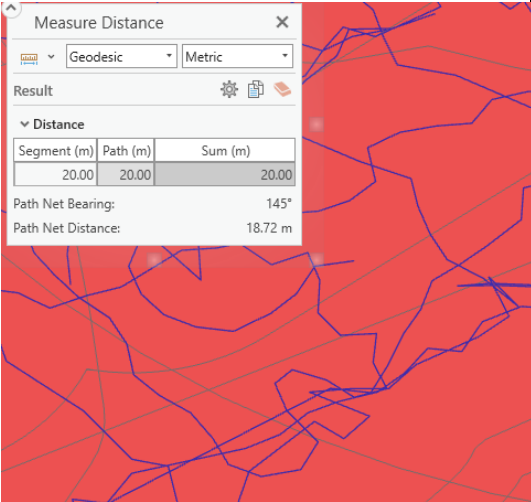
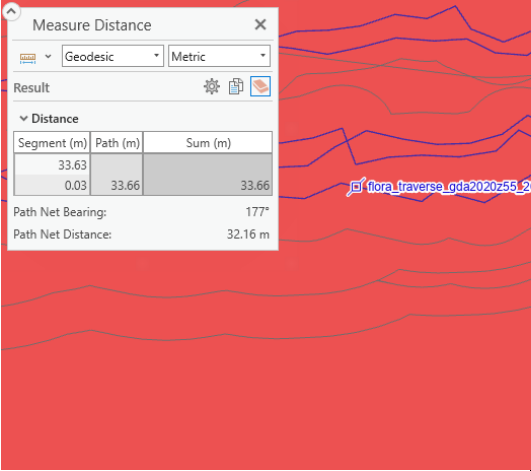

13	<p>Section 4.2: Revised Habitat Constraint Mapping: Table 4-3 and Table 4-4</p>	<p>Hollow bearing trees: A 61ha reduction of area previous modelled to contain HBTs has been identified in Table 4-3. It is not understood where this reduction has occurred within the alignment or specifically how it impacts each of the hollow dependent species (and their associated PCTs). It would be beneficial that this information was presented in the BAVR and in spatial data to differentiate the habitat reduction from survey effort.</p> <p>Stick Nest: 17 stick nests listed in Table 4-3. Spatial data only has six (6) stick nests. In regard to stick nests that maybe associated with the white-bellied sea-eagle, the 1km required buffer of rivers appears to be a 500m buffer (spatial data supplied). The TBDC lists <i>Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines</i>, therefore a buffer should be 1km either side of a river, creek, dam etc.</p> <p>Only one of the current six stick nests available for the review would be located in a 1km buffer (stick nest is outside the 500m buffer supplied).</p> <p>When reviewing spatial outputs (Microsoft Excel tables) it is not clear where an additional 47.1ha of suitable habitat for the raptor species is located or if it has been included in the spatial data.</p> <p>Surface rock: A total 1694.73ha of surface rock has been considered as potential habit for the Pink-tailed legless lizard (412.73ha confirmed 1,282ha assumed). The spatial data provided does not include surface rock habitat other than in areas associated with the existing species polygon. Further information is required to understand how this reduction will be represented in the overall habitat for this species.</p> <p>Terrestrial orchids: The following terrestrial orchids have had their potential habitat revised based on microhabitat assessment.</p>	<p>HBTs: A new spatial layer has been provisioned for owl species to delineate the extent of lands within the project footprint where HBTs have been confirmed absent, present or are assumed to occur based on LiDAR tree height data. Where HBTs are present or assumed and a corresponding owl species polygon is not present, then this will be the result of an absence of other necessary habitat attributes (such as PCT, veg cover and patch size thresholds, absence of woody vegetation, etc).</p> <p>Stick nests: Only 15 as per BAVR R1. Refer to response to CPHR comment 35: There were no stick nests recorded within 500m (250m peri-urban areas) of suitable WBSE streams. 15 stick nests have been recorded elsewhere within the project footprint. These are considered suitable for candidate raptors. Whilst breeding was not observed, this has been assumed and a 300m buffer to these nests which have been delineated in the species polygons. All WBSE habitats have been developed using the HBT & Stick nest gaps layer which draws upon the LiDAR tree height dataset (as noted in Table 2-3 and documented in detail in Attachment 1 of the BDAR). Note – as a precautionary approach was applied to one stick nest situated approximately 580m from a suitable stream in YG-034 (shown below). A 500m buffer was applied to this stick nest and all buffered areas included in the species polygon, including habitats situated beyond the 500m stream buffer.</p>	<p>Hollow Bearing Trees</p> <p>The information in this section has changed format and now provides specific extent of potential habitat that includes areas where modelling of HBTs for Cockatoos and Forest owls has occurred. There is still a lack of understanding of where (spatially) habitat reduction has occurred for each species. A spatial layer has been provided that displays habitat that has been excluded. When trying to determine how this spatial data correlates to each Cockatoo and Forest owl, it is not easy to see where these reductions occur. In addition, when trying to compare the extent of potential habitat to Table 24 (Assumed and Known habitat combined) it was not possible to get a match. Example for the Cockatoos have been provided in Items 23 and 24</p> <p>Stick Nest</p> <p>The BAVR R2 and supplied data shows 15 stick nests suitable for large raptors (compared to six in BAVR R0). The required constraint mapping for the White-bellied sea-eagle (WBSE) in accordance with the TBDC and those used in the BAVR were identified as being inconsistent in the original review. As noted previously the habitat constraint for the white-bellied sea-eagle is <i>Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines</i>. This should be interpreted as a creek, river dam buffered by 1km each side of the water body (not 500m). The update to this habitat constraint will require the assessment of other stick nests not considered for WBSE previously. Further information has been provided in item 20.</p> <p>Surface Rocks</p> <p>Noted no further feedback</p> <p>Orchids</p>	<p>HBTs: Habitat constraint mapping has been undertaken in accordance with the BAM. There is no need to spatially represent areas for which habitat absence has been established. This has been provided in the HBT >20cm spatial dataset.</p> <p>Stick nest: WBSE polygons have been revised in accordance with the TBDC, following the below methodology:</p> <ol style="list-style-type: none"> 1. Suitable streams were buffered by 1km. 2. All suitable stick nests (correct height from ground and size) within an associated PCT/IBRA that is located within 1km of a suitable WBSE stream has been identified and buffered by 500m. 3. Where data gaps remain within the 1km buffer to the streams, LiDAR data has been used as a proxy for nests, where the LiDAR tree heights are >20m tall and within an associated PCT. 4. These areas (suitable stick nest buffer and LiDAR polygons) have been merged to create the species constraints mapping and incorporated into the species polygon as "assumed presence". <p>Surface rock: Noted. No update required.</p> <p>Orchids: Noted. No update required.</p>
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Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>Caladenia montana</p> <p>Pterostylis oreophila</p> <p>Thelymitra alpicola</p> <p>Further detail should be provided if this information was provided by the approved orchid specialist panel and used to inform orchid species potential habitat and survey effort.</p>	<p>Surface rock: species polygon updated to include 50m buffer to surface rock</p> <p>Terrestrial orchids: What information is required here? Orchid experts were engaged to undertake the field surveys and are BAVR co-authors and have contributed to these outcomes directly.</p>	<p>Noted the orchid specialist are now authors. It is acknowledged that these types of habitat constraints should be available to all experienced ecologist, the request for additional information was to ensure there was support by the approved orchids specialist team to exclude these areas.</p>	


Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
14	<p>Section 2.5.2 Threatened Flora Survey Effort and Sections 4.4.1 and 5.1.2</p> <p>Results: <i>Caladenia concolor</i></p>	<p>As noted in Item 3, threatened flora species polygons have been reduced by applying OSR. There are many species which this has been applied and to different extents. The Serious and Irreversible Impact (SAIL) entity <i>Caladenia concolor</i> is one example of where 23ha has been assigned to OSR within the development footprint and approximately 3ha directly impacted by the current construction footprint. No justification has been provided for the assignment to the OSR category. Further detail should be provided to support the removal of assumed presences across areas now assigned to OSR.</p> <p>The below clip displays the extent of OSR (blue) in the development footprint.</p>  <p>The below clip is an example of the buffer greater than stated in the BAVR as described in item 5 2.5-5 m compared to 10 m in the clip.</p> 	Refer to item 3 and 5	As noted in Item 3 there are still some areas that should be considered as assumed presence due to lack of evidence to support survey or OSR in accordance buffers in Table 9.	Species polygon for this species has been further refined. Refer to item 3.

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15	Section 2.5.2 Threatened Flora Survey Effort and Sections 4.4.1 and 5.1.2 Results: <i>Caladenia montana</i>	<p><i>Caladenia montana</i> has approximately 36ha of potential habitat assigned to OSR in the development footprint and 20.89ha currently assessed as direct impacts. The below clip displays areas of assumed presences (red) and OSR (blue) which have no obvious differences when reviewing the aerial imagery and there is no information provided that details why the areas have been assigned to OSR. The image also shows larger buffers of transects which has resulted in in additional areas excluded from the species polygon (Noted in Item 5).</p> <p>Further detail should be provided to support the removal of assumed presences across areas now assigned to OSR.</p> 	Refer to item 3	OSR has been reduced to minor patches within surveyed areas (slivers between buffers). Further consideration of areas still assigned to OSRs that are outside buffer limits as per item 3	Species polygon for this species has been further refined. Refer to item 3.
16	Section 2.5.2 Threatened Flora Survey Effort and Sections 4.4.1 and 5.1.2 Results: <i>Genoplesium superbum</i>	<p><i>Genoplesium superbum</i> has approximately 9.17ha of potential habitat assigned to OSR in the development footprint and 1.12ha currently assessed as direct impacts. There is no information that details how these areas have been opportunistically surveyed or any spatial data to support this mapping update.</p> <p>The below clip shows areas of OSR (blue) with no survey transects and the closest transect >5m away.</p> <p>Further information should be provided to support the OSR areas for this</p>	Refer to item 3	It is acknowledged that some areas have now been included in the assumed presences areas. New clip still shows areas 30m wide considered OSR, which is not consistent with Item 3 buffer requirements.	Species polygon for this species has been further refined. Refer to item 3.

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		<p>endangered species listed as a SAIL entity.</p> 			
17	<p>Section 2.5.2 Threatened Flora Survey Effort and Sections 4.4.1 and 5.1.2</p> <p>Results: <i>Pimelea bracteata</i></p>	<p>During the review it was identified not all survey reduction areas in the spatial files show survey transects covering the polygons, also there are OSR areas with no survey transects present. The spatial file indicates in the attribute table these polygons have been surveyed (Post BDAR survey column =Yes). Further clarification whether these areas have been surveyed should be provided, this includes areas that may have been previously surveyed, such as for the Amended BDAR. It could also include identifying polygons surveyed by year to differentiate between survey efforts.</p> <p>The current species polygons within the wider development footprint are based on a 30m buffer of a single point (species polygon method for count species). When reviewing the species abundance at each point (spatial data and BAVR Table A5-1) shows that individual counts range from 1-300.</p> <p>The variation in individuals at each point should be represented by multiple points or a polygon around the patch for example around the 300 individuals. This would give a spatial representation of the patch of individuals. The current method does not provide an understanding of the extent of individuals therefore the buffer may not be adequate to protect all individuals especially as this species is area-based species for generating a species</p>	Refer to item 3 and 4	Review of the updated species polygon for <i>Pimelea bracteata</i> appears to have been developed by buffering very course polygons some that appear to have been created in July 2025. Please refer to item 4.	Species polygon for this species has been further refined. Refer to item 4.

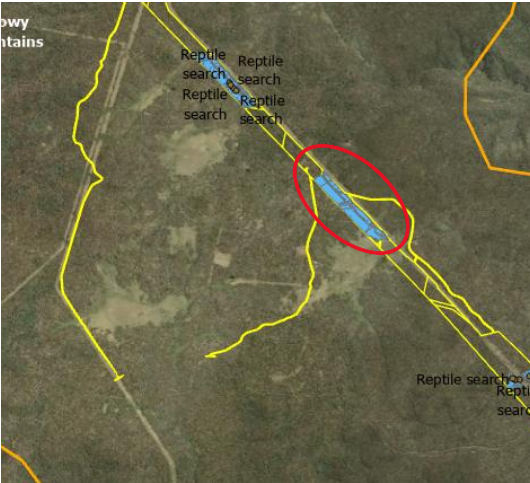
Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>polygon. There is no information provided in the BAVR that explains why a 30m buffer has been used instead of mapping of suitable habitat in accordance paragraph 6.4.1.28of the BAM. Additional information should be provide to support how the species polygon has been generated and justification for the extent of buffer.</p>			
18	<p>Section 2.5.2 Threatened Flora Survey Effort and Sections 4.4.1 and 5.1.2</p> <p>Results: <i>Pomaderris delicata</i></p>	<p>Spatial data illustrates buffers of transects inconsistent with Table 2-5 in the BAVR. The following example shows buffers of 20m applied to the transect line rather than 10m.</p>  <p>In addition, there are examples where areas greater than the 20m buffer have been applied incorrectly but is still considered surveyed see following example (approximately 33m)</p> 	<p>Refer to item 5 and 3</p>	<p>The following clip shows an area of OSR (Green) for this critically endangered species that has not followed the parameters outlined in Item 3.</p> 	<p>This location comprises a roadside cleared paddocks. Survey tracks and field data points intersect the location as shown in screenshot. Suitable for opportunistic reduction on this basis.</p>

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		<p>The OSR has been applied to areas greater than the incorrectly applied buffer, therefore these areas should be reviewed or a justification provided that supports the exclusion of these areas from formal survey or assumed presences.</p> <p>As this species is a SAI entity it is recommended that all areas be reviewed and where survey effort does not reflect the Table 2-5 buffers all areas should be considered assumed presences. This includes areas of OSR.</p>			
19	2.5.2 Flora Survey Effort: <i>Solanum armourense</i>	<p>The SBS refers to carrying out surveys in accordance with Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method & TBDC survey requirements. TBDC refers to multiply surveys may be required (up to three surveys). In addition, it is noted in the SBS that consultation with CPHR had occurred. There is no further information provided in the BAVR that outlines a modified survey method away from the TBDC, therefore it is recommended that this information be provided to support the removal of assumed presences areas for this species.</p>	<p>Refer to response to CPHR comment 23:</p> <p>Whilst the TBDC does suggest that multiple rounds of survey MAY be required, CPHR were consulted regarding proposed survey effort for this species as a part of the BDAR, supplementary biodiversity strategy and as a part of the supplementary surveys (as noted in Section 1.5 of the BAVR). This matter was not raised by CPHR during consultation, nor is repeat survey proposed within the Approved SBS.</p> <p>Following the meeting held 19/06/2025, we understand a recent confirmed detection was noted in the locality and the likelihood of the species occurrence has increased to moderate. As such, a review of survey effort was undertaken to identify areas that may be considered undersurveyed (i.e. only one survey round). 88% of habitat was subject to two or more survey events. Only 2.49ha of habitat was surveyed once. Species presence has been conservatively assumed within this portion of habitat. A repeat survey will be prioritised within these habitats prior to the commencement of construction (MM10)</p>	<p>The justification provided in Annex 8 is sufficient to support survey coverage across areas of 2-3 surveys. Single surveyed areas should be retained as assumed presences as outlined in the justification.</p>	<p>Noted – this is what has been adopted. No update required.</p>

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20	2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: White bellied Sea-eagle	<p>The current development footprint and direct impacts to White-bellied sea-eagle (WBSE) breeding habitat has been generated using the incorrect buffer for known stick nests. The example below shows a section removed from the species polygon due to the incorrect habitat constraint buffer being applied (500m not 1km). In addition, the buffer applied to the stick nest is approximately a 300m radius compared to the 500m radius (when located outside urban/peri-urban areas) required in accordance with the TBDC. The WBSE species polygon should be updated to reflect these requirements and a complete review of the species polygon with consideration of the other 11 stick nests found (not provided in spatial data).</p> 	Refer to item 13 above	<p>As noted in Item 17, the habitat constraint for the WBSE has not been applied to its full extent (within 1km of water bodies). The following stick nest are examples that should be considered as part of the WBSE species polygon.</p> <p>Stick nest YG-034 is within the 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines.</p> <p>Stick Nest BY-111 is within 1km of Merrill Creek. This nest is located on a creek therefore if to be exclude a justification as to why they are not considered potential breeding habitat should be included.</p> <p>Stick Nest YG001 is within 1 km of an existing creek that only has a 500m buffer applied. Notes in the spatial indicate “potential” WBSE nest.</p>	<p>Species polygon method is consistent with the approved BDAR.</p> <p>However, we have reviewed the species polygon to address all confirmed and potential suitable stick nets within 1km of suitable streams using LiDAR veg heights and stick nest mapping.</p> <p>Species polygon development is described in item13.</p>
21	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Pink-tailed worm-lizard	<p>The survey effort is concentrated within the Bungonia IBRA Sub-region (SR). An area southwest of surveyed area (>5km along the alignment) has been assigned to survey reduction even though no survey is present or indication that no habitat is present. Further detail on why this has been assigned to surveyed needs to be provided.</p> <p>It is noted that the survey effort in the concentrated area is greater than required, however this should not be used to justify the removal of</p>	Whilst these patches were not directly subject to survey during the BAVR (i.e. only a subset of habitats were surveyed), a total of 180 mins of rock rolling surveys were undertaken 25-26 January 2022 at these locations. This survey has been brought forward to the BAVR to justify reductions in these locations where required.	<p>The inclusion of the 2022 surveys provides to context to the assignment of this area to the survey reduction category. There is no detail relating to the number of rocks rolled across these areas. This info should also be included to support the assignment of this category.</p> <p>Information provided in Section 4.2.3 gives context to the surface rock assessment across the project area and is supported by spatial files. The areas of direct impact and project area extent</p>	Noted. No updates required.

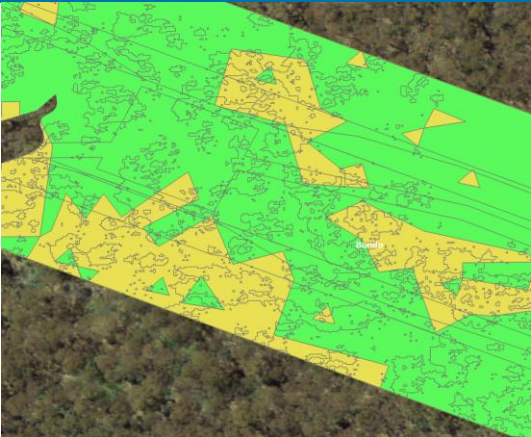
Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>approximately 8.27ha as it is disjunct area to the surveyed section of the alignment.</p> <p>When reviewing the spatial data, it was not possible to recreate the 37.29ha of direct impact recorded in the Amended BDAR, therefore it appears there is a greater area of assumed presences removed compared to the spatial data. Further clarification should be provided to show how the reduction from 37.29ha to 15.31ha has been achieved.</p> <p>Survey appears adequate for the small 17.5ha of habitat that has been removed from the development footprint. It is unclear how the original 257.47ha of assumed presences and 36.15ha for this species identified in the BDAR has been reduced to 95.64ha and 23.84ha in the development footprint. It is acknowledged that there has been some habitat constraint mapping as outlined in Section 4.2 Table 4-3 which must have reduced the potential habitat, but it is unclear where this reduction has occurred when interrogating the spatial data. As the aim of the post approval surveys is to reduce impacts to biodiversity, it would be of benefit to show where these changes have occurred and provide a breakdown in a table of areas excluded based on habitat constraints and survey to make it clear how the final direct impacts have been reduced.</p>	<p>The Aprasia species polygons are not consistent with the BDAR due to the confirmed absence or presence of surface rock in some locations subject to further desktop or field assessment. Please refer to the Surface rock layer.</p> <p>An update of the species polygon has been made to address a 50m buffer to rocky areas that was not previously applied.</p>	<p>have been updated to include the 50m buffer of the rock areas. All information relating to areas has been clarified.</p>	
22	<p>Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results:</p> <p>Eastern pygmy possum</p>	<p>Survey coverage appears appropriate for surveyed area in the Bungonia IBRA SR. There has been a significantly higher survey effort undertaken compared to the required trap nights outlined in the SBS (100/50ha). A total 4627 trap nights (197 cameras) have been carried out across Bungonia. These are only cameras with the target species identified as Eastern pygmy possum.</p> <p>Development footprint Amended BDAR results states 862.11ha of assumed</p>	<p>Noted. The extra survey effort undertaken was due to unexpected increase in survey requirements for Phascogale which overlapped with target EPP habitats.</p> <p>A small section of Grassy Woodland habitat was removed from the EPP species polygon in the Crookwell region following PCT mapping updates from 1330 to 351.</p>	<p>Noted: Regarding the extra survey effort. Noted the change to PCTs has changed the association for this species when the new PCT has been assigned.</p>	<p>Noted. No updates required.</p>

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		<p>presences compared to 851 ha (spatial data). This 11 ha difference is therefore reflected in the overall potential habitat reduction of 13.81 ha across the development footprint in the BAVR compared to the 2.8 ha when reviewing the spatial data. It is not understood if this additional reduction relates to habitat constraints mapping noted in Item 13. In accordance with previous recommendation this constraint should be removed.</p> <p>Further detail on the reduction of the species polygon for both the development footprint and direct impacts should be included in the BAVR.</p>			
23	Section 2.6 Threatened Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Gang gang cockatoo	<p>Table 2-9 outlines that no reduction to the species polygon has been applied as survey effort has not been met. In Table 4-6 there has been a reduction in overall habitat (assumed and known) within the project footprint by 124.22 ha.</p> <p>In Table 5-3 there is an overall reduction in direct impacts of 34.54 ha. When reviewing the spatial data results from the Amended BDAR and BAVR Results both have the same total direct impact (441.37 ha). It is not understood how the approved Amended BDAR total (475.87 ha) has been reduced to the current 441.37 ha. Further clarification of these changes (if correct) should be documented in the BAVR.</p>	<p>This is not due to survey effort. This is due to supplementary constraint mapping. We will try and explain this in the BAVR.</p>	<p>Additional data has been provided that supports Table 26 of the BAVR potential habitat mapping changes made for this species relating to <i>Changes to the extent of mapped potential habitats due to the presence/ absence of suitable hollows in lands subject to survey</i>.</p> <p>There is still a lack of understanding of where habitat reduction has occurred for the species as there is no way to compare the BDAR results in Table 24 (Assumed and Known habitat combined) to the BAVR results in the table.</p> <p>The extent of potential habitat in Table 21 after constraints mapping identified 1901.08 ha (2021.65 ha BDAR result) and then overall BVAR result is 1897.41 ha. These are relatively small variances which if correct, should be explained further in the BAVR to provide overall clarity.</p>	<p>Refer to item 4.</p> <p>No updates required.</p>
24	Section 2.6 Threatened Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Glossy black cockatoo	<p>Table 2-9 does not outline survey effort. In Table 5-3 there is reduction in direct impacts of 38.57 ha. When reviewing the spatial data results from the Amended BDAR and BAVR, both have the same total direct impact (38.57 ha). It is not understood how the Amended BDAR area total (45.09 ha) has been reduced to the current 38.57 ha. Further clarification of this reduced impact on habitat for this species should be</p>	<p>See item 23 above</p>	<p>Additional data has been provided that supports Table 26 of the BAVR potential habitat mapping changes made for this species relating to <i>Changes to the extent of mapped potential habitats due to the presence/ absence of suitable hollows in lands subject to survey</i>.</p> <p>There is still a lack of understanding of where habitat reduction has occurred for the species as there is no way to compare the BDAR results in Table 24</p>	<p>Refer to item 13.</p> <p>No updates required.</p>

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		documented in the BAVR. This would include whether it was by survey or habitat constraint and extent of each method.		(Assumed and Known habitat combined) to the BAVR results in the table. The extent of potential habitat in Table 21 after constraints mapping identified 177.78 ha (214.17 ha BDAR result) and then overall BVAR result is 177.61haha. These are relatively small variances which if correct, should be explained further in the BAVR to provide overall clarity.	
25	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Alpine She-oak Skink	<p>Survey effort for the Alpine she-oak skink was considered generally in accordance with the reptile guidelines and SBS. A section of potential habitat (25.21ha) has no survey present and the closest survey location is just under 2km. A justification for the removal of this area from assumed presences without survey should be provided as support to the reduction of assumed presences for this species.</p>  <p>Areas of severely burnt land have been removed from the species polygon, which is in contradiction to Section 3.1 which states severely burnt land will be retained as assumed presences for this species in the Snowy Mountain IBRA SR.</p>	Two surveys were carried out on 17 December 2021 within 200 m of that patch of habitat (total of 72 mins survey). This survey has been brought forward to the BAVR to justify reductions in these locations where required.	<p>Additional surveys carried out adjacent and within the area in question. The surveys for this patch are not strictly in accordance with the guidelines and as this patch was considered as assumed presences at the time of BDAR approval it is recommended further justification should be provided to support the use of the two surveys for the area.</p> <p>Noted: assumed presences for severely burnt land has been reapplied.</p>	<p>The species colonises grassland habitats, which were confirmed at the BDAR stage through SBL assessments to have fully regenerated post-fire. Despite this, a SER has not been applied in any SBL for this species.</p> <p>No update required.</p>
26	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Little Eagle, White-bellied sea-eagle and Square-tailed kite	The spatial data only includes 6 of the 17 stick nests noted in Table 4-3. A review of the survey effort and habitat impacts cannot be completed without this information for these three raptor species. Where species polygons are	Refer to item 13 above	The peer review was of BAVR R0 which stated 17 stick nests. Since then, it has been verified as 15. The following feedback should be considered for Little eagle and Squared-tailed kite:	A review of WBSE constraints mapping and species polygon methodology has been undertaken and adopted, as described in item 13.

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		present around available nest data, it appears the correct buffer (300m) has been applied to the Little eagle and Square-tailed kite. As noted earlier the WBSE buffer has incorrectly been applied and will need to be revised.		<ul style="list-style-type: none"> - Stick nest YG001 is not included in the species polygon (tree is not mapped as vegetation). The tree should be mapped in the polygon as the nest occurs in the tree regardless of the associated PCT. It is noted in the TBDC for square-tailed kite the <i>300m radius around the nest tree is to incorporate all woody and non-woody native vegetation within the radius</i> - Stick Nest YG018, YG 036 Species polygons drawn/updated and include all woody vegetation as per previous point. - Review all species polygons around stick nests for both species to ensure they are generated in accordance with the TBDC. 	<p>Square-tailed Kite and Little Eagle has undergone an initial review, detailed below:</p> <ul style="list-style-type: none"> • YG-001: Polygons missing nest tree & other trees within 300m. • YG-018: Nest tree outside footprint. Polygons missing other trees within 300m. • YG-036 (2 nests): Polygons missing nest trees & other trees/woody vege within 300m. Appears that areas without vegetation are included in polygons, but woody veg excluded. • BY-111: Missing woody vegetation from polygons. • WM-053: Missing nest tree from polygon for both species. • WM-008, WM-032, YG-034, YG-038: Confirmed accurate. <p>These items will be reviewed post-submission to amend as necessary in regard to items identified by the peer review.</p>
27	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Stuttering Frog	The removal of potential habitat (22.87ha) should be further supported with additional information detailing how small pools in likely ephemeral drainage lines would not be considered potential habitat for this species.	An annexure has been added to the BAVR providing details of field observations and notable habitat prescriptions that were applied to inform stream suitability.	<p>Detailed habitat suitability information in Annex 10 provided sufficient information to support the exclusion of streams based on the lack of suitable breeding habitat in streams.</p> <p>Survey effort for areas of suitable habitat is generally in accordance with the frog guidelines and has been considered to be sufficient meet the survey requirements.</p>	Noted. No update required.
28	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Powerful owl	The current survey effort is not consistent with owl survey guidance that has been available in the TBDC since March 2024. The departure from this method and the reliance on survey method from the original assessment should be detailed in the BAVR. The SBS independent peer review outlined the changes to the survey method and recommended surveys be carried out in accordance with the TBDC survey guide.	<p>Owl survey effort has addressed the proposed SBS survey effort, being:</p> <ul style="list-style-type: none"> • Powerful Owl and Barking Owl: At least 5 surveys per 200 ha • Masked owl: At least 8 surveys per 200ha • Sooty Owl: At least 6 surveys per 200ha. 	No further feedback provided based on data package and report requiring updates as at 23/07/25	Refer to item 11.

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		<p>It is understood there can be difficulties implementing these types of surveys over linear projects such as HumeLink, but where it is not possible to meet guidelines as recommended above a justification for not following should be provided and where possible discussed and approved by the CHPR. There is no information in the SBS or the BAVR that supports the approval of the survey effort in the BAVR by CPHR.</p> <p>General Feedback</p> <p>When reviewing the spatial data it was difficult to determine which call playback (CPB) surveys have been included in each survey effort due to the target species including other owls. When interrogating the data there were instances where CPB were located <1000m apart on the same day (The example provided for Masked owl is the same for this species). Time of surveys is incorrect noting this could be due to incorrect time in software used to record data.</p> <p>Areas of severely burnt land have been removed from the species polygon, which is in contradiction to Section 3.1 of the BAVR which states severely burnt land will be retained as assumed presences for this species in the Snowy Mountain and Bondo IBRA SR.</p> <p>Areas of severely burnt land are very coarsely mapped with triangles and straight edges throughout the layer. This is obviously not a true representation of the on-ground condition of the vegetation. The clip below is an example of this coarse mapping.</p>	<p>Surveys undertaken within the Bungonia IBRA SR have addressed the TBDC: 10 call playback stations per 1000 ha of habitat, repeated for 6 nights.</p> <p>Severely burnt lands have been retained as assumed present- refer to BAVR R2 fauna species polygons and section 3.1 of the BAVR.</p> <p>General feedback: I am not 100% clear what this is saying. Data was provisioned in wrong time zone. This has been corrected with latest data provision.</p> <p>The severely burnt lands layer was developed as a part of the BDAR and addresses the FESM (the source of the course mapping that is noted). Section 3.1 of the BAVR has been updated to capture this information.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> • Survey methods compliant with SBS and not TBDC. • Not required • Already addressed • Already addressed • Not required- this is a result of the severely burnt lands layer and the course mapping noted is due to the FESM. <p>Spatial data was provisioned with R1 BAVR</p>		

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<div></div> <p>Bondo IBRA sub-region: one survey present only lists Barking owl. Provide further detail if this point is for Powerful owl. The area of potential habitat is less than 100ha in the sub-region therefore would still require 6 repeated surveys at a CPB station</p> <p>Snowy Mountains IBRA Sub-region: A total of 24 CPB surveys are present in the spatial data, 22 in the BAVR Table 2-9. Current TBDC guidelines would require between 4-5 CPB stations with 24-30 surveys in total.</p> <p>Recommendations</p> <ul style="list-style-type: none">• Provide further information to support compliance with the TBDC guidance for survey or where possible justification for the departure from the methods outlined.• Assume presences for Powerful owl if survey methods are determined not compliant (Snowy mountains specifically).• Assume presence in areas of severely burnt land.• Clean up survey spatial data to include CPB stations for this species only and ensure compliance with survey method (proximity to adjacent survey station is >1000m).• Review mapping to update coarse mapping where obvious areas are not likely to represent the conditions			

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		on the ground i.e. triangle polygons and assign to most appropriate survey results with information detailing the decision-making process.			
29	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Barking owl	<p>The current survey effort is not consistent with owl survey guidance that has been available in the TBDC since March 2024. The departure from this method and the reliance on survey method from the original assessment should be detailed in the BAVR. The SBS independent peer review outlined the changes to the survey method and recommended surveys be carried out in accordance with the TBDC survey guide. It is understood there can be difficulties implementing these types of surveys over linear projects such as HumeLink but where it is not possible to meet guidelines as recommended above a justification for not following should be provided and where possible discussed and approved by the regulators. There is no information in the SBS or the BAVR that supports the approval of the Survey effort in the BAVR by regulators.</p> <p>General Feedback</p> <p>When reviewing the spatial data it was difficult to determine which CPB surveys have been included in each survey effort due to the target species including other owls. When integrating the data there were instances where CPB were located <1000m apart (The example provided for Masked owl is the same for this species). Time of surveys is incorrect noting this could be due to incorrect time in software used to record data. Areas of severely burnt land have been removed from the species polygon, which is in contradiction to Section 3.1 which states severely burnt land will be retained as assumed presences for this species in the Snowy Mountain and Bondo IBRA SRs.</p>	<p>As per item 28</p> <p>The survey methods layer notes each target species associated with the call playback surveys undertaken</p> <p>Bondo: Only 13.5ha of Wet Sclerophyll forest (grassy sub-formation) habitat was targeted in Bondo. Only 1 call playback survey required for this extent of habitat. Species presence is assumed in other formations where survey was not undertaken</p> <p>Inland Slopes: A total of 28 CPB surveys undertaken within Inland Slopes targeting Barking Owl. Please refer to reprovisioned data</p>	No feedback provided based on data package and report requiring updates as at 23/07/25	Refer to item 11.

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>Areas of severely burnt land are very coarsely mapped with triangles and straight edges throughout the layer. This is obviously not a true representation of the on-ground condition of the vegetation. See Powerful owl for example.</p> <p>Bondo IBRA SR: one survey present only lists Barking owl. The area of potential habitat is less than 100ha in the IBRA sub-region therefore would still require 6 repeated surveys at a CPB station.</p> <p>Inland slopes IBRA SR: Only nine (9) CPB surveys were identified in the spatial data (where Barking Owl is listed as target species) compared to 25 in BAVR survey effort (Table 2-9). All CPB are located in the very north of the SR with no spatial spread across the 346.6ha proposed to be surveyed. Based on area alone current survey requirements would require between 3-4 CPB stations with a minimum of 6 repeated surveys at each (18-24 surveys).</p> <p>There are significant areas of potential habitat that have no CPB present and no information to suggest habitat constraints have been used to exclude these areas from assumed presence.</p> <p>Recommendations</p> <ul style="list-style-type: none"> • Provide further information to support compliance with the TBDC guidance for survey or where possible justification for the departure from the methods outlined. • Assume presence for barking owl if survey methods are determined not compliant. • Assume presence within the Inland Slopes IBRA SR where no survey has been completed and no justification for the exclusion of these areas as potential habitat for this species. 			

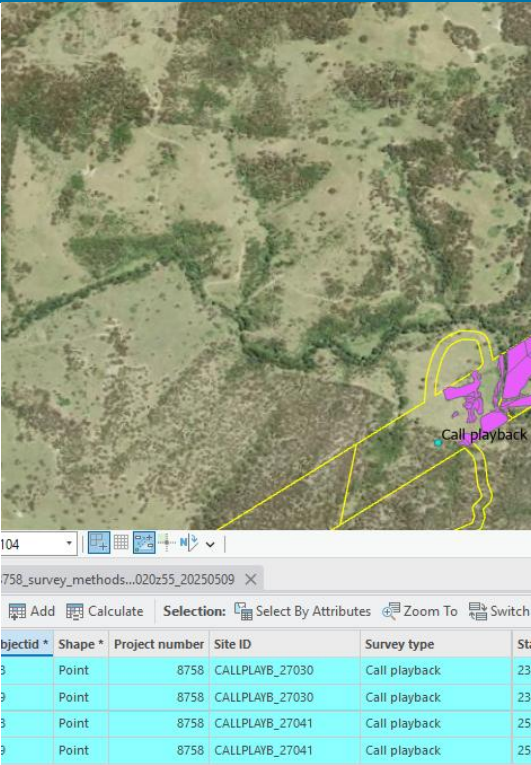
Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<ul style="list-style-type: none"> Assume presence in areas of severely burnt land. Amend survey spatial data to include CPB stations for this species only and ensure compliance with survey method (proximity to adjacent survey station is >1000m). Review mapping to update coarse mapping where obvious areas are not likely to represent the conditions on the ground i.e. triangle polygons and assign to most appropriate survey results with information detailing the decision-making process. 			
30	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Pink robin	Bird surveys do not specifically identify species surveyed. A total of 29.4hrs (2024/25 only) was calculated in spatial data compared to 27.2hr in the BAVR. This difference may be related to which bird survey points have been included within the IBRA sub-region. It is suggested to provide a table with survey ID, dates and times to support the reduction in assumed presence across the Snowy Mountains IBRA SR.	Resolved with data reprovision	Surveys have been assigned to species individually to easily determine survey effort. Effort now considered consistent with the method outlined in the SBS.	Noted. No updated required.
31	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Brush-tailed phascogale	<p>Using the Brush-tailed phascogale survey effort in the TBDC for the survey areas it would be required to have a camera density of 84 cameras and 2,352 nights for the 41.8ha area and 96 cameras and 2688nights for the area 46.83ha in size.</p> <p>When reviewing the spatial data the two areas of survey have the following camera details</p> <p>41.8ha area = 101 cameras 2,162 nights</p> <p>46.83ha area = 121 Cameras-3,045 nights.</p> <p>It is not understood which cameras have been used to calculate the number of cameras and trap nights in the BAVR as these are different to the numbers quoted from the spatial data above. The difference is likely due to spatial data not identifying BTP as a target species on</p>	<p>Refer to response to CPHR comment 13:</p> <p>Survey methods spatial dataset has been reprovisioned addressing this issue.</p> <p>Survey comprised 218 cameras for a total of 5096 trap nights as documented in Table 2-10 of the BAVR</p> <p>Device numbers are provided for all cameras within the provisioned dataset.</p>	<p>The revised spatial file and updated Table 13 of BAVR R2 are consistent. A total of 218 cameras utilised for 5,096 trap nights over approximately 88 ha. The survey method used differs from the SBS and is not in accordance with the TBDC, but is consider sufficient as there is an additional 147 trap nights recorded above the SBS requirement and over 218 cameras that where present for 14-28 days.</p> <p>In the BAVR it is noted re-baiting occurred after 14 days and where inaccessible for re-baiting only the initial 14 days of trap nights were considered in the trap night count.</p>	Noted. No updated required.

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		any cameras. The reviewer has assumed all cameras located within the survey area of assumed presences in the Bungonia IBRA sub-region were used for the BTP. Further information should be provided to support the number of cameras and trap nights used to meet survey adequacy for this species. No information has been provided in the BAVR to indicate if cameras were re-baited two weeks after install in accordance with the TBDC.			
32	Section 2.5.3 Fauna Survey Effort and Section 4.4.2 and 5.1.3 Results: Koala	<p>There are inconsistencies with the survey methods used for Koala across the three IBRA subregions where assumed presences are proposed to be reduced in the BAVR.</p> <p>The following addresses each of the method inconsistencies per SR.</p> <p>Snowy Mountains</p> <ul style="list-style-type: none"> A large proportion of Koala SATs were carried out on days with rain occurring in the previous 3 days or on days when rain occurred, therefore the current SAT method has not been carried out in accordance with the <i>Koala Biodiversity Assessment Method Survey Guide</i> (DPE 2022), due to not meeting the minimum SAT requirements when SATs were carried out within 3 days of rain. Insufficient spotlight transects undertaken (Requires two replicates of 74hrs of survey), also large areas where no spotlight surveys occurred Passive acoustic monitoring not undertaken in accordance with guidelines. Areas of severely burnt land have been removed from the species polygon, which is in contradiction to Section 3.1 which states severely burnt land will be retained as assumed presences for this species in the Snowy Mountain IBRA SR. 	<p>SATS: Refer to response to CPHR comment 10: A review of SAT survey effort was undertaken. 15 (12%) of the 195 SAT surveys undertaken were conducted within 3 days of moderate rainfall (i.e. >10mm). No surveys were carried out following heavy rainfall. Possum and pest animal scats were detected in locality following the noted rainfall periods suggesting survey conditions were still suitable. Justification for SAT survey timing is provided in Annex 11 of the BAVR</p> <p>Spotlighting: Refer to BAVR R1 table 2-10 and the survey methods dataset</p> <p>Acoustic recording: supplementary survey only</p> <p>Severely burnt lands: Refer to item 28 above. Assumed presence retained within severely burnt habitats.</p> <p>Murrumbateman: refer to BAVR R1 and survey methods dataset. 65 SATs completed</p>	<p>It is acknowledged that the consultant has provided a justification for utilising the existing SAT data set. The current guidelines for Koala SAT surveys provides a clear threshold for the amount of rainfall that is considered acceptable to still undertaking SAT surveys - 0mm in previous 3 days. On this basis even light rain as defined by the BOM classification and used to justify SAT usage, would not be compliant with the guidelines. In addition, in Annexure 12 a three-day average has been used to determine the classification. The following examples show the variation of rain in the three days prior to 5th December SAT works (average 7.3mm)</p> <ul style="list-style-type: none"> Tumarumba (72043) - Rain on the 4th 16mm, 3rd 11.8mm, 2nd 0.6mm Adjacent station at Tumbarumba (72169) rain on the 4th 30.4mm, 3rd 8mm, 2nd 0mm <p>It is recommended if a classification system was used to justify the survey period the full three days of rain should be included to determine the extent of rainfall over the three days rather than an average, then justify if the amount is minor that it would not affect SAT surveys.</p> <ul style="list-style-type: none"> BAVR R1 was not available for the first peer review therefore the spotlight effort was based on the 	<p>A total rainfall calculation has been incorporated into the BAVR.</p> <p>It is noted that based on discussions at the Page-turn session (28/7), CPHR have indicated that they are satisfied with the level of survey conducted. Opportunities to update mitigation measures will be discussed (addressing potential impacts to connectivity, implementation of exclusion zones during breeding season etc).</p>

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<ul style="list-style-type: none"> • Recommendation: Provide further information to support compliance with the Koala survey guidelines survey methods of two standard methods (one scat one non-scat). • Assume presences for Koala if survey methods are not compliant. • Assumed presences in areas of severely burnt land. <p>Murrumbateman</p> <ul style="list-style-type: none"> • Only 11 Koala SATs are present in the spatial data compared to 65 identified in Table 2-9, therefore the minimum SAT requirement of 56 has not been met. • Did not meet the minimum drone survey requirements. • Recommendation: Provide further information to support compliance with the Koala survey guidelines survey methods of two standard methods (one scat one non-scat). • Assume presences for Koala if survey methods are not compliant. <p>Bungonia</p> <ul style="list-style-type: none"> • Koala SATs should have been calculated on 150m for suitable habitat <50ha (within IBRA SR). This equates to a minimum of 21 SATs. Spatial data only shows 20 SATs and BAVR notes 39 SATs. • Drone surveys have met the non-scat survey requirement. • Recommendation: Provide further information to support compliance with the Koala survey guidelines survey methods of the scat detection method. • Assume presences for Koala if survey methods are not compliant. • General Survey Requirements <p>Survey summary Information has not been provided in accordance with Appendix F of the <i>Koala Biodiversity Assessment Method Survey Guide</i> (DPE 2022). It is recommended that the survey</p>	<p>Bungonia: Whilst a total of 37.6 ha of habitat within Bungonia was targeted for survey, this habitat is still considered continuous as it is situated within 500m of other habitats adjacent to the project footprint. Regardless, 39 SATs have been completed in Bungonia, exceeding the required survey effort for both contiguous and discontinuous habitats.</p>	<p>information provided in BAVR R0. The data supplied as part of the BAVR V2 review shows 89hrs of spotlight. In accordance with Box 4 (page 17) of the Koala guidelines a total of 74hrs is required for spotlighting with all transects to be surveyed twice (double the time for the full survey effort) therefore 148hrs over two survey replicates.</p> <ul style="list-style-type: none"> - Noted Severely burnt lands retained as assumed presences. - Murrumbateman spatial supplied with BAVR R2 shows 65 SATs. As noted above rainfall in previous three days should be reviewed across the three days not an average. Drone surveys have been met in part across this IBRA sub-region. - Bungonia spatial supplied with BAVR R2 shows 39 SATs. As noted above rainfall in previous three days should be reviewed across the three days not an average. 	

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		methods and survey specific data be included in the BAVR.			
33	Section 2.6.2 Survey Effort Section 4.4.2 and 5.1.3 Results Superb parrot	<p>In the BAVR the diurnal bird survey effort in inland slopes IBRA SR states the survey effort is not met within the grassy woodland formation. When reviewing the spatial data there are large sections of grassy woodland that have been assigned to survey reduction. Its acknowledged that some areas have some survey and are likely to meet the survey requirements in discrete locations. It is not clear why areas where there is no survey present, areas have still been changed from assumed present to survey reduction. In addition, Table 2-9 indicates there is no species polygon reduction.</p> <p>When reviewing the results there is a reduction in the development footprint of 402.123ha within the grassy woodland formation and a 64.61ha reduction of direct impacts.</p> <p>There is also a discrepancy in the spatial data compared to the Project approved direct impacts (BDAR) there is 157.14ha of direct impacts in the results of the BDAR whereas the BAVR states 127.01ha as the clearing limit. It is not clear how previous results are higher than the project clearing limit.</p> <p>Further information should be provided to justify these survey reductions based on survey effort currently not being met. In addition, if there is a reduction relating to habitat constraints this should be detailed for the species and for clarity identified separate to diurnal bird survey effort.</p>	Species polygon issues addressed in revised data provisioning	Updates to spatial data has addressed feedback relating to this species.	Noted. No updated required.
34	Section 2.6.2 Survey Effort: Smoky mouse	<p>The survey effort for Elliot traps in the BAVR differs from the spatial data as the date start and finish indicate three nights not four. This totals 75 trap nights. This is still compliant with the proposed methodology.</p> <p>Update BAVR or provide justification if dates are incorrect.</p>	It was 4 nights. Addressed in updated data provisioning	Addressed, no further comment.	Noted. No updated required.

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
35	Section 2.6.2 Survey Effort Section 4.4.2 and 5.1.3 Results: Masked owl	<p>The current survey effort is not consistent with owl survey guidance that has been available in the TBDC since March 2024. The departure from this method and the reliance on survey method from the original assessment should be detailed in the BAVR. The SBS independent peer review outlined the changes to the survey method and recommended surveys be carried out in accordance with the TBDC survey guide. It is understood there can be difficulties implementing these types of surveys over linear projects such as Humelink but where it is not possible to meet guidelines as recommended above a justification for not following should be provided and where possible discussed and approved by the regulators. There is no information in the SBS or the BAVR that supports the approval of the survey effort in the BAVR by regulators.</p> <p>General Feedback</p> <p>When reviewing the spatial data it was difficult to determine which CPB surveys have been included in the survey effort due to the target species including other forest owls. When interrogating the data there were instances where CPB were located <1000m apart on the same night (examples below are approx. 350m and 150m). Time of surveys (often am) is incorrect noting this could be due to incorrect time in software used to record data.</p>	<p>As per item 28 Survey effort only counted for target formation over each separate night survey (i.e. where target formation subject to two separate surveys on same night, only one night of survey effort is counted). You can see the dates of each call playback survey relating to each target species, IBRA SR and formation within the survey methods layer.</p> <p>Severely burnt habitats: will be retained as assumed presence</p> <p>Inland Slopes SR: A total of 22 surveys completed for Masked owl within the Grassy Woodlands formation. Refer to reprovisioned survey methods data layer.</p> <p>Course mapping is due to FESM and severely burnt lands layer developed and approved at the BDAR stage. No updates proposed as a part of the BAVR.</p>	No further feedback provided based on data package and report requiring updates as at 23/07/25	Refer to item 11.

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2																														
		<div><table><thead><tr><th>Objectid *</th><th>Shape *</th><th>Project number</th><th>Site ID</th><th>Survey type</th><th>St</th></tr></thead><tbody><tr><td>3</td><td>Point</td><td>8758</td><td>CALLPLAYB_27030</td><td>Call playback</td><td>23</td></tr><tr><td>9</td><td>Point</td><td>8758</td><td>CALLPLAYB_27030</td><td>Call playback</td><td>23</td></tr><tr><td>3</td><td>Point</td><td>8758</td><td>CALLPLAYB_27041</td><td>Call playback</td><td>25</td></tr><tr><td>9</td><td>Point</td><td>8758</td><td>CALLPLAYB_27041</td><td>Call playback</td><td>25</td></tr></tbody></table></div> <p>Areas of severely burnt land have been removed from the species polygon, which is in contradiction to Section 3.1 which states severely burnt land will be retained as assumed presences for this species in the Snowy Mountain and Bondo IBRA SR.</p> <p>Note comment for Powerful owl coarse mapping applies to this species.</p> <p>Inland slopes IBRA SR: Only nine (9) CPB surveys were identified in the spatial data (where Masked owl is listed as target species) compared to 11 in BAVR survey effort (Table 2-9). All CPB are located in the very north of the IBRA sub-region with no spatial spread across the 346.6ha proposed to be surveyed (Table 2-9). Based on area alone current survey requirements would require between 3-4 CPB stations (no consideration of spatial spread) with a minimum of 6 repeated surveys at each (18-24 surveys).</p> <p>There are significant areas of potential habitat that have no CPB present and no information to suggest habitat</p>	Objectid *	Shape *	Project number	Site ID	Survey type	St	3	Point	8758	CALLPLAYB_27030	Call playback	23	9	Point	8758	CALLPLAYB_27030	Call playback	23	3	Point	8758	CALLPLAYB_27041	Call playback	25	9	Point	8758	CALLPLAYB_27041	Call playback	25			
Objectid *	Shape *	Project number	Site ID	Survey type	St																														
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9	Point	8758	CALLPLAYB_27030	Call playback	23																														
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Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>constraints have been used to exclude these areas from assumed presences.</p> <p>Recommendations</p> <ul style="list-style-type: none"> • Provide further information to support compliance with the TBDC guidance for survey or where possible justification for the departure from the methods outlined. • Assume presence for Masked owl if survey methods are determined not compliant. • Assume presence within the Inland Slopes IBRA SR where no survey has been completed and no justification for the exclusion of these areas as potential habitat for this species. • Assume presence in areas of severely burnt land. • Amend survey spatial data to include CPB stations for this species and ensure compliance with survey method (proximity to adjacent =survey station is >1000m). • Review mapping to update coarse mapping where obvious areas are not likely to represent the conditions on the ground i.e triangle polygons. 			
36	<p>Section 2.6.2 Survey Effort Section 4.4.2 and 5.1.3 Results:</p> <p>Sooty owl</p>	<p>The current survey effort is not consistent with owl survey guidance that has been available in the TBDC since March 2024. The departure from this method and the reliance on survey method from the original assessment should be detailed in the BAVR. The SBS independent peer review outlined the changes to the survey method and recommended surveys be carried out in accordance with the TBDC survey guide. It is understood there can be difficulties implementing these types of surveys over linear projects such as HumeLink but where it is not possible to meet guidelines as recommended above a justification for not following should be provided and where possible discussed</p>	<p>As per item 28</p> <p>Severely burnt habitats: will be retained as assumed presence</p> <p>Bondo CPB: Survey methods layer reprovisioned with all target species listed. Only 1 survey targeting 13.2 ha of wet sclerophyll (grassy sub-formation) habitat.</p> <p>Snowy Mountains CPB: 8 surveys undertaken in 127.5ha of wet sclerophyll (grassy sub-formation) habitat.</p>	<p>No further feedback provided based on data package and report requiring updates as at 23/07/25</p>	<p>Noted. No update required.</p>

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>and approved by the regulators. There is no information in the SBS or the BAVR that supports the approval of the survey effort in the BAVR by regulators.</p> <p>General Feedback</p> <ul style="list-style-type: none"> • Areas of severely burnt land have been removed from the species polygon, which is in contradiction to Section 3.1 which states severely burnt land will be retained as assumed presences for this species in the Snowy Mountain and Bondo IBRA SR. • Note comment for Powerful owl coarse mapping applies to this species. • Bondo CPB does not have Sooty owl listed as a target species. If original CPB included Sooty owl there is only a single CPB survey in the IBRA SR. • There are only five CPB surveys in the Snowy Mountain IBRA SR across 161.9ha. Current guidelines based on area only would require between 6-12 surveys. <p>Recommendations</p> <ul style="list-style-type: none"> • Provide further information to support compliance with the TBDC guidance for survey or where possible justification for the departure from the methods outlined. • Assume presence for Sooty owl if survey methods are determined not compliant. • Assume presence in areas of severely burnt land. • Amend survey spatial data to include CPB stations for this species and ensure compliance with survey method (proximity to adjacent survey station is >1000m) 	<p>Course mapping is due to FESM and severely burnt lands layer developed and approved at the BDAR stage. No updates proposed as a part of the BAVR.</p>		
37	Section 6: Serious and Irreversible Impacts (SAII)	White Box-Yellow Box-Blakely's Red Gum Grassy Box Woodland and Derived Native Grassland	Box Gum Woodland: A data source field will be added to the veg zone map to allow for delineation of patches subject to BAVR updates	Box Gum Woodland Updates (Section 7 in BAVR R2) to the Box Gum Woodland direct impacts have	Refer to item 17 and 19.

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<p>The Amended BDAR and SBS state that direct impacts to Box Gum Woodland (SAIL) will be 457.18ha and 476.98ha respectively.</p> <p>Noting the feedback raised in Item 12, the direct Impacts in the spatial data supplied with the BAVR show there will be approximately 455.27ha on Box Gum Woodland listed under the NSW Biodiversity Conservation Act (This is provided the multiply spreadsheet filters required to determine the impacts have been applied correctly).</p> <p>In the BAVR there is a discrepancy between the above areas and the 4.94ha reduction stated in Section 6.1.</p> <p>Furthermore, in Table 6-1 of the BAVR (updated impacts to SAIL entities) the area outlined in the changes relate to the direct impacts (117.15ha down to 112.21ha) to Box Gum Woodland that conform to the Commonwealth listed CEEC rather than the State BC Act.</p> <p>It is recommended that this section of the BAVR be updated to reflect the extent of direct impacts on Box Gum Woodland (considered an SAIL) post the supplementary surveys to ensure consistency across all documents and supporting spatial data.</p> <p>SAIL Entities – Flora</p> <p>The exclusion of the following species from the assessment should be reviewed based on response to feedback provided at Item 3 and Item 4:</p> <ul style="list-style-type: none"> • <i>Pomaderris delicata</i> • <i>Solanum armourense</i> • <i>Pterostylis oreophila</i> <p>The reduction of impacts associated with the project to this species need to be reviewed in consideration of information outlined in Item 3 and Item 4. This information would not increase impacts above the approved limits for this species.</p>	<p>only. Veg zone impacts report on assessment against clearing limits for the entire PCT and not just areas subject to update at BAVR stage.</p> <p>SAIL Flora: Addressed in item 3, item 4 and item 17 above.</p> <p>Sooty owl: addressed at item 36 above</p>	<p>been reviewed and reflect the changes made at Item 12 relating to PCT change. Current direct impacts to the SAIL entity are consistent across the spatial data and BAVR i.e. 468.47ha of Box Gum Woodland.</p> <p>No further feedback</p> <p>SAIL Entities Flora</p> <ul style="list-style-type: none"> - <i>Pomaderris delicata</i>: Further review should be considered for this species to address the comments around OSR in Item 19. - <i>Solanum armourense</i>: BAVR R2 includes this species based on justification of survey effort. Details in item 17. - <i>Pterostylis oreophila</i>: Noting there is no direct impacts to this species proposed currently. Some further consideration of the wider survey area has been noted in Item 3. - <i>Bossiaea fragrans</i>: No further feedback. - <i>Caladenia concolor</i>: Review information at Item 3 - <i>Genoplesium superbum</i>: Review information at Item 3 - <i>Pimelea bracteata</i>: Review in accordance with feedback provided at Item 4 and 17 <p>SAIL Entities Fauna</p> <p>No further feedback provided based on data package and report requiring updates as at 23/07/25</p>	

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		<ul style="list-style-type: none"> • <i>Bossiaea fragans</i> • <i>Caladenia concolor</i> • <i>Genoplesium superbum</i> <p>The changes to impacts on <i>Pimelea bracteata</i> needs to be reviewed in consideration of information in Item 17.</p> <p>SAIL Entities – Fauna</p> <p>Impacts to the Sooty owl will need to be reconsidered based on the information provided in Item 36. At the very least all areas previously mapped as Severely burnt land must be re-assigned to assumed present to be compliant with the Amended BDAR assessment and Section 3.1 of the BAVR.</p>			
38	Section 6.1 Additional and Appropriate Measures	The additional and appropriate measures (A&AM) for the Sooty owl should be included in the BAVR based on the feedback provided in Item 36 and 37.	No updates to AAM proposed at this stage	Further feedback not proposed in this round of Review due to data and reporting updates required for Sooty Owl.	Transgrid have provided updated AM&Ms. Resolved in the BAVR.
39	Section 7 Matters of National Environmental Significance	<p>White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland):</p> <p>When filtering vegetation data based on the disturbance category V3 and other associated filters a total impact of 123.56ha on box gum woodland was identified. This could be a filtering issue in the spreadsheet. It is recommended this is reviewed to ensure spatial data and BAVR match.</p>	A data source field will be added to allow for delineation of patches subject to BAVR updates only	The area calculations in the BAVR R2 are now consistent with the spatial data and area outputs ie 128.71ha of Commonwealth listed CEEC Box Gum Woodland. No further feedback.	Noted. No update required.
40	Section 8.2 Additional mitigation measures	<p>Mitigation measures for <i>Pimelea bracteata</i> should be reconsidered based on feedback on the current species polygon listed in Item 17.</p> <p>A review of mitigation measure for all species that have been identified as requiring further information will be required if sufficient justification cannot be provided to support the reduction in potential habitat for each species.</p> <p>A review of the overall mitigation measures provided in the supplied spreadsheet as part of the BAVR package noted that a number of flora and fauna species are not specifically</p>	Addressed at item 17	<p>Originally feedback still stands based on further feedback given at Item 4 and Item 17.</p> <p>Originally feedback still stands for all species.</p>	Refer to item 4.

Item	Stage 1 BAVR Section	Peer Review Findings and Recommendations	Niche Response	Peer Review Findings BAVR - R2	Niche Response – R2
		listed with dedicated mitigation measures, including a total 12 flora species and one fauna species (Alpine She-oak skink based on feedback provided in item 23). As these species have been assumed present, specific mitigation measures should be included for each species or generalise the mitigation measures for all known and assumed present species.			

Attachment B: BAVR R0- OSR Calculations

Threatened flora species	Increase in OSR -Development Footprint	Increase in OSR to Direct Impacts
<i>Ammobium craspedioides</i>	24.85	2.6
<i>Bossiaea fragans</i>	0.4	0.04
<i>Caladenia concolor</i>	22.73	3.04
<i>Caladenia montana</i>	35.76	20.89
<i>Dillwynia glaucula</i>	3.57	0.79
<i>Genoplesium superbum</i>	5.05	0.83
<i>Grevillea wilkinsonii</i>	0.51	0.09

11 August 2025

Tuesday Heather
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Dear Tuesday

RE: Peer Review of HumeLink Stage 1 Biodiversity Verification Assessment Report -Addendum Letter

Umwelt was engaged by Transgrid to undertake a peer review of the HumeLink Stage 1 Biodiversity Assessment Verification Report (BAVR). Transgrid received NSW Infrastructure Approval (SSI 36656827) (November 2024) for the HumeLink Transmission Project (the Project) under Part 5 Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) (CSSI approval).

This Addendum Letter has been prepared at the request of Transgrid to undertake a peer review of the ecological information detailed in the BAVR specifically in relation to Forest Owls.

This peer review information should be read in conjunction with Umwelt's Peer Review of HumeLink Stage 1 Biodiversity Verification Assessment Report dated 24 July 2025.

1.0 Forest Owl Information Review

1.1 Barking Owl (*Ninox connivens*) and Powerful Owl (*Ninox strenua*)

Bondo IBRA Sub-region Survey: The single survey effort in the Bondo IBRA sub-region (SR) has meet the minimum requirement of the HumeLink Supplementary Biodiversity Strategy (SBS). The survey effort is inadequate to meet the current Threatened Biodiversity Data Collection (TBDC) survey requirements and does not meet the minimum survey requirements for these two species in the *Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004).

In addition, the Bondo section of the alignment has large areas identified as severely burnt vegetation which is likely to have affected results for this species. Further consideration should be given to this survey effort and the survey reduction areas reverted to assumed presences.

Bungonia IBRA Sub-region Survey: The survey effort has been carried out in accordance with the SBS survey methods. The survey effort has also generally been undertaken in accordance with the current TBDC requirements (min 6 nights of survey per call playback (CPB) station)

Inland Slopes IBRA Sub-region Survey (Barking Owl only): A total 12 survey location for the 2024-2025 survey period have been identified in the spatial data set compared to the 22 identified in the BAVR (for grassy woodlands). The dataset contains an additional 24 CPB survey locations that have been surveyed between 2021-2023. It is not clear if these older surveys were to be used to meet the minimum survey requirement. Further detail should be provided that clearly shows the survey effort used to inform the BAVR. Section 2.5.1 of the BAVR indicates surveys were undertaken between August 2024- April 2025, therefore it is assumed the older surveys were not part of the survey effort for the BAVR. The survey effort of 12 surveys is not consistent with the SBS survey effort requirements or any published guidelines.

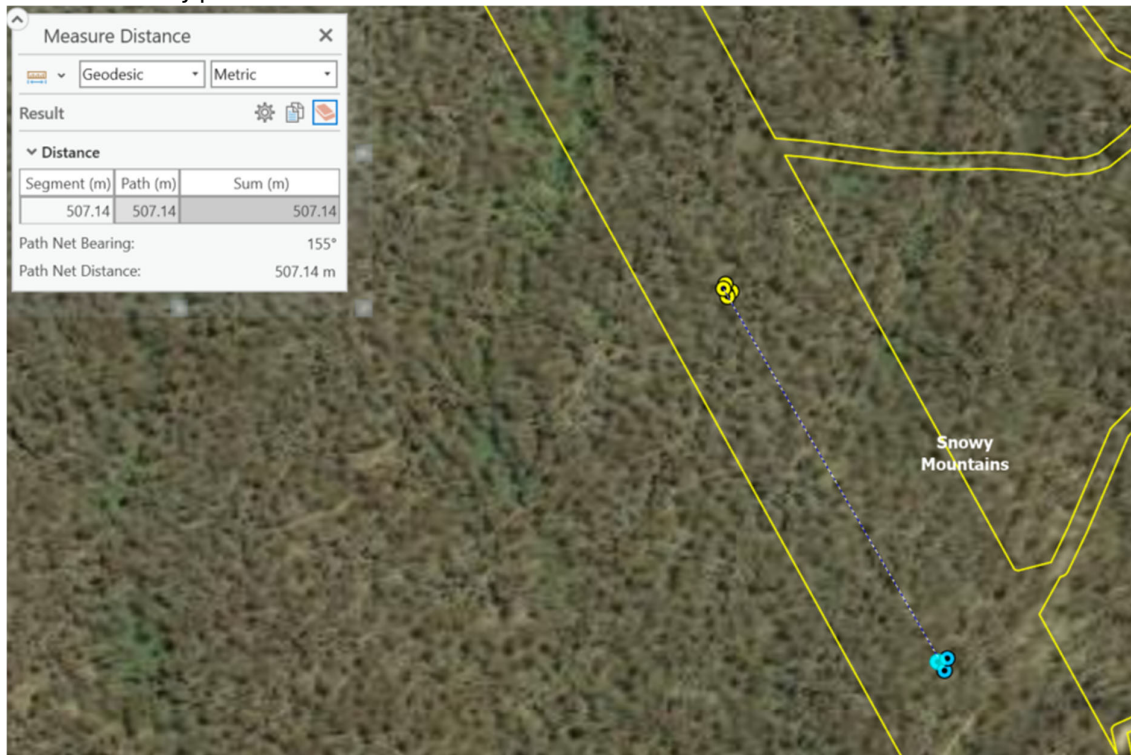
Snow Mountain IBRA Sub-region Survey: The current survey effort is consistent with the SBS.

- **Wet Sclerophyll Forest:** A total of nine (9) CPB surveys in 2024 were identified in the Spatial data. This is consistent with the survey method outlined in the approved SBS.
- **Dry Sclerophyll Forest:** Total of 13 CPB surveys in 2024 were identified in the spatial data. This is consistent with the survey method outlined in the approved SBS.

The survey effort for Powerful owl appears to be sufficient to meet the SBS survey methods. The total number of surveys is generally in accordance with the current TBC guidance, though Call play back (CPB) was not resurveyed at each CPB station rather survey effort was spatially spread across the alignment.

There are survey effort examples that are less than 800m apart (same night survey) which is not consistent with the TBC or previous survey guidelines such as the *Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). This distance is not listed in the SBS as part of the proposed survey method. In addition the BAVR notes survey separation ranges from 300m-800m with no adequate justification.

Example provided below. This shows survey effort on the same night (17/9/24) with 500m separation between survey points.



1.2 Masked Owl (*Tyto novaehollandiae*)

Bondo IBRA Sub-region Survey: The single survey effort in the Bondo IBRA sub-region is inadequate to meet the current TBDC survey requirements and does not meet the minimum survey requirements for this species in the *Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). As noted in the 2004 guidelines several sampling sessions are required to have even a 50% probability of detecting owl species (Debus 1995). For the Masked Owl to have 50% probability four (4) sampling sessions are required to find an owl species (when present on site) (Debus 1995). In addition, this section of the alignment has large areas identified as severely burnt vegetation which is likely to have affected results for this species.

Bungonia IBRA Sub-region Survey: The survey effort has been carried out in accordance with the SBS survey methods. The survey effort is generally in accordance with the current TBDC requirements (min 6 nights of survey per CPB station)

Inland slopes IBRA Sub-region Survey: A total 12 survey location for the 2024-2025 survey period have been identified in the spatial data set compared to the 22 identified in the BAVR (for grassy woodlands). The dataset contains an additional 23 CPB survey locations that have been surveyed between 2021-2023. It is not clear if these older surveys were to be used to meet the minimum survey requirement. Further detail should be provided that clearly shows the survey effort used to inform the BAVR. Section 2.5.1 of the BAVR indicates surveys were undertaken between August 2024- April 2025, therefore it is assumed the older surveys were not part of the survey effort for the BAVR. The survey

effort of 12 surveys is not consistent with the SBS survey effort requirements or any published guidelines.

Snow Mountain IBRA Sub-region Survey: The current survey effort is consistent with the SBS.

- **Wet Sclerophyll Forest:** A total of nine (9) CPB surveys in 2024 were identified in the Spatial data. This is consistent with the survey method outlined in the approved SBS.
- **Dry Sclerophyll Forest:** Total of 13 CPB surveys in 2024 were identified in the spatial data. This is consistent with the survey method outlined in the approved SBS.

This survey does not meet the minimum requirement as per the DEC 2004 survey guidelines (8 surveys per 100ha) though it would generally meet the TBDC requirements. The location of surveys adjacent to severely burnt areas would also limit the likelihood of detecting this species due to the impacts the 2019/20 fire had on the surrounding area.

Please note: Comments for Powerful owl and separation distance are relevant for the Masked owl.

1.3 Sooty Owl (*Tyto tenebricosa*)

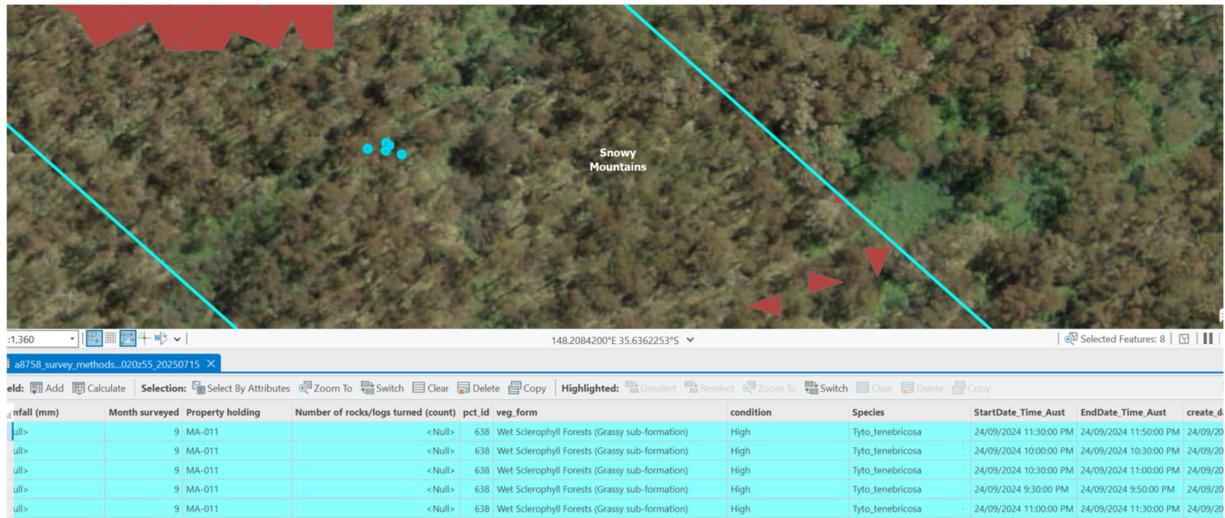
Bondo IBRA Sub-region Survey: The single survey effort in the Bondo IBRA sub-region is inadequate to meet the current TBDC survey requirements and does not meet the minimum survey requirements for this species in the *Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). As noted in the 2004 guidelines several sampling sessions are required to have even a 50% probability of detecting owl species (Debus 1995). For the Sooty Owl to have 50% probability three (3) sampling sessions are required to find an owl species (when present on site) (Debus 1995).

In addition, the Bondo section of the alignment has large areas identified as severely burnt vegetation which is likely to have affected results for this species. Further consideration should be given to this survey effort and the survey reduction areas reverted to assumed presences.

Snowy Mountain IBRA Sub-region Survey: A review of the spatial data CPB survey effort shows only four separate surveys not eight (8) as indicated in the BAVR. Four surveys would meet the SBS survey effort requirements. This survey does not meet the minimum requirement as per the DEC 2004 survey guidelines (6 surveys per 100ha) or the current TBDC. The location of surveys adjacent to severely burnt areas would also limit the likelihood of detecting this species due to the impacts the 2019/20 fire had on the surrounding area.

An export of the survey data was used to interrogate the survey effort by removing all surveys identified in the Site ID attribute column starting with ID (pre-2024 surveys). This information was provided by Niche via Transgrid. In addition, the following example was identified where a single point has been

replicated five times for the same species. This data issue was noted for forest owl species.



If you require any further information relating to this peer review, please do not hesitate to contact the author

Kind regards



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	Comment	Resolution
Barking Owl (<i>Ninox connivens</i>) and Powerful Owl (<i>Ninox strenua</i>)		
Bondo IBRA Sub-region Survey: The single survey effort in the Bondo IBRA sub-region (SR) has meet the minimum requirement o the HumeLink Supplementary Biodiversity Strategy (SBS). The survey effort is inadequate to meet the current Threatened Biodiversity Data Collection (TBDC) survey requirements and does not meet the minimum survey requirements for these two species in the <i>Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities</i> (DEC 2004). In addition, the Bondo section o the alignment has large areas identified as severely burnt vegetation which is likely to have affected results for this species. Further consideration should be given to this survey effort and the survey reduction areas reverted to assumed presences.	Noting that the majority o Wet sclerophyll grassy habitats within the Bondo IBRA subregion have been subject to bushfire impacts, a reversion in these habitats to assumed presence will be adopted.	Revert these areas to assumed presence. Resolved 12/8/25
Bungonia IBRA Sub-region Survey: The survey effort has been carried out in accordance with the SBS survey methods. The survey effort has also generally been undertaken in accordance with the current TBDC requirements (min 6 nights o survey per call playback (CPB) station)	No further action required	Resolved 12/8/25
Inland Slopes IBRA Sub-region Survey (Barking Owl only): A total 12 survey location for the 2024- 2025 survey period have been identified in the spatial data set compared to the 22 identified in the BAVR (for grassy woodlands). The dataset contains an additional 24 CPB survey locations that have been surveyed between 2021-2023. It is not clear if these older surveys were to be used to meet the minimum survey requirement. Further detail should be provided that clearly shows the survey effort used to inform the BAVR. Section 2.5.1 o the AVR indicates surveys were undertaken between August 2024- April 2025, therefore it is assumed the older surveys were not part o the survey effort for the BAVR. The survey effort o 12	Noted. Section 2.5 o the BAVR will be updated to amend the survey dates documented, per the following: Surveys for threatened owls were conducted during both the BDAR and supplementary survey programs. The combined survey effort from all survey events within this period has been considered in assessing survey adequacy for these species.	Update the BAVR text Resolved 12/8/25

surveys is not consistent with the SBS survey effort requirements or any published guidelines.		
<p>Snow Mountain IBRA Sub-region Survey: The current survey effort is consistent with the SBS.</p> <ul style="list-style-type: none"> · Wet Sclerophyll Forest: A total of nine (9) CPB surveys in 2024 were identified in the Spatial data. This is consistent with the survey method outlined in the approved SBS. · Dry Sclerophyll Forest: Total of 13 CPB surveys in 2024 were identified in the spatial data. This is consistent with the survey method outlined in the approved SBS. The survey effort for Powerful owl appears to be sufficient to meet the SBS survey methods. The total number of surveys is generally in accordance with the current TBC guidance, though Call play back (CPB) was not resurveyed at each CPB station rather survey effort was spatially spread across the alignment. There are survey effort examples that are less than 800m apart (same night survey) which is not consistent with the TBC or previous survey guidelines such as the <i>Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities</i> (DEC 2004). This distance is not listed in the SBS as part of the proposed survey method. In addition the BAVR notes survey separation ranges from 300m-800m with no adequate justification. Example provided below. This shows survey effort on the same night (17/9/24) with 500m separation between survey points. 	<p>No further action required – consistent with SBS</p> <p>Noting that the surveys were consistent with the SBS, Niche have provided the following justification for survey spacing in section 2.5 of the BAVR:</p> <p>Survey site spacing for threatened owl surveys ranged from 300m to 800m to ensure representative coverage of suitable habitat across the impact area while targeting habitat of highest suitability, and to accommodate adequate survey spacing within the mosaic of burnt landscapes present in proximity to the target habitats. In areas where habitat features (e.g., hollow-bearing trees, intact canopy structure, proximity to drainage lines) were concentrated, survey sites were placed closer together to maximise detection probability. Wider spacing was adopted to ensure variation across the landscape, and reduce the likelihood of recording the same individual at multiple sites.</p>	Resolved 12/8/25
Masked Owl (<i>Tyto novaehollandiae</i>)		
<p>Bondo IBRA Sub-region Survey: The single survey effort in the Bondo IBRA sub-region is inadequate to meet the current TBDC survey requirements and does not meet the minimum survey requirements for this species in the <i>Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities</i> (DEC 2004). As noted in the 2004 guidelines several sampling sessions are required to have even a 50% probability of</p>	<p>Noting that the majority of Wet sclerophyll grassy habitats within the Bondo IBRA subregion have been subject to bushfire impacts, a reversion in these habitats to assumed presence will be adopted.</p>	<p>Revert these areas to assumed presence.</p> <p>Resolved 12/8/25</p>

detecting owl species (Debus 1995). For the Masked Owl to have 50% probability for (4) sampling sessions are required to find an owl species (when present on site) (Debus 1995). In addition, this section of the alignment has large areas identified as severely burnt vegetation which is likely to have affected results for this species.		
Bungonia IBRA Sub-region Survey: The survey effort has been carried out in accordance with the SBS survey methods. The survey effort is generally in accordance with the current TBDC requirements (min 6 nights of survey per CPB station)	No further action required – consistent with SBS and TBDC	Resolved 12/8/25
Inland slopes IBRA Sub-region Survey: A total 12 survey location for the 2024-2025 survey period have been identified in the spatial data set compared to the 22 identified in the BAVR (for grassy woodlands). The dataset contains an additional 23 CPB survey locations that have been surveyed between 2021-2023. It is not clear if these older surveys were to be used to meet the minimum survey requirement. Further detail should be provided that clearly shows the survey effort used to inform the BAVR. Section 2.5.1 of the BAVR indicates surveys were undertaken between August 2024- April 2025, therefore it is assumed the older surveys were not part of the survey effort for the BAVR. The survey effort of 12 surveys is not consistent with the SBS survey effort requirements or any published guidelines	Noted. Section 2.5 of the BAVR will be updated to amend the survey dates documented (as above)	Update BAVR text. Resolved -12/8/25
Snow Mountain IBRA Sub-region Survey: The current survey effort is consistent with the SBS. <ul style="list-style-type: none"> · Wet Sclerophyll Forest: A total of nine (9) CPB surveys in 2024 were identified in the Spatial data. This is consistent with the survey method outlined in the approved SBS. · Dry Sclerophyll Forest: Total of 13 CPB surveys in 2024 were identified in the spatial data. This is consistent with the survey method outlined in the approved SBS. This survey does not meet the minimum requirement as per the DEC 2004 survey guidelines (8 surveys per 100ha) though it would generally meet the TBDC requirements. The location of surveys adjacent 	No further action required – consistent with SBS	Resolved 12/8/25

to severely burnt areas would also limit the likelihood of detecting this species due to the impacts the 2019/20 fire had on the surrounding area. Please note: Comments for Powerline owl and separation distance are relevant for the Masked owl.		
Sooty Owl (<i>Tyto tenebricosa</i>)		
<p>Bondo IBRA Sub-region Survey: The single survey effort in the Bondo IBRA sub-region is inadequate to meet the current TBDC survey requirements and does not meet the minimum survey requirements for this species in the <i>Working Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities</i> (DEC 2004). As noted in the 2004 guidelines several sampling sessions are required to have even a 50% probability of detecting owl species (Debus 1995). For the Sooty Owl to have 50% probability three (3) sampling sessions are required to find an owl species (when present on site) (Debus 1995). In addition, the Bondo section of the alignment has large areas identified as severely burnt vegetation which is likely to have affected results for this species. Further consideration should be given to this survey effort and the survey reduction areas reverted to assumed presences.</p>	Reverting all polygons to assumed presence – no further action required	Resolved 12/8/25
<p>Snowy Mountain IBRA Sub-region Survey: A review of the spatial data CPB survey effort shows only four separate surveys not eight (8) as indicated in the BAVR. Four surveys would meet the SBS survey effort requirements. This survey does not meet the minimum requirement as per the DEC 2004 survey guidelines (6 surveys per 100ha) or the current TBDC. The location of surveys adjacent to severely burnt areas would also limit the likelihood of detecting this species due to the impacts the 2019/20 fire had on the surrounding area. An export of the survey data was used to interrogate the survey effort by removing all surveys identified in the Site ID attribute column starting with ID (pre-2024 surveys). This information was provided by Niche via Transgrid.</p>	Reverting all polygons to assumed presence – no further action required	Resolved 12/8/25

In addition, the following example was identified where a single point has been replicated five times for the same species. This data issue was noted for crested owl species.	Noted, the duplicates will be removed in the final dataset	Resolved 12/8/25



Annex 2

Orchid reference population check schedule

Scientific Name	Flowering Est Time	Estimated duration of flowering	Survey approach for reference sites	Reference populations	Meeting Notes (21/08/24)	Niche notes -	Reporting notes	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4		
Caladenia concolor	C. concolor will likely start flowering from around 9th September in western populations (Albury & Benambra) and 16th Sept eastern populations (Gundagai, Burrumbidgee, Ulandra, Bethungna, Bango) and peaks 16th-23-29th	3-4 weeks (from early to mid Sept)	Graeme Bradburn will check this population in week of 2-6 Sept. If no flowers, or flowers still 1-2 weeks away, delay start of surveys by one week	Bango NR - SOS Monitoring Site	Flowering 2 weeks later to Benambra site.		Graeme Bradburn checked C. concolor population at Bango NR on 11 August 2024 and found two plants in flower, plus a number of plants in bud																										
			Courtney will check this population in week of 2-6 Sept. If no flowers, or flowers still 1-2 weeks away, delay start of surveys by one week	Ulandra NR	Flowering 2 weeks later to Benambra site.		Caladenia concolor confirmed flowering by Courtney Whitton at Ulandra Nature Reserve on 18 and 20 September 2024, after buds recorded in June																										
			DCCEEW will be monitoring this population on 16th Sept	Albury - SOS Monitoring Site																													
			DCCEEW will be monitoring this population on 15-16th Sept	Benambra NP - Ref site from BCD (SOS Monitoring site).	Niche or EP - to visit on W2 Sept - surrounded by private lands - need permissions. Chani ask Anna Murphy to ask to get permission - access route. Largest section requiring checking is in this vicinity. Cant just use Bango population to check western portion. Checking 2-6th Rob can send Courtney if we get permission. (Hit first)																												
			DCCEEW will be monitoring this population on 18-19th Sept	Bethungna (Private Property)			DCCEEW Caladenia concolor SOS Accountable Officer and contractors advised flowering of C. concolor commenced at Benambra NR on 14 September 2024																										
			DCCEEW will be monitoring this population on 20th Sept	Gundagai (Private Property)			Population checked by Courtney Whitton on 21 September 2024 and Ben Brown on 27 September 2024. Individuals at this reference population were in the final stages of flowering. Based on this, surveys were condensed to ensure flowers would still be detectable during the survey period.																										
Prasophyllum petium	Can commence flowering from late September - through October and into early-mid November (subject to seasons)		As per BOS advice early Oct - Only need to do 1 round of check. Possibly fenced off.	Boorowa populations around mid-October. Seen flowering strongly at Boorowa on 17th October 2024.	Can survey as soon as reference site is in flower. C. concolor and P. petium reference sites near one another. P. petium flowers 2-3 weeks later than C. concolor.		Population checked by Izak Schoon and Thea Kane on 27 September 2024. Individuals at this population were observed to be in early bud (photos). A second reference population check was undertaken by Matthew Bailey and Ella Smyth on 14 October 2024, which confirmed the species to be in full flower (photos) Based on this, surveys for the species commenced on 15 October 2024.																										
			As per BOS advice early Oct - Check. Possible moving	Hall Cemetery (ACT)	Can survey as soon as reference site is in flower. C. concolor and P. petium reference sites near one another. P. petium flowers 2-3 weeks later than C. concolor.		Not checked.																										
Caladenia montana		3-4 weeks (from mid to late October)	Lachlan Copeland will be checking for SOS, but maybe too late for our purposes.	Snowy 2.0 Site - Niche team to confirm access for eastern and western sites. (BCD information: The reference sites east of Elliott Way and west of the Tumut River / dam will be much easier accessed on foot than those east of Tumut River / dam).	Best ref site to check - get permissions. If we get permission in W1 Oct - Lachlan could jump access to this site to go and check. Tentative - If Lachlan cant attend - Rob could send Courtney to this site in W1.	East side (lower elevation) - full flower - W1 Sept West Side - early budding - W1	Advice from UOL on September 8 indicated that C. montana was in flower at the reference population nearby the Maragle substation within the Snowy 2.0 alignment. One team, led by an orchid specialist, was deployed to begin surveys for this species in this area on 9 September. Izak Schoon (EcoPlanning) and Thea Kemp (LandEco) were unable to attend the reference population check until 14 September 2024, where the teams were unable to identify any individuals in full flower. A number of individuals were observed to be in advanced bud, which indicated that the population was a number of weeks away from peak flowering. On this basis, the team conservatively mapped locations of potential C. montana individuals, based on basal rosettes and/or other above-ground material. Another team, led by an orchid specialist (Isaac Kammert) was deployed the following week of 16 September 2024 with the instruction to conservatively map locations of potential C. montana individuals based on basal rosettes and/or other above-ground material. This conservative approach was taken to ensure identification of any individuals which may have flowered early. This approach was confirmed as suitable by BCS on 10 October 2024 via email. Based on the results of these surveys and the results of the reference population check, the decision was made to halt surveys until such time that the reference population could be confirmed as flowering. A second reference population check was undertaken on 8 October 2024 by Courtney Whitton (EcoPlanning) to confirm full flowering, which detected 7 individuals all in advanced bud. Advice from Rob Humphries team was that surveys should commence within the following two weeks. A total of four teams were deployed on 14 October 2024 to survey the species. On 22 October 2024, Izak Schoon checked the population again and found a few plants in flower, with most still in bud. On 2 November 2024, Courtney Whitton checked the site again and found a significant number of plants in flower.																										
			Can arrange for Canberra based orchid experts to check in early-mid October if required	Reliable reference site in Namadgi NP - Nursery Swamp Track	Check with Rob if no success with Snowy 2.0																												
Diuris aequalis	TBC	TBC		Taralga - on Wombeyan Caves Road (refer to survey program for details).			Reference populatio was confirmed in flower on 11 October 2024 and was checked again on 3 November 2024 and 13 November 2024. On the 15 November this population as no longer in flower						Can be checked	Can be checked																			
				Abercrombie		Izak Schoon and Courtney Whitton checked this reference site on 14 November 2024 and found significant number of plants in flower																											
			Mr Rae site	Can arrange for a Goulburn based expert to check this site		Izak Schoon and Courtney Whitton checked this reference site on 13 November 2024 and found a few Diuris plants that had already finished flowering																											
Diuris tricolor				Pilgaa			Niche advised by EcoPlanning on 6 September 2024 that Diuris tricolor was flowering in the Pilgaa area in northern NSW and would likely be flowering by the end of September in the project area.																										
			Coolamon		Reference population check undertaken on 24 September 2024. Advice provided to Niche from Robert Humphries indicated that the species flowered first in the north of its range, and flowering slightly later in southern areas. On this basis, and the results of the reference population checks, the species was considered to be in peak flowering during surveys undertaken in September.																												
Genoplesium superbum	Jan-Feb-March (6 weeks after heavy summer rains)	TBC		main populations around Morton/Oatlen (Nerriga) and Mongarlowe	Jan-Feb-March flowering		A known reference site near Lithgow (PCT 3747) was checked on 3 January 2025 and a single plant was observed in flower, no other plants were seen. This was considered early for this species. A second reference site was checked in Morton National Park in PCT 3861 (Morton Plateaux Rocky Heath-Woodland) on 12 January 2025 and no plants or early buds were seen. The DCCEEW SOS Accountable officer was contacted who advised early buds were seen in on 29 January 2025. A 3rd ref site check was undertaken on 7 February 2025 in Morton National Park and again only early buds were seen, no plants in flower, however plants were found in full flower at Oatlen Ford Rd in PCT 3737 (Bungonia Tableland Scribbly Gum), which is considered to be the same PCT as in the project area - so surveys were commenced on 12 February 2025 and finished 27 February 2025.																										
Prasophyllum bagense		TBC	TBC	McPhersons Plain Conservation Area (flowering 13/12/24 - (Bago State forest)			Ref sites re-checked on 26 Feb 2024 - species still in flower at Oatlen Rd and Morton NP. Reference sites at MA001 checked and species was identified with peak flowering confirmed by all members of the survey team prior to surveys being undertaken in the easement area on 16 and 17 December 2024.																										
Prasophyllum innumbum		TBC	TBC	McPhersons Plains - recorded at "Brandy Mary" (eastern section of McPhersons Plains which is within the Project Footprint) - flowers later than bagense - early to mid Jan			Reference sites at AD014 checked and species was identified with peak flowering confirmed by all members of the survey team prior to surveys being undertaken in the easement area on 13 and 14 January 2025.																										
Pterostylis foliata		3-4 weeks +	TBC	Snowy 2.0 survey detected the species in PCT 1196 east of Talbingo on 14/11/2018	Flowers October - December in the same area high altitude																												
Pterostylis oreophila		3-4 weeks +	TBC	McPhersons Plain Conservation Area																													



Annex 3

CPHR consultation



HumeLink Post-BDAR survey methodology discussion

CPHR meeting minutes - 28 August 2024

Attendees

- Chani Wheeler, Niche (CW)
- Thea Kane, Niche (TK)
- Tuesday Heather, Transgrid (TH)
- Christine Lussier, Transgrid (CL)
- Angie Jenkins, CPHR (AJ)
- Anna Murphy, CPHR (AM)

Meeting notes/minutes

Caladenia survey suggestions and queries

- AM: *Caladenia* have varied responses to fire.
- AM: Mark Clements suggests two sweeps and extend to October.
- AM: Confirms that the plan is to start West and work towards East.
- AJ: Questions what information/data package they will receive, going to get a report BAVR (Biodiversity Assessment Verification Report) which will include mapping of where surveys have been undertaken and CPHR can see that the surveys were conducted at the right time.
- AJ: CPHR also want to check that they are confident on who is undertaking the surveys.
- AM: Mark Clements is going out in October for *Caladenia concolor* to monitoring sites.
- AM: Clarified the objective of the surveys.
- AJ: Confirms that we are surveying to determine presence/absence and to feed into mitigation measures
- CW: Requests advice on how to develop species polygons for orchids where there is a chance that there is more of the population persisting in the seedbank that haven't flowered.
- CW: What is reasonable to say we have adequately captured and excluded areas from consideration.
- AM: Can't provide a specific number for species polygon buffers.
- CL: Wants some certainty over what is reasonable for surveying such large habitat extents.
- AM: Substantial proportion of population will be dormant depending on species location and ecological conditions.
- AJ: Pre-clearing surveys are also another safety net which is a standard mitigation measure.
- CW: After looking through reference sites, asks AM to chase up access route to Benambra. AM has said that Rob can come with her (going on 16 September).
- TH: Suggests that some funding be given for monitoring.
- AM: Says that you can't rely on microhabitat mapping because orchids are so cryptic and do not always occur in discrete ecological communities.
- CW: Summarises that we can't refine habitat based on microhabitat suitability, that we can't confidentially exclude based on survey, and that if we do detect then we can't confidently delineate habitat.
- AJ: Suggests a compromise between robust survey effort and drawing the line, and applying mitigation strategies to clearing works, to minimise clearing impacts.



- AJ: Is happy to have good resources dedicated to it.
- CL: Wants to determine how many passes required.
- AJ: Thinks it's reasonable to do follow up surveys, but we have confirmation of flowering from reliable botanists and we are maximising opportunity in relation to known flowering.
- CW: Going to overlap and stage surveys.
- CW: Acknowledges that it is a compromise NOT to double-up on same lines, but to stagger effort to mix up areas with surveys rather than doing it holding by holding, which would mitigate the need for a second pass.
- AM: Suggests that there are small ecological considerations which could be used for surveys, e.g. Grazing effects, growth along waterways, areas under spikey plants, fencelines, gates, etc.
- CL: Anna, would you agree that heavily grazed lands would be a lower priority for certain species?
- AM: depends on many factors, including native vs exotic etc. It can't be relied upon. No research to show certain variables

Action list

Number	Action	Responsibility
1	Survey as per TBDC and survey method to be discussed further with experts.	Niche



HumeLink Post-BDAR survey – email chain regarding *Acacia flocktoniae* methodology

CPHR email communication – 4 October 2024

Attendees

- Thea Kane, Niche (TK)
- Angie Jenkins, CPHR (AJ)
- Cc: Chani Wheeler, Niche (TK)

Email communication summary

- AJ: I've spoken with Steve Douglas who has advised it would be appropriate to limit survey to PCT 870 in Bungonia IBRA. Also - given deviation from recommended survey window any potential species detected should be assumed and sent to herbarium for ID confirmation.
- TK: Thank you. To confirm, are we able to exclude the other PCTs from the species polygon (assumed presence) within Bungonia?
- AJ: I think so. Steve sounded very confident that survey efforts should focus on PCT 870. He said although predicted - it would be very unlikely to occur in the other listed PCTs in Bungonia. Also, he considers any detection would be a significant range extension for the species - so although low probability - can't exclude with 100% certainty.

Action list

Number	Action	Responsibility	Due date
1	Niche to focus survey efforts for <i>Acacia flocktoniae</i> in PCT 870 in the Bungonia IBRA.	Niche	N/A



HumeLink Post-BDAR survey methodology discussion

CPHR meeting minutes – 23 October 2024

Attendees

- Chani Wheeler, Niche (CW)
- Thea Kane, Niche (TK)
- Tuesday Heather, Transgrid (TH)
- Angie Jenkins, CPHR (AJ)
- Nat O'Rourke, CPHR (NO)
- Damon Oliver, CPHR (DO)
- Allie Cash, DPIE (AC)

Meeting notes/minutes

- Meeting objective is for Niche and Transgrid (TG) to gain feedback on survey methodology and approach to species polygon updates
- AJ: CPHR want assurance that Niche are completing habitat constraint mapping and confirmation, and certainty that these steps have been applied concurrent with current surveys. This may result in species polygon changes (larger areas, smaller areas, new areas). The current table provided to CPHR indicates that this may be happening, but CPHR want greater certainty.
- CW: Our BDAR potential habitats form the basis for the extent of proposed surveys. As per the approved BDAR, the extent of potential habitat adopted the BAM steps (including consideration of IBRA subregion, patch size, veg cover, associated PCTs, habitat constraints, etc.) noting that supplementary datasets were used to inform habitat constraint data gaps arising from land access issues. Additional habitat constraints mapping and assessment will be undertaken concurrent with targeted survey to address these data gaps. In particular, additional hollow-bearing tree (HBT) and surface rock mapping. This would be used to remove some potential habitats from further consideration on the basis of unsuitable floristics or the absence of BAM habitat constraints. New polygons would be provisioned following the proposed surveys which would address the BAM, delineating the extent of habitats confirmed unsuitable and overlaying the survey effort reductions achieved in relation to remaining potential habitats. The methods and results of this process would be documented in our reporting to TG.
- AJ: Would the report form a type of amendment to the BDAR which would update the BAMC and certification reporting?
- TH: TG are waiting on conditions of approval/project approval. Niche are working to a reporting schedule. A formal report will be provided to CPHR for approval. This will also be independently reviewed by another AA. The report will not be formally an "Addendum to the BDAR", as this working may trigger a modification which TG are trying to avoid.
- CW: Could CPHR provide any feedback on what they would like to be captured in this report.
- AJ: CPHR need to see evidence of rapid confirmation of habitat suitability and constraints on newly accessed properties. Need to address against relevant BAM steps - assessing habitat suitability for threatened species. Opportunity to remove degraded habitats.
- CW: The flora surveys would target the easement buffer. CW shares screen to discuss visually: This incorporates the operational easement plus a 30m buffer. Proposed survey would extend well beyond a 30m



buffer to impact areas (HTZ, ECZ and TCZ) where are fully contained within the easement buffer. However, survey within off-easement access tracks does not incorporate a 30m buffer due to design uncertainty at this stage.

- DO: How is the access track design changes being addressed?
- TH: It's up to the delivery partners (DPs) to ensure biodiversity surveys are undertaken for access track design changes outside the BDAR corridor and how these comply with the approval. In summary, the current access track locations will be subject to some changes which may occur under consistency assessments or require further approval.
- AJ: CPHR is comfortable with the easement buffer approach and feel it should adequately address edge effects provided a survey extent buffer is maintained outside the corridor to allow for detection of any potential populations on the edge of the easement. This should be on a species by species basis if needed to determine the proportionate impact – particularly SAIL + MNES.
- CW: The fauna survey approach incorporates the stratification of potential habitats, by means of IBRA subregion and vegetation formation (or streams for frogs). This habitat stratification approach forms the basis for survey effort requirements as documented in the BDAR. Is there a different stratification approach that BSC wish to see? The extent of potential habitat for each survey unit (i.e. unique IBRA subregion and formation/ stream), has been provided to CPHR in the spreadsheet. Fauna surveys would be located within strategic landholdings. These are properties that support a large extent of potential habitats and/ or multiple formations allowing for maximum survey efficiencies.
- DO: What was the rationale behind leaving areas of assumed presence vs survey based on?
- CW: Considered separately for each species based on available field resources, total extent of habitat, location of habitats (i.e. number of landholdings it intersects and geographic proximity, as this impacts on survey efficiencies. Niche have provided estimates on what could be addressed using the current methods and available resources. Niche is seeking feedback on the proposed survey methods to ensure survey coverage is maximised. Niche will need to revise the estimated survey coverage following receipt of CPHR feedback on the proposed survey methods and approach.
- AJ: CPHR don't want to see the strict application of hours/ha where there may be an advantage of undertaking additional survey where an area is accessible. Need a flexible approach on a site by site basis. Survey suitable habitats v's just doing required hours – can be swings and roundabouts if can demonstrate the habitat constraints are not present – good rationale applied on top of meeting TBDC.
- Specific species survey methodology discussion:
 - Koala
 - CW: The guidelines currently say two detection methods are required (scat and non-scat). The BDAR approach was SAT surveys combined with spotlighting. Songmeters are an option that Niche is currently exploring as this could provide the most-efficient non-scat detection method.
 - DO: Use of thermal drones for Koala survey is also an option that could be explored and seems to be adopted more frequently now.
 - In relation to scat-based survey: Niche are seeking to use rapid SAT surveys as opposed to full SAT surveys. This method is documented by Stephen Phillips as an effective method for determining presence/absence of Koala. This would reduce effort from 30 to 7 trees for each SAT survey.
 - DO: Niche should provide an outline of proposed survey methodology for Koala. CPHR will consult with Sally Miller.
 - Eastern Pygmy-possum (EPP) and Brush-tailed Phascogale (BTP)
 - CW: Niche seeks feedback on proposed effort, i.e. number of traps/ha and minimum trap nights. There is no real guidance in relation to camera trapping. BDAR survey effort prescriptions are proposed for EPP (i.e 100 trap nights/50 ha). CPHR to confirm this is still acceptable.



- CW: BTP was not targeted for survey for the BDAR. The TBDC currently says 2 cameras/ha which will be difficult to achieve. Niche has sought advice from William Terry who has been approved as a project-specific expert for another project in NSW. William proposed that 1 camera/ ha for min 4 nights, would be appropriate for detection.
- DO: CPHR can run this past current and previous AO's.
- AJ: Is there a veg zone cut off per survey?
- CW: William indicated that dry sclerophyll forests were more likely to support the species than wet sclerophyll.
- CW: Niche wanting to understand if survey effort can be reduced in poorer habitat.
- DO: Surveys need to delineate habitat that is in and that is out (i.e. suitable). Almost need more survey in poorer condition to increase chance of detection. Possibility to reduce surveys in better condition habitat where species is more likely to be detected.
- CPHR to confirm this survey effort would be accepted.

- Birds

- Superb Parrot

- CW: Is there capacity to continue survey for Superb Parrot into December?
 - DO: Yes, but only into early December - i.e. first week. There is a chance that by mid-December that the young have fledged.
 - CW: Niche are currently proposing diurnal surveys to detect Superb Parrot, within potential habitats (i.e. associated PCTs supporting suitable hollows). However, survey guidance notes recently provided by CPHR suggested stagwatching was required. CPHR to confirm if diurnal surveys could be acceptable given the large number of potential roosts that would be required for survey should stagwatching be necessary.
 - DO: Advice for other projects is one hour of diurnal bird survey per 50ha. For contiguous woodland with suitable hollows this is a reasonable amount of time. Best practice would be within 4 hours of sunrise, and the last few hours before sunset if necessary. Where two or more birds detected, active nesting observed (or fledged young), additional stagwatching survey to be undertaken or breeding assumed in potential roosts intersecting with that location.
 - AJ: If Niche had a positive detection for the birds, to what extent would potential nests need to be considered? I.e. would all suitable hollows in the veg zone need to be mapped and a buffer applied? If looking to do presence/absence. If get presence - map habitat constraints. If get absence - not mapping habitat constraints if required survey has been conducted.
 - TH: Niche to provide CPHR with a proposed methodology for review.

- Cockatoos

- CW: TBDC indicates Glossy Black survey period from April to August. This means we are unlikely to be able to address survey for this species unless alternative survey period could be approved.
 - Discussion - CW/DO: As per Superb Parrot, diurnal bird surveys are proposed for Gang-gang Cockatoo. Proposed method would be 12 hours/50ha, with multiple visits over four days (four repeat visits to the same location) - one hour with two observers = 2 observer hours, with the intent to cover off on multiple vegetation formations on each property.



- DO: Multi-species approach risks the dilution of survey efficacy for each species- i.e. reduces detection ability if looking for multiple species using different hollow types.
- CW: there is little overlap of habitats between target bird species and as such, a multi-species approach is not required.
- CW: When survey effort is calculated, Niche will consider total habitat and overlap bird survey points, consider the duration and intersect with potential habitat polygons to understand the IBRA and formation, and then look at the total effort achieved, and the total number of days. It would be spatially referenced.
- CW: Niche have mapped large areas of hollows and do have gaps that we are currently targeting. Field teams are only targeting habitats that support suitable hollows in higher condition areas. Method is a meander, or water point census.
- AJ: update on current survey effort and results is requested.
- DO: Agrees this is an acceptable approach. Niche would be targeting surveys near known hollows. For Glossy-black Cockatoo - a good approach is to find dams and water points within the footprint and look for birds at dusk and follow birds back to nest trees. This is fairly time consuming however and may not be relevant given unsuitable survey period.
- CW: Gang-gang Cockatoos - Angie sent through advice from Damon which noted stag-watching was required for this species.
- DO: No current TBDC guide notes say it's not required (can confirm with BOS team to be sure). Approach is to survey for birds within four hours of dawn. If lone male, begging or nesting activity observed in proximity to suitable hollows, then additional stagwatching survey to be undertaken or breeding assumed in potential roosts intersecting with that location. To do that confidently, multiple days would be required. 12 hours per 4 days/50 ha would be a suitable level of survey effort provided this allowed for good coverage across habitats. (DO advises this rapid method alleviates the need to confirm hollow use, but there are risks attached).
- AJ: Survey should be undertaken across habitats including different vegetation zones - need to make sure survey is conducted if a veg zone is to be excluded. If detected presence need to map all suitable sized hollows in the veg zone.
- CW: Survey effort is assessed by means of the proposed stratification method (i.e. vegetation formation and not vegetation zone [PCT and condition]). This means that survey effort required is based on the extent of all relevant veg zones within that formation and ensures survey effort is prioritised in the habitats most likely to be occupied. If Niche detect a species, the process applied in the BDAR involved a buffer to the record and then delineating all habitats within that buffer as known habitat. CPHR to confirm stratification according to vegetation formation and not veg zone is acceptable.
- AJ: Look at Section 5.2.5.4c of the BAM - ensure this is covered in rationale where no habitat constraints are identified - specifically EPP, BTP and Koala.



Action list

Number	Action	Responsibility	Due date
1	Niche to provide outline of proposed survey methodology for Koala, Eastern Pygmy Possum and Phascogale	Niche	4 November 2024
2	CPHR to liaise with relevant accountable officers to provide feedback on the proposed approach, outlining suitable alternatives to the proposed methodology that would be accepted where relevant	CPHR	11 November 2024
3	Niche to develop protocol for species polygon mapping in relation to positive fauna detections (i.e. distance/ patch extent mapped as known habitat in relation to the positive detection). Methodology to be provided to CPHR for comment.	Niche	4 November 2024
4	Niche to provide interactive tool to illustrate survey progress and upcoming plans	Niche	11 November 2024



HumeLink Post-BDAR survey methodology discussion

CPHR meeting minutes - 18 December 2024

Attendees

- Chani Wheeler, Niche (CW)
- Thea Kane, Niche (TK)
- Tuesday Heather, Transgrid (TH)
- Angie Jenkins, CPHR (AJ)
- Nat O'Rourke, CPHR (NO)
- Damon Oliver, CPHR (DO)
- Allie Cash, DPIE (AC)

Meeting notes/minutes

Owls (300m buffer to Hollow Bearing Trees (HBT))

- CW: Context is that owls changed from dual to full species mid-way through project. Species polygon prescriptions have shortfalls around assumed presence. Currently polygons are drafted up in relation to confirmed records but no guidance around assumed presence. Niche came up with prescriptions we can apply.
- Prescriptions:
 - Take associated PCTs (woody vegetation only) - agreed by CPHR
 - Then look at habitat constraints (i.e. hollows) according to TBDC supporting breeding - agreed by CPHR.
 - Suitable habitat should be suitable for sustaining populations (i.e. support breeding activities). We have delineated an extent at which a woody PCT is no longer suitable based on absence of breeding features.
 - Process of analysing different buffers. Footprint is generally 200m wide. Looked at 100, 200, 300, 400, 500m buffers. The veg stratification takes into consideration VI (among other factors). Delineating suitable veg, instead of adopting veg zones, we need to consider whether that veg zone supports hollows.
 - Next step is considerations around the survey effort itself.
- DO: Have you applied the 300m buffer distance? Are we looking 300m outside the easement to capture adjacent impacts?
- CW: Many of the areas already have a buffer with the footprint, but in some cases where the edge of the easement abuts the footprint, we haven't been extending survey outside of this area. Survey extent for HBT mapping is the project footprint.
- DO: Survey effort potentially missing areas immediately adjacent to the footprint.
- CW: To look into potentially missed HBTs.
- TH: How would we offset this impact?
- AJ: If we have a tree not within the footprint, but the buffer is within it



- TH: The question is around the effort happening on the ground to survey for the hollows, and then how to map the species polygons. Surveys need to be considered by Niche. The question of how the species polygon is mapped is for CPHR. Niche to consider how far out we need to go outside the footprint.
- CW: Surveys are constrained by access. We are constrained to the corridor. We are mapping areas adjacent to the footprint where possible as standard. We will look at the LiDAR mapping, in areas that are vegetated adjacent & within 300m of the clearing footprint that does not extend into the footprint. Only a few rare circumstances of this.
- TH: Need to determine how to offset for impacts outside the footprint.
- TH: Confirm everyone approves of the 300m buffer?
- AJ: For the purpose of habitat constraints mapping – yes. And the species polygon is the area within the impact area. Some thought needs to go into what a reasonable distance is. There will be some justification for how this is drawn.
- TH: Many landholders won't allow access outside of the footprint.

Raptors (clarify what was documented for each species)

- To discuss potential use of drones to target the survey, but we haven't progressed that use any further.
- CW: Similar to HBTs, we had large gaps in survey effort and access which limited ability to finalise constraint mapping across the footprint. This phase of works has been to consolidate HBT and stick nest datasets. Approach was to go through a gap analysis of areas picked up through LIDAR that could support stick nests, then identify areas that we already had data, identify gaps, and prioritise these areas for survey.
- Survey teams dropped points for confirmed features. There is also data to show where there is a confirmed absence of those features. There are still gaps remaining which we will work to close out, but we have identified some stick nest locations as a part of that review and further survey activity.
- CW: Data showing the location of new stick nest locations with signs of use. Not confirmed as raptor nests.
- DO: Regarding the use of drones to pick up stick nests - some species are cryptic with where their nest locations are (i.e. mid-storey). Some reluctance to approve this method.
- CW: The plan is to continue with HBT surveys up to the commencement of construction. It will be ongoing.
- DO: Are there any outstanding stick nests that we could return to and confirm occupation prior to clearing?
- CW: We would look to revisit all nests. What is CPHR's suggestion?
- DO: Apart from Ospreys, relocation of raptor nests won't work. We could try but it would require a nearby suitable receiver tree.
- CW: They will revisit nests between breeding season.
- AJ: Approves the method.
- AJ: Disused raptor nest - what is the basis for disuse? Will need justification in reporting.
- CW: We were looking to adopt a conservative approach and buffer each potential nest. Prior to construction it would be managing risks prior to construction. Gap mapping will clearly identify gap areas.

Koala SATs

- We have reverted back to the original plan of full Spot Assessment Techniques (SATs) within the Snowy Mountains IBRA subregion.
- We will make up the difference.

Brush-tailed Phascogales

- Chased up within CPHR. Discussion when through the AO and CPHR. The result was a "no" – the reduction in effort wasn't justified.
- CW: One camera per ha equates to a gap in cameras of 100m. If you increase this, that will be one camera every 50m.
- TH: One thing not resolved yet is that the TBDC does say to consult for areas over 50ha. The consultation is happening and the answer is that there's no opportunity to reduce.



- AC: The TBDC argument was ‘what was the justification?’ The TBDC had not seen this justification.
- TH: There hasn’t been a lot of guidance around what additional justification would be required.
- AC: Happy to chase that up for the area over 10ha.
- AJ: It’s about putting the information together with site context. I.e. description of site, what other survey methods have been undertaken at the time. Provide information on existing survey effort.
- TH: With that level of survey effort, what opportunity to we have to cover that 88ha in our timeframe?
- CW: Showing spatially the spread of the cameras.
- AJ: Happy with the spread. Will chase up if we can leave some cameras in situ for additional time, and add some more into access tracks and other locations.

Action list

Number	Action	Responsibility
1	Niche to revise the Brush-tailed Phascogale survey plan and issue to CPHR for approval.	Niche

From: [Angie Jenkins](#)
To: [Chani Wheeler](#)
Cc: [Nat O'Rourke](#); [Sian Griffiths](#); [Peter Taylor](#); [Damon Oliver](#); [Carolyn McCallig](#); [Sumaya Osman](#); [Jack McGovern](#); [Christine Lussier](#); [Daniel Whaite](#); [Tuesday Heather](#); [Allison Treweek](#)
Subject: RE: Humelink- species polygon workshop materials
Date: Friday, 9 February 2024 10:43:51 AM
Attachments: [image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)
[image008.png](#)

Hi Chani

Please see BCD comments on Species Polygons materials provided below. Please give me a call if you require any clarification.

1. Order of filters: Level 1, 2 & 3 filters are not consistent with the order applied in BAM (% Native vegetation cover and PCT filters are applied before Patch size) & the reason for applying patch size filter before %veg cover & PCT is not clear. Can Niche please provide justification for the order of the "levels" or filters applied by the model to ensure consistency with BAM. This may not represent a high risk but if not – then it should be made clear in the BDAR. In regard to this the BDAR should also be clear on what isolation/tree spacing rule has been applied to determine what a 'patch' is? It also needs to be acknowledged that confirmation of PCT will be required in inaccessible lands, & that this may have a significant change to the candidate species polygons for assumed presence (if PCT changes)
2. Category 1 land / degraded habitat: BCD support the use of presence/absence of woody/non woody vegetation & Category 1 land as a filter for degraded habitat for those species as per the table provided there is suitable pre-clearing survey and mitigation for removal of hollow bearing trees within the category 1 landscape
3. Low condition filters: BCD do not agree that a broad low condition state can be used to exclude some species (level 7) on the basis of degraded habitat. For example the VI scores, plot data and pictures provided in the BDAR for low condition PCT 679 show ideal habitat for *Caledonia montana* and *Pimelea bracteata* in the Snowys. The 'low condition' zoning needs further analysis in each IBRA and was an issue raised in the BCD submission on the EIS BDAR. The example below (plot data from BDAR) shows a low condition PCT 679 and PCT 268 (BGW TEC) with trees recorded in every size class. These plots for example do not meet the description of low condition provided in the BDAR for low condition. Some plot data for low condition zones is not provided in the BDAR for review – eg MA0922CD PCT 268
4. BCD do not support the use of Vegetation zones (ie low condition) as a filter to exclude species for any of the subject land where there has not been field assessment to verify condition (and /or PCT) (ie inaccessible land).
5. BCD recommend the BDAR stipulate that vegetation zones will be verified based on the results of post approval surveys –
6. Post approval surveys to exclude candidate species must appropriately timed for species detection as per the BAM survey requirements & any commonwealth requirements for MNES eg threatened orchid survey.
7. Gang-gang and Glossy Black Cockatoo habitat constraint - we disagree with the application of a 50 m buffer to LiDAR tree heights >20m (inaccessible lands) as a habitat constraint. If using lidar /buffer, Tree heights must be reduced to a minimum of 10m as they will have potential to harbour suitable hollows. Planted native vegetation may be

excluded as unlikely to provide suitable hollows for nesting. Category 1 lands may be assumed to not be within a suitable patch size or %native vegetation cover range to provide suitable breeding habitat /attract a species credit for Gang Gang cockatoos but this is not the case for Glossies – they can nest in isolated paddock, trees, particularly large HBT within category 1 land that might be close to planted native vegetation & /or that are >100m from remnant vegetation. BCD would be comfortable with excluding cat 1 lands from the potential species polygons provided there is opportunity to review the value of scattered HBT that may fall into this category.

Please see additional responses to your specific questions in your email - in green below

Kind regards

Angie

Angela Jenkins

Senior Conservation Planning Officer, South East

Biodiversity and Conservation Division,

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Energy, the Environment and Water

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I acknowledge the traditional custodians of the land and pay respects to Elders past and present. I also acknowledge all the Aboriginal and Torres Strait Islander staff working with NSW Government at this time.

In order to ensure a high level of customer service and monitor work flow, South East Planning Team has an email address: rog.southeast@environment.nsw.gov.au. Please address all further email correspondence in relation to Planning matters to this address. If appropriate, emails can be marked to the attention of your usual contact in the team. Please consider the environment before printing this email.

From: Chani Wheeler

Sent: Wednesday, December 13, 2023 6:40 PM

To: 'Angela Jenkins' <Angela.Jenkins@environment.nsw.gov.au>

Cc: 'Nat O'Rourke' <Nat.ORourke@environment.nsw.gov.au>; Sian Griffiths <sgriffiths@niche-eh.com>; Peter Taylor <ptaylor@niche-eh.com>; 'Carolyn McCallig' <Carolyn.McCallig@aurecongroup.com>; 'Sumaya.Osman' <Sumaya.Osman@transgrid.com.au>; 'Jack Mc Govern' <Jack.McGovern@transgrid.com.au>; 'Christine.Lussier' <Christine.Lussier@transgrid.com.au>; 'Daniel Whaite' <Daniel.Whaite@transgrid.com.au>; 'Tuesday Heather' <Tuesday.Heather@environment.nsw.gov.au>

Subject: RE: HumeLink- species polygon workshop materials

Hi Angie,

Whilst there are some specific queries outlined in the slides provided, I thought it best to collate what specific input/ feedback we are seeking from the BCD in relation to the species polygon mapping process discussed today:

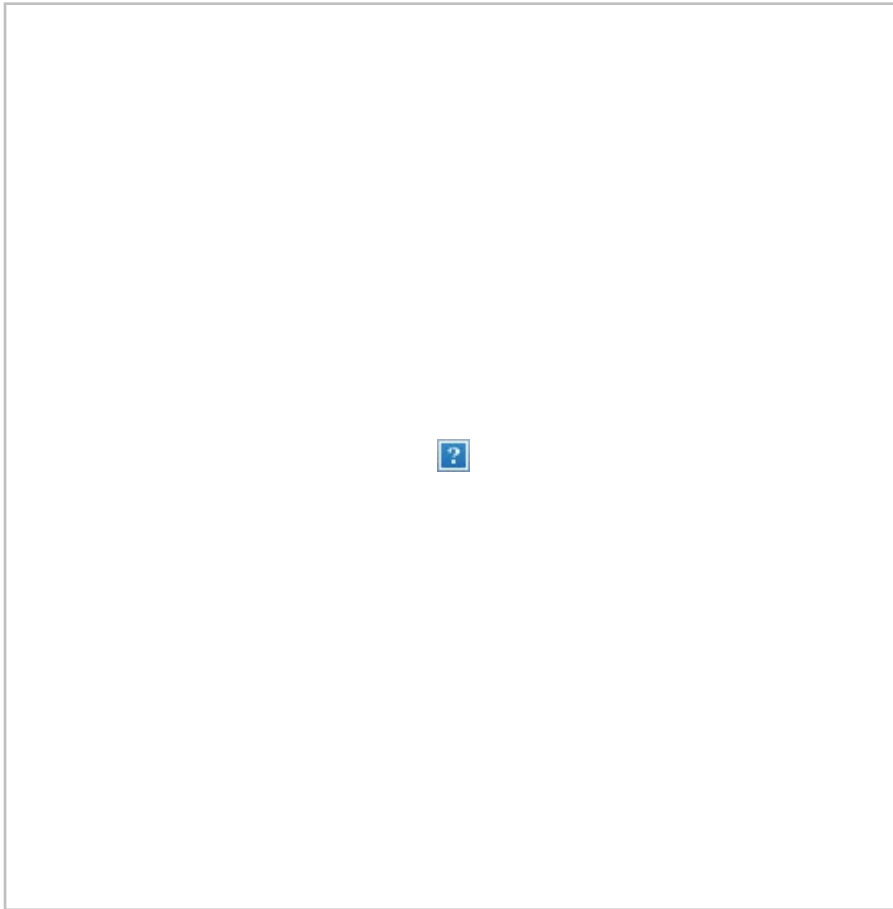
- Highlight any issues with the species polygon methods applied. Please be specific about what these issues are. Do they relate to a specific species, a particular model step, specific habitat mapping criteria (i.e. habitat constraints or degraded habitat prescriptions) or data inputs applied (i.e. use of LidAR, HBT coverage, etc)? Can the BCD recommend alternatives where issues are identified. *see above*
- Does the BCD generally support the mapping criteria applied for species (as documented in Attachment 2 of the workshop materials), noting that the input habitat constraints datasets will largely dictate the detail for how this is captured in the species polygon. For example, a habitat constraint of 'within 20m of streams' has been applied for *Acacia phasmoides* following advice received from the BCD on 11/1023. In this example, a 20m buffer has been applied to the Strahler stream order layer and wherever this intersects with associated PCTs for this species in the appropriate IBRA subregion, this has been included in the species polygon. If the BCD have issues with our criteria and process applied for species we really need to understand this so we have time to correct it in January for the Amended BDAR. *20m buffer for phasmoides is fine/ as per AO advice*
- Can we resolve a suitable breeding offset correction factor that could be applied for dual credit birds? Stag watching to rule out breeding across the alignment is not considered feasible. Species polygons will map potential breeding habitats based on the presence of breeding constraints. However, we need to reduce this to align more accurately with the BAM species polygon prescriptions which are a buffer to a roost tree (i.e. 3.14ha for a 100m buffer and 12.57 ha for a 200m buffer) and to make our offset obligation more reasonable. We discussed a possible strategy incorporating consideration of species home ranges and/ or applying a roost allowance that could be applied to our level 11 species polygons and input into the BAM-C. We will continue to work through breeding offset considerations for owls with David Mileage. We will also follow up Michael Mulvaney in relation to Gang-gang Cockatoo. Where the specifics could be appropriately justified, we would like to understand if the BCD would support this approach in principle. *Threatened Owls- some advice was provided to Sian on revised credit status of owls-& no stag watching required for survey. No change to requirement for expert report for assumed presence. Cockatoos- we have no info on cockatoo 'breeding' home ranges so we are unsure how would you do this? BCD understand that there will be a high credit obligation but that there will be opportunity to revise/re-calculate when access is granted for targeted survey to confirm absence/presence. Planning have the ability to discount the obligation. We don't have any process or ability to apply a reduced offset factor.*
- Flora species count methods. Our counts for flora are based on numbers detected through field survey (i.e. within confirmed habitats) extrapolated across all potential habitats separately for each IBRA subregion. A detailed method for count estimates was provided in the BDAR Attachment 12 (Section 3). For flora that were not recorded during field survey, counts were based on the advice provided by the BCD (where relevant). Flora count estimates do not currently incorporate any habitat stratification (i.e. based on vegetation zone or canopy cover). I think it would be difficult to stratify according to veg zones as it would limit the extent to which we could use the counts from confirmed habitats. For example, Hoary sunray was only recorded in 31 vegetation zones but 81 vegetation zones are likely to support potential habitat. However, based on a review of proportions of confirmed habitat that are woody vegetation v non-woody vegetation in comparison to potential habitats, a count reduction is likely to be achieved where this method of stratification is applied (i.e. given counts are likely to be much lower in wooded habitats- we will double check our data to confirm this). *We would be happy to support a*

method provided there is robust justification/rationale (as per BAM stage 1 ops manual which states “Where the species is assumed to be present and the unit of measure is ‘counts of individuals’, the number of individuals likely to be present on the subject land will need to be estimated (e.g. based on reference sites, relevant information in the TBDC for the species, etc.). The approach to generate population estimates must be evidence-based and clearly documented in the BAR” & provided there is commitment to undertake on ground validation of vegetation zones and targeted survey of currently unsurveyed areas to confirm presence/absence

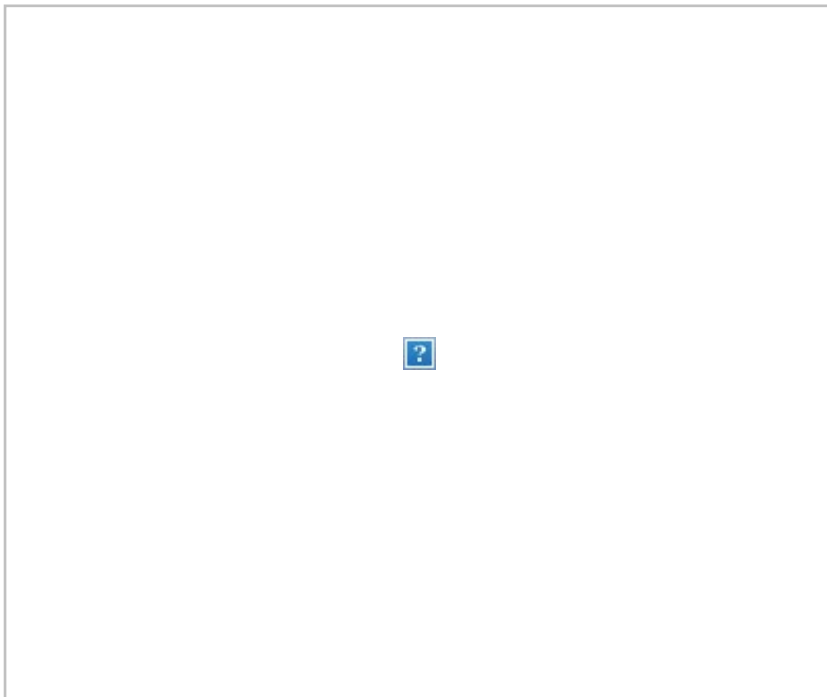
- Survey effort review and desired input from the BCD:
 - Our general approach to assessing survey effort across the alignment is using survey units to stratify habitats. A summary of this approach and detail regarding what survey units are applied for what species is provided in Attachment 3 of the workshop materials. It was also outlined in the BDAR Attachment 12.
 - Does the BCD have any comments on the survey effort prescriptions provided in Attachment 3? You will need to ensure that any Commonwealth survey methods techniques required for Threatened flora listed under the EPBC Act as critically endangered, endangered or vulnerable are met.- eg parallel transects for critically endangered orchids
 - We would like to understand what justification would be needed to include survey effort outside the BAM seasonal window. Are there specific species and a time window (i.e. 3 weeks either side) that we could apply with confidence? Evidence that the species is/has been detected elsewhere in the locality outside that window. See advice on orchid flowering /detection dates where known provided to Sian- Autumn flowering orchids have longer windows and a correlated response to rainfall – Spring orchids generally only a 2- 3 week flowering period, sometimes less and this period can vary slightly across locations /regions
 - Given survey prescriptions are based on an extent of habitat (i.e. 500m of stream or 50ha of habitat), we assume that where a smaller extent of habitat is present, a reduced survey effort is applied. For example, if stream is 250m long then min survey effort for threatened frogs would be 240 mins. No – not strictly a linear relationship. Use a common sense approach to justify survey effort. The guide is a guide.
 - Similarly, the frog survey guidelines prescribe survey effort based on stream length. But we are also dealing with a number of dams which are not necessarily associated with a stream and for which there is not guidance regarding survey effort in the BAM survey guidelines. Does the BCD have any advice on how survey effort should be assessed for dams (mostly relevant for *Litoria castenae*)? Appreciate the requirement for prescriptions but a common sense approach has to apply here –If the dam is considered suitable habitat (: Suitable breeding and non-breeding habitat consists of any waterbody with emergent aquatic vegetation and preferably does not contain the plague minnow (*Gambusia holbrooki*). Foraging habitat and migratory habitat are areas of native and nonnative vegetation) you must still follow the guidelines in terms of the required number of repeat surveys. You could estimate the time it will take to undertake them based on the size of the waterbody based on the guideline- But for example if the dam/waterbody was only 10x20m to apply a reduction strictly proportionate to the 500m transect you would end up with <5 minutes of Aural/visual survey which would be inadequate. Common sense would prevail here and BCD would recommend a minimum of

- 30minutes for small dams as a minimum rule (&as per DECC 2004 TBDSA guide)
 - BCD also want to be sure that the survey area/effort is adequate to capture potential areas/TS habitats subject to indirect impacts given we have not had opportunity to review a number of changes to the footprint or the extent of the current survey effort.
- Further reduction from opportunistic survey.
 - Based on the Hoary Sunray example we worked through today, it is clear that applying the survey guidelines to the letter results in some small sections of habitat being retained in the species polygons but for which we could likely exclude given field teams were opportunistically searching for individuals when moving between survey sites. I am sure that this would need to be looked at closely for each species in detail but it would be good to understand what the BCD need to see to justify us ruling some areas out based on opportunistic survey? The below screenshots provide two examples of where I think we could apply some reduction for Hoary Sunray based on opportunistic survey. Are there some limits that BCD could prescribe (i.e. shouldn't exclude potential habitat patches > xx ha or where distance between surveys is greater than xx m?) My thoughts on this are that if we where there and moving between sites, we have contiguous habitats and generally good coverage, we should be able to rule some areas out. It is unlikely that we will have sufficient time to load in survey tracks and carry out a details assessment of staff movements for each species. *The 2 examples provided below appear reasonable. The assumptions may change depending on cover and height of target species ie cannot assume detection would occur at the same distancess in closed canopy/shrub cover compared to open. Justification needs to be in BDAR . BCD recommend 40m open vegetation and 20m closed /dense vegetation if surveying large species ie trees, 20m (open) and 10m (dense) if surveying for shrubs , 15m(open) and 10m (dense)_ for sub-shrubs and 10m (open) 5m (dense/close) if searching for orchids /herbs/grasses/forbs*
- **Category 1 lands and exotic vegetation.** For some species we have assumed presence within exotic habitats or overlapping category 1 lands for which we do not need to address ecosystem credits. As these cannot be addressed in the BAM-C, we have instead captured them as prescribed impacts. However, no offsets are currently proposed for these impacts. Is the BCD comfortable in addressing impacts within these habitats through post-consent survey to confirm species absence? Otherwise, how would the BCD like us to generate offsets for these habitats if required? firstly we need them quantified- ie how much habitat are we talking? And what is the likelihood of presence? & What proportionate impact on populations? Apply a similar matrix to how you addressed SAll – to come up with species list that are most at risk & most likely to need an offset

Example 1: very small slithers of habitat between survey points. Largely contiguous habitat/ lands and very good coverage throughout.



Example 2: some increased distance between survey but generally contiguous habitats and good coverage throughout.



As indicated in the workshop today, we will be picking this up in the new year and intend to rerun the species polygons model in mid January to allow for assessments to carry through into the Amended BDAR.

Kind Regards,

Chani Wheeler *BSc. MConsBiol. MEIANZ. BAM Accredited Assessor*
Principal Ecologist
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Angela Jenkins

Senior Conservation Planning Officer, South East
Biodiversity and Conservation Division,

**Department of Climate Change,
Energy, the Environment and Water**

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11 Farrer Place

Queanbeyan NSW 2620

Working days Monday to Friday, 9:00am - 5:00pm



I acknowledge the traditional custodians of the land and pay respects to Elders past and present. I also acknowledge all the Aboriginal and Torres Strait Islander staff working with NSW Government at this time.

In order to ensure a high level of customer service and monitor work flow, South East Planning Team has an email address: rog.southeast@environment.nsw.gov.au. Please address all further email correspondence in relation to Planning matters to this address. If appropriate, emails can be marked to the attention of your usual contact in the team. Please consider the environment before printing this email.

From: Chani Wheeler

Sent: Wednesday, 13 December 2023 7:54 PM

To: Angie Jenkins

Cc: Nat O'Rourke ; Sian Griffiths ; Peter Taylor ; Carolyn McCallig ; Sumaya.Osman ; Jack Mc Govern ; Christine.Lussier ; Daniel Whaite ; Tuesday Heather

Subject: RE: HumeLink- species polygon workshop materials

Hi Angie,

Apologies I hit send prematurely. See correction and additional query below in red.

Kind Regards,

Chani Wheeler *BSc. MConsBiol. MEIANZ. BAM Accredited Assessor*

Principal Ecologist

0488 774 254

NSW Head Office – Sydney

PO Box 2443 North Parramatta NSW 1750



From: Chani Wheeler

Sent: Wednesday, December 13, 2023 6:40 PM

To: 'Angela Jenkins' <Angela.Jenkins@environment.nsw.gov.au>

Cc: 'Nat O'Rourke' <Nat.OURourke@environment.nsw.gov.au>; Sian Griffiths <sgriffiths@niche-eh.com>; Peter Taylor <ptaylor@niche-eh.com>; 'Carolyn McCallig' <Carolyn.McCallig@aurecongroup.com>; 'Sumaya.Osman' <Sumaya.Osman@transgrid.com.au>; 'Jack Mc Govern' <Jack.McGovern@transgrid.com.au>; 'Christine.Lussier' <Christine.Lussier@transgrid.com.au>; 'Daniel Whaite' <Daniel.Whaite@transgrid.com.au>; 'Tuesday Heather' <Tuesday.Heather@environment.nsw.gov.au>

Subject: RE: HumeLink- species polygon workshop materials

Hi Angie,

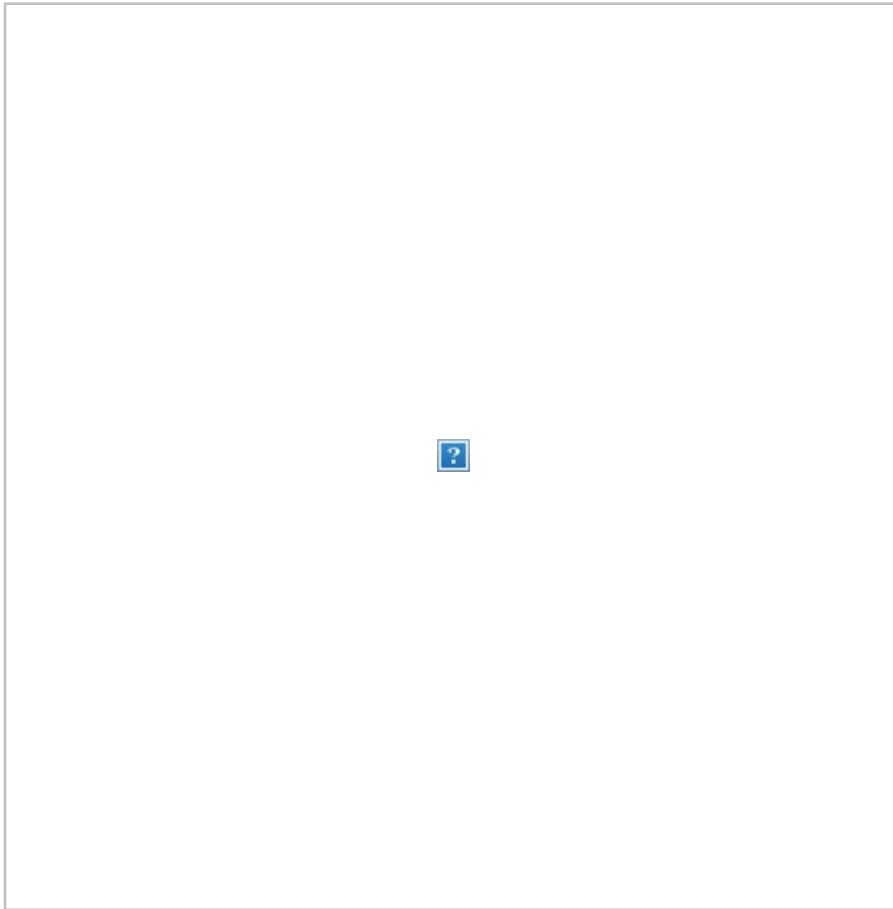
Whilst there are some specific queries outlined in the slides provided, I thought it best to collate what specific input/ feedback we are seeking from the BCD in relation to the species polygon mapping process discussed today:

- Highlight any issues with the species polygon methods applied. Please be specific about what these issues are. Do they relate to a specific species, a particular model step, specific habitat mapping criteria (i.e. habitat constraints or degraded habitat prescriptions) or data inputs applied (i.e. use of LidAR, HBT coverage, etc)? Can the BCD recommend alternatives where issues are identified.
- Does the BCD generally support the mapping criteria applied for species (as documented in Attachment 2 of the workshop materials), noting that the input habitat constraints datasets will largely dictate the detail for how this is captured in the species polygon. For example, a habitat constraint of 'within 20m of streams' has been applied for *Acacia phasmoides* following advice received from the BCD on 11/1023. In this example, a 20m buffer has been applied to the Strahler stream order layer and wherever this intersects with associated PCTs for this species in the appropriate IBRA subregion, this has been included in the species polygon. If the BCD have issues with our criteria and process applied for species we really need to understand this so we have time to correct it in January for the Amended BDAR.
- Can we resolve a suitable breeding offset correction factor that could be applied for dual credit birds? Stag watching to rule out breeding across the alignment is not considered feasible. Species polygons will map potential breeding habitats based on the presence of breeding constraints. However, we need to reduce this to align more accurately with the BAM species polygon prescriptions which are a buffer to a roost tree (i.e. 3.14ha for a 100m buffer and 12.57 ha for a 200m buffer) and to make our offset obligation more reasonable. We discussed a possible strategy incorporating consideration of species home ranges and/ or applying a roost allowance that could be applied to our level 11 species polygons and input into the BAM-C. We will continue to work through breeding offset considerations for owls with David Mileage. We will also follow up Michael Mulvaney in relation to Gang-gang Cockatoo. Where the specifics could be appropriately justified, we would like to understand if the BCD would support this approach in principle.
- Flora species count methods. Our counts for flora are based on numbers detected through field survey (i.e. within confirmed habitats) extrapolated across all potential habitats separately for each IBRA subregion. A detailed method for count estimates was provided in the BDAR Attachment 12 (Section 3). For flora that were not recorded during field survey, counts were based on the advice provided by the BCD (where relevant). Flora count estimates do not currently incorporate any habitat stratification (i.e. based on vegetation zone or canopy cover). I think it would be difficult to stratify according to veg zones as it would limit the extent to which we could use the counts from confirmed habitats. For example, Hoary sunray was only recorded in 31 vegetation zones but 81 vegetation zones are likely to support potential habitat. However, based on a review of proportions of confirmed habitat that are woody vegetation v non-woody vegetation in comparison to potential habitats, a count reduction is likely to be achieved where this method of stratification is applied (i.e. given counts are likely to be much lower in wooded habitats- we will double check our data to confirm this).
- Survey effort review and desired input from the BCD:
 - Our general approach to assessing survey effort across the alignment is using survey units to stratify habitats. A summary of this approach and detail regarding what survey units are applied for what species is provided in Attachment 3 of the

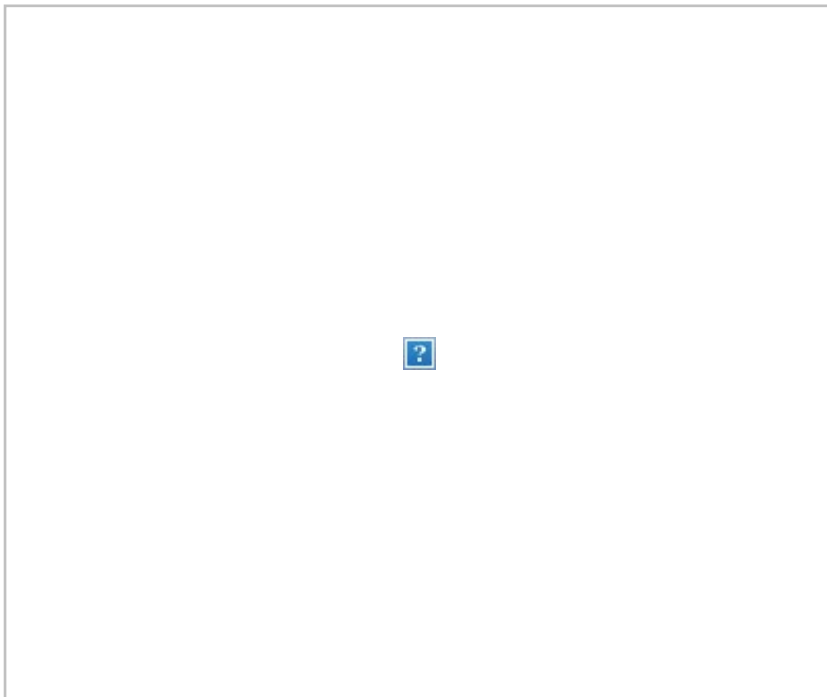
workshop materials. It was also outlined in the BDAR Attachment 12.

- Does the BCD have any comments on the survey effort prescriptions provided in Attachment 3?
- We would like to understand what justification would be needed to include survey effort outside the BAM seasonal window. Are there specific species and a time window (i.e. 3 weeks either side) that we could apply with confidence?
- Given survey prescriptions are based on an extent of habitat (i.e. 500m of stream or 50ha of habitat), we assume that where a smaller extent of habitat is present, a reduced survey effort is applied. For example, if stream is 250m long then min survey effort for threatened frogs would be 240 mins.
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- Further reduction from opportunistic survey.
 - Based on the Hoary Sunray example we worked through today, it is clear that applying the survey guidelines to the letter results in some small sections of habitat being retained in the species polygons but for which we could likely exclude given field teams were opportunistically searching for individuals when moving between survey sites. I am sure that this would need to be looked at closely for each species in detail but it would be good to understand what the BCD need to see to justify us ruling some areas out based on opportunistic survey? The below screenshots provide two examples of where I think we could apply some reduction for Hoary Sunray based on opportunistic survey. Are there some limits that BCD could prescribe (i.e. shouldn't exclude potential habitat patches > xx ha or where distance between surveys is greater than xx m?) My thoughts on this are that if we were there and moving between sites, we have contiguous habitats and generally good coverage, we should be able to rule some areas out. It is unlikely that we will have sufficient time to load in survey tracks and carry out a details assessment of staff movements for each species.
- Category 1 lands and exotic vegetation. For some species we have assumed presence within exotic habitats or overlapping category 1 lands for which we do not need to address ecosystem credits. As these cannot be addressed in the BAM-C, we have instead captured them as prescribed impacts. However, no offsets are currently proposed for these impacts. Is the BCD comfortable in addressing impacts within these habitats through post-consent survey to confirm species absence? Otherwise, how would the BCD like us to generate offsets for these habitats if required?

Example 1: very small slithers of habitat between survey points. Largely contiguous habitat/lands and very good coverage throughout.



Example 2: some increased distance between survey but generally contiguous habitats and good coverage throughout.



As indicated in the workshop today, we will be picking this up in the new year and intend to rerun the species polygons model in mid January to allow for assessments to carry through into the Amended BDAR.

Kind Regards,

Chani Wheeler *BSc. MConsBiol. MEIANZ. BAM Accredited Assessor*
Principal Ecologist
0488 774 254
NSW Head Office – Sydney



From: Chani Wheeler

Sent: Wednesday, December 13, 2023 3:15 PM

To: Angela Jenkins <Angela.Jenkins@environment.nsw.gov.au>

Cc: Nat O'Rourke <Nat.ORourke@environment.nsw.gov.au>; Sian Griffiths <sgriffiths@niche-eh.com>; Peter Taylor <ptaylor@niche-eh.com>; Carolyn McCallig <Carolyn.McCallig@aurecongroup.com>; Sumaya.Osman <Sumaya.Osman@transgrid.com.au>; Jack Mc Govern <Jack.McGovern@transgrid.com.au>; Christine.Lussier <Christine.Lussier@transgrid.com.au>; Daniel Whaite <Daniel.Whaite@transgrid.com.au>; Tuesday Heather <Tuesday.Heather@environment.nsw.gov.au>

Subject: HumeLink- species polygon workshop materials

Hi Angie,

Thanks for your time to consult today regarding the HumeLink species polygons. Please see via the link below:

- Slides as presented today (noting there will be some additional information in there we didn't have time to cover which will hopefully address some of Nat's queries)
- A methods statement provided in August 2022 following our second BCD workshop to discuss the species model. This includes a summary of methods applied for native veg cover and patch size. The methods have not changed.



[8196_Species Workshop Materials](#)

Please also refer to the following sections of the BDAR where more detailed methods are provided for relevant model considerations, including:

- Native vegetation cover analysis: Section 4.1.1
- Patch size analysis: Section 4.1.2
- Category 1 lands mapping: Section 4.2.1
- Flora and fauna habitat mapping process and criteria: Section 7.1 and Attachment 12 (Section 1.1, 4.1 and 4.2). Note that updated habitat mapping criteria was issued to BCD on 7 December 2023 in preparation for this workshop. The updates to the criteria were to capture recent species-specific consultation with the BCD and to incorporate use of LiDAR mapping in inaccessible lands. Level 11 polygons were issued as working draft to capture these mapping updates and to align polygons to the new project footprint.
- Survey effort review and process: Attachment 12 (Section 1.2). As discussed, we are reviewing this process currently and would appreciate your feedback into the proposed refinements as documented in the slides. Happy to flesh these out in more detail if required.
- Flora count estimates: Attachment 12 Section 3. As discussed, we are reviewing this and whether a stratified approach to count estimates would be worthwhile. Based on what I presented today, this may be the case.

Kind Regards,

Chani Wheeler *BSc. MConsBiol. MEIANZ. BAM Accredited Assessor*
Principal Ecologist
0488 774 254
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PO Box 2443 North Parramatta NSW 1750



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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From: [Angie Jenkins](#)
To: [Thea Kane](#)
Cc: [Chani Wheeler](#)
Subject: RE: HumeLink - Acacia flocktoniae
Date: Thursday, 3 October 2024 5:01:39 PM
Attachments: [image001.png](#)

no worries- Im waiting to hear back from the AO- have you checked Bionet records? they often have details on flowering /fruiting dates- although I suspect they support whats in the TBDC.

I'll let you know as soon as I hear anything. Given the species is only known to occur in the Sthn blue Mtns – it does have a low probability of occurrence- Can you advise specifics of locations/ pictures of veg & what PCT's you are surveying? This might help if I send to the AO and he might be able to determine suitability/non suitability of habitat.

Angie

From: Thea Kane <tkane@niche-eh.com>
Sent: Thursday, 3 October 2024 12:44 PM
To: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>
Cc: Chani Wheeler <cwheeler@niche-eh.com>
Subject: Re: HumeLink - Acacia flocktoniae

Apologies Angie, I was looking at the wrong species! Can confirm that all of our habitat for this species is within the Bungonia IBRA subregion. Is this okay to continue with surveys into October?

Best,

Thea Kane BEnvMgmt, Accredited BAM Assessor
Ecology Experienced Consultant

T - 0488 224 968

E - tkane@niche-eh.com

NSW Office - Sydney
Dharug Country

02 9630 5658



From: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>

Sent: Wednesday, October 2, 2024 1:16 PM

To: Thea Kane <tkane@niche-eh.com>

Cc: Chani Wheeler <cwheeler@niche-eh.com>

Subject: RE: HumeLink - Acacia flocktoniae

hey Thea Just confirming – yass “area” unlikely. I have it only predicted in Bungonia. So unlikely to be around Yass

From: Thea Kane <tkane@niche-eh.com>

Sent: Wednesday, 2 October 2024 11:01 AM

To: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>

Cc: Chani Wheeler <cwheeler@niche-eh.com>

Subject: Re: HumeLink - Acacia flocktoniae

Hi Angie,

Surveys would be located around the Yass area.

Best,

Thea Kane BEnvMgmt, Accredited BAM Assessor
Ecology Experienced Consultant

T - 0488 224 968

E - tkane@niche-eh.com

NSW Office - Sydney
Dharug Country

02 9630 5658



From: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>

Sent: Wednesday, October 2, 2024 10:47 AM
To: Thea Kane <tkane@niche-eh.com>
Cc: Chani Wheeler <cwheeler@niche-eh.com>
Subject: RE: HumeLink - Acacia flocktoniae

Hey thea- Do you have general locations? so I can let the AO know where you are targeting-

From: Thea Kane <tkane@niche-eh.com>
Sent: Tuesday, 1 October 2024 3:54 PM
To: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>
Cc: Chani Wheeler <cwheeler@niche-eh.com>
Subject: HumeLink - Acacia flocktoniae

Hi Angie,

Could you confirm if *Acacia flocktoniae* surveys could continue into October?

Best,

Thea Kane BEnvMgmt, Accredited BAM Assessor
Ecology Experienced Consultant

T - 0488 224 968

E - tkane@niche-eh.com

NSW Office - Sydney
Dharug Country

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From: [Angie Jenkins](#)
To: [Thea Kane](#)
Cc: [Chani Wheeler](#)
Subject: Re: Acacia flocktoniae
Date: Friday, 4 October 2024 5:55:58 PM

I think so- Steve sounded very confident that survey efforts should focus on 870. He said although predicted - it would be very unlikely to occur in the other listed pcts in Bungonia. Also he considers any detection would be a significant range extension for the species- so although low probability- can't exclude with 100% certainty,

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From: Thea Kane <tkane@niche-eh.com>
Sent: Friday, October 4, 2024 5:10:53 PM
To: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>
Cc: Chani Wheeler <cwheeler@niche-eh.com>
Subject: Re: Acacia flocktoniae

That's very helpful, thanks Angie!

To confirm, are we able to exclude the other PCTs from the species polygon (assumed presence) within Bungonia?

Have a great weekend.

Thea

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From: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>
Sent: Friday, October 4, 2024 4:38:06 PM
To: Thea Kane <tkane@niche-eh.com>
Subject: Acacia flocktoniae

Hi Thea

I've spoken with Steve Douglas who has advised it would be appropriate to limit survey to pct 870 in Bungonia IBRA. Also - given deviation from recommended survey window any potential species detected should assumed and sent to herbarium for id confirmation.

Hope this helps

Angie

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From: [Angie Jenkins](#)
To: [Chani Wheeler](#)
Cc: [Peter Taylor](#); [Thea Kane](#); [Christine Lussier](#); [Tuesday Heather](#); [Daniel Whaite](#); [Sumaya Osman](#); [Allison Treweek](#); [Allie Cash](#); [Nat O'Rourke](#); [Damon Oliver](#)
Subject: RE: 8758 HumeLink Post-BDAR Surveys
Date: Thursday, 10 October 2024 2:21:58 PM
Attachments: [image001.png](#)

Hi Chani

Can you please also provide spatial data and/or mapped locations of the survey effort for *Caladenia* and the owl polygons/habitat constraints mapping.

I'm not certain of our specialists availability yet but will let you know ASAP (it's that time of year).

I think the approach for *C. montana* sounds reasonable and you have the orchid experts on board.

Ideally we would need at least a week to review material if you want feedback when we meet.

Thanks

Angie

From: Chani Wheeler <cwheeler@niche-eh.com>
Sent: Thursday, 10 October 2024 1:02 PM
To: Angie Jenkins <Angela.Jenkins@environment.nsw.gov.au>
Cc: Peter Taylor <ptaylor@niche-eh.com>; Thea Kane <tkane@niche-eh.com>; Christine Lussier <Christine.Lussier@transgrid.com.au>; Tuesday Heather <tuesday.heather@transgrid.com.au>; Daniel Whaite <Daniel.Whaite@transgrid.com.au>; Sumaya Osman <Sumaya.Osman@transgrid.com.au>
Subject: 8758 HumeLink Post-BDAR Surveys
Importance: High

Hi Angie,

Could you confirm your availability to meet next week to discuss the below agenda? We will have an updated flora and fauna survey plan to you this week.

Meeting Agenda

- *Caladenia montana* survey timing:
 - Two September survey teams were deployed between 9/9 to 18/9, following notice from UGL that the Snowy 2.0 reference population was in flower. These teams comprised orchid specialists Isaac Mammot and Rob Humphries team.
 - Given the uncertainty regarding the stage of the flowering period (as this was not communicated by UGL and particularly as we were not expecting *C. montana* to flower until October), the teams were searching for any rosettes and buds during their traverses that may indicate the presence of *Caladenia* species.
 - A reference site check was prioritised on 14/9 which indicated the population was still in early bud.
 - The location of all potential *C. montana* rosettes detected by teams in September were recorded and these will be revisited during the confirmed flowering period to inform identification to species level.
 - A reference site check was undertaken on the 7/10 which has confirmed the *C. montana* population would likely be in full flower from around 14/10. Teams will now be mobilising back to site to recommence *C. montana* surveys on 14/10.

Based on the above approach, we are confident *C.montana* detection probability has been maximised across potential habitats. Despite September surveys being undertaken in advance of the flowering period, we feel the approach implemented with subsequent revisits to sites with potential *C.montana* individuals has ensured the species, where present, would be detected.

- We are seeking BCS approval of our September *C.montana* survey approach and proposed October survey timing. Details of reference site checks, including notes and photos, would be documented in our survey progress report. We can provide this to BCS in advance of reporting where required.
- Owls and raptors
 - Revised habitat constraint mapping survey outcomes
 - Summary of owl survey effort and outcomes
 - Proposed approach to owl and raptor species polygon updates and application of owl survey effort reductions
- Survey effort requirements for:
 - Phascogale
 - Eastern Pygmy-possum
 - Gang-gang Cockatoo and Superb Parrot
 - Koala

Kind Regards,

Chani Wheeler BSc, MConsBio, Accredited BAM Assessor
Ecology Principal

QLD Office - Brisbane
T - 07 2104 8594
M - 0488 774 254
E - cwheeler@niche-eh.com

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Meeting Recap

 19 Jun HumeLink TG/CPHR Meeting

The HumeLink TG/CPHR Meeting on 19 June 2025 focused on reviewing survey methodologies, addressing data inconsistencies in biodiversity assessments, and ensuring compliance with environmental guidelines. Key discussions included aligning survey efforts with biodiversity guidelines, addressing species-specific risks, and determining next steps for habitat assessments and data reprovisioning. Significant points included addressing BAM survey guidelines for post-approval surveys, the need for updated maps in reports, and concerns about species recovery in fire-affected areas. Quantitative data and specific examples were discussed to support these points, such as the use of spotlighting and acoustic methods for koalas, and the impact of limited land access on survey coverage.

Key takeaways

- **Draft Guidelines for Post-Approval Surveys:** A draft guideline for post-approval surveys is being developed to incorporate lessons learned from current projects. Feedback from this meeting will be used to refine the guideline. [FYI this guideline has been released but not as a draft. It also restricts post-approval surveys to land without previous access \(eg – access possible during a period outside a survey window, then no access during the survey window\) so there will still be a need for post-approval surveys as conditions of approval if these are proposed/supported.](#)
- **Data Provisioning Issues:** Several datasets for species surveys were provisioned incorrectly, leading to misalignment between reported data and actual survey efforts. These datasets will be reprovisioned to ensure clarity and alignment with biodiversity assessment requirements.
- **Survey Methodology Adjustments:** For koalas, a combination of spotlighting and acoustic methods was used in some regions. However, guidelines lack clarity on multi-method approaches, necessitating external advice to validate adequacy.
- **Mapping and Data Visualisation Needs:** There is a strong need for updated maps in reports to clearly show surveyed areas, fire-affected zones, and connectivity between surveyed habitats. This will aid in justifying survey adequacy and addressing stakeholder concerns.
- **Species-Specific Concerns:** Concerns about population recovery in fire-affected areas persist for species like Powerful Owl, Barking Owl, and koalas due to limited prey availability and habitat regeneration timelines. Additional mapping is needed to clarify survey coverage and habitat connectivity.
- **Survey Effort Justifications:** There is a need to align survey efforts with biodiversity guidelines more rigorously. Justifications for deviations from standard survey methods must be clearly documented in reports to address regulatory concerns.

- **Data Reprovisioning for Clarity:** Updated datasets will include additional fields to make it easier for stakeholders to filter data by species and verify survey efforts.
- **Table Inclusion in Reports:** A table summarising changes in species polygons will be added to reports to provide clarity on survey coverage and methodology changes over time.
- **Access Limitations During Surveys:** Limited land access during both beta and post-beta phases has impacted survey coverage. This limitation will be explicitly documented in reports to clarify gaps in survey data and manage stakeholder expectations.
- **Stakeholder Collaboration:** The meeting highlighted the importance of ongoing collaboration with stakeholders to address concerns about survey adequacy and ensure compliance with biodiversity guidelines.

Decisions

- Severely burnt lands will not be used for credit reductions; these areas will revert back to assumed presence for all relevant species – those being koala, owls and Alpine She-oak Skink.
- Updated mapping will be included in reports to visually represent surveyed areas, fire-affected zones, and habitat connectivity for key species like koalas and owls.
- Additional mapping layers will be provided in reports to address stakeholder concerns about survey adequacy and clarify where boots-on-the-ground surveys have occurred versus areas relying on desktop assessments or limited access data.
- Orchid specialists will sign the BDR as co-authors instead of preparing separate reports to simplify approval processes.
- The updated BDR will be prioritised for submission to Transgrid by Monday to meet project timelines. Anticipated delivery to CPHR on Tuesday 24/6/25.
- Additional cross-referencing of box gum woodland with BAM plot locations will be included in maps for PCT justification clarity.

Action items

- Reprovision datasets to include all relevant survey methods and effort details, ensuring alignment with reported findings. Chani Wheeler
- Create updated maps for koala habitat surveys showing surveyed areas, fire mapping overlays, and habitat connectivity to address stakeholder concerns about survey adequacy. Chani Wheeler
- Seek external advice on multi-method survey approaches for koalas to validate the adequacy of combined spotlighting and acoustic methods. Chani Wheeler

- Add a table in the BAVR report summarising changes in species polygons to clarify survey coverage over time -ie survey for BDAR, survey conducted during BDAR but unable to be utilised due to insufficient effort and survey Post_BDAR . Chani Wheeler
- Provide justification for reduced survey efforts for specific species like ~~Fascalia~~ *Phascogale* in the BAVR report to address regulatory concerns. Chani Wheeler
- Identify under-surveyed patches for *Solanum armourense* and consult with regulatory agencies on whether additional surveys are required. Chani Wheeler
- Document access limitations during beta and post-beta phases in reports to clarify gaps in survey data and manage stakeholder expectations. Chani Wheeler
- Follow up on commercial confidentiality issues related to sharing *Solanum armourense* findings from adjacent projects to narrow down high-risk areas for additional surveys. Evan Creek
- Include a rationale in the BAVR report for targeting multiple species during flora traverses to mitigate risks of overstressing survey teams' capacity. Chani Wheeler
- Double-check spatial data filters and attributes to resolve discrepancies between spatial data outputs and table figures. Nat O'Rourke, Evan Creek
- Provide additional details in the data directory to clarify specific attributes in datasets. Chani Wheeler
- Cross-reference box gum woodland with BAM plot locations and overlay them on maps for clarity in PCT justifications. Chani Wheeler
- Reassess traverse buffer calculations to ensure alignment with guidelines and correct any discrepancies in reported survey areas. Chani Wheeler
- Review opportunistic reductions applied during surveys to confirm their reasonableness and compliance with guidelines. Chani Wheeler
- Coordinate with orchid specialists to review relevant sections of the BAVR and sign off as co-authors. Chani Wheeler
- Schedule a follow-up session with relevant team members to review opportunistic reductions and ensure alignment. Chani Wheeler
- Finalise and submit the updated BAVR for review by Transgrid. Chani Wheeler by 23 Jun. To CPHR on 25/6/25 – Tuesday Heather

Meeting Minutes

Humelink BAVR Page-turn with CPHR, Transgrid and Niche

Date	28 July 2025	
Time	09:30 to 11:45, 13:00 to 14:20	
Location	Online over MS Teams	
Subject	BAVR Review Page-turn Session	
Attendees	Angie Jenkins Allie Cash Peter Monsted Thea Kane Sam Pathammavong	Nat O'Rourke Tuesday Heather Chani Wheeler Cara Parsons Evan Creek

FIRST SESSION

Minutes

Item	Description	Action	Date for action
1.	Traverse buffers		
1.1	<ul style="list-style-type: none"> – EC: Buffer incorrectly applied for most species. Needs all flora to be reviewed and have correct buffers aligned – CW: Survey undertaken of the targeted easement, plus a 30 m buffer – EC: Accurate buffers need to be applied, to clearly show minimal risk of missing a plant. – EC: Did a quick check on a <i>Prasophyllum</i> species and found a 15% discrepancy – CW: For more showy species in open habitats, edge environments would have been assigned to OSR, as teams would have been moving in and between sites and picked up these showy species. 	<ul style="list-style-type: none"> – Conduct review of transect buffer widths, and associated OSR 	30/07/2025
2.	Caladenia concolor		
	<ul style="list-style-type: none"> – AJ: Requesting to check each location individually as some locations have greater risk of significant deviation 	<ul style="list-style-type: none"> – 	



Item	Description	Action	Date for action
	<ul style="list-style-type: none"> – AJ: OSR width of 10 – 15 m is reasonable depending on the species. A 20 m buffer is too large for this species, and some others. – CW: Rob Humphries detailed a methodology and explained that due to some species being more obvious and growing up to 30cm tall that the OSR widths applied were appropriate. – AJ: OSR in the areas walked between transects, current method applied seems inconsistent. – EC: Notes in comments made, but concerns with inconsistency in buffer and OSR application – CW: BDAR methodology has generally been applied 		
3.	Bossiaea fragrans		
3.1	<ul style="list-style-type: none"> – Patch identified by CPHR as being inappropriately attributed as OSR. 	<ul style="list-style-type: none"> – Niche to amend section of the polygon to retain OSR in open areas directly adjacent to the survey area, and revert other areas to assumed present. 	
4.	Non-SAI flora species		
4.1	<ul style="list-style-type: none"> – TBDC and previous correspondence to be checked if 15m buffer can be applied – CW (via email) - BCD recommend that 15m buffers are applied to shrubs in open vegetation. 	<ul style="list-style-type: none"> – Niche to amend 15m buffer 	
2.	White-bellied Sea-eagle		
2.1	<ul style="list-style-type: none"> – CW: Explanation of species polygon: At the BDAR stage; <ul style="list-style-type: none"> – Suitable streams, potential foraging – Within 500m of those, or 250m (urban), included lidar, proxy for stick nests – At BAVR stage; <ul style="list-style-type: none"> – within 1 km of streams, 15 potential stick nest were identified – Only two within 1km buffer of stream, has been captured – 500m buffer to then be applied to confirmed stick nests – EC: Info doesn't align with TBDC <ul style="list-style-type: none"> – Streams should be 1km buffer and nest 500m – Thought 2 nest within the buffer 	<ul style="list-style-type: none"> – NO'R: to check notes and confirm – Niche: Revised White-bellied Sea-eagle species polygon calculation to be submitted to CHPR 	29/07/2025



Item	Description	Action	Date for action
	<ul style="list-style-type: none"> – CW: Only 1 nest in the buffer. 500m buffer has been applied trees within 500m buffer of stream. As per BDAR, LiDAR was used as a proxy for stick nests 		
3.	Gang-gang Cockatoo		
3.1	<ul style="list-style-type: none"> – EC: habitat constraint reduction layer doesn't detail which species the reduction is for – CW: Habitat absent was mapped (this includes all HBT, stick nests. Where no suitable habitat is present then species assumed absent) 	<ul style="list-style-type: none"> – EC to discuss with NO'R and get back to Niche 	29/07/2025
3.2	<ul style="list-style-type: none"> – EC: Was the species surveyed? – CW: Not targeted but Pink Robin and Superb Parrot surveyed in Gang-gang Cockatoo habitat. Would have been observed during other species survey 		
4.	Koala		
4.1	<ul style="list-style-type: none"> – AJ: Survey effort is below BAM requirements – CW: Only 3 SATs completed in Snowy Mountains - 1 short of BAM requirement – CW: Spotlighting for Koala is 91.62 hours short – CW: Acoustic monitoring; Niche completed 5 recorders for 262 nights when only 5 for 12 nights is required. Therefore, Niche feels enough effort has been met 	<ul style="list-style-type: none"> – Amend minimum amount of effort for acoustic recorders in table in BAVR 	
4.2	<ul style="list-style-type: none"> – TH: Over 300ha remains assumed present – CW: During revised BDAR, expert Stephen was consulted. He advised that Snowy Mountains has high unlikelyhood for koala occupation – AJ: Bionet record in Greenhill/Tumut in 2017/2019 – TH: Will this species need to be reverted back to assumed present 	<ul style="list-style-type: none"> – AJ to consider options and get back to Niche 	
4.3	<ul style="list-style-type: none"> – TH: Mitigation measures to be reviewed by CPHR for suitability in preparing response. – CW: Mitigation during construction, areas could be flagged in constraints mapping as potential for koala migration. This could be part of BMP measures to manage vehicles, etc. 	<ul style="list-style-type: none"> – CPHR to review mitigation measures 	



Item	Description	Action	Date for action
	<ul style="list-style-type: none"> – CW: Removes as offset liability, but still flag as ongoing mitigation measure – TH: Suggest this to be a good addition. Extra level of consideration in constraints mapping, not clear cut present/assumed present, it's a level of potential presence we'll retain for certain entities. – CW: This mitigation measure should apply to all mobile species 		
5.	Alpine She-oak Skink		
5.1	– Some survey points present in Severely burnt land	– Survey points to not be included	
6.	Bush Stone-curlew		
6.1	<ul style="list-style-type: none"> – One survey point is located 45km away from some species polygon areas on the west of the alignment toward Wagga Wagga – CW: No reductions were adopted at the BDAR stage. Surveys conducted during BDAR have been incorporated in this round of surveys. 	– Niche to review and incorporate findings into the BAVR	30/07/2025
7.	Project general updates		
7.1	<ul style="list-style-type: none"> – TH: Unsure when construction to commence. Commencement changes on daily basis around delivery partners, wanting BAVR/BMP and other documents. <p>Trying to do with RFI, have a fully approved BAVR we are fully happy with for construction.</p> <p>Trying to avoid scenario where construction starts and areas are still trying to be addressed.</p> <ul style="list-style-type: none"> – TH: Timeframe on the RFI is expected to be less than 2 weeks. 	<ul style="list-style-type: none"> – BAVR to go to planning on Thursday – RFI to be issued immediately (Fri or Mon), with Niche currently working on it to address as much as we can prior to commencement 	30/07/2025

SECOND SESSION

Q Minutes

Item	Description	Action	Date for action
1.	Koala		
1.1	– AJ: Current koala survey effort is acceptable.	– Keep current Koala species polygons	29/07/2025



Item	Description	Action	Date for action
	<ul style="list-style-type: none"> AJ: Bionet records are at a distance from the footprint, community records, and one Koala that likely strayed into town as a result of the fires. 		
1.2	<ul style="list-style-type: none"> AJ: Mitigation measures – integrate with connectivity strategy, have at least temporary movement corridor opportunities TH: The connectivity strategy is not up to that level of detail yet. TH: Niche could include recommendations for mitigation measures for temporary connectivity and exclusions zones during breeding season. CW: MMs to include integration with pest animal control. 	<ul style="list-style-type: none"> Niche & TG to prescribe appropriate additional Koala AM&Ms 	31/07/2025
1.3	<ul style="list-style-type: none"> AJ: What were to happen if a species that has been ruled out is found incidentally? TH: In the BMP, there is a section for how to handle incidental finds CW: With fauna, incidental finds are not unexpected when adjacent to habitat. TH: If there are unexpected finds, the procedure in the BMP advises how to handle fauna, the relevant authorities to contact, and direction to relocate or halt works until the animal has moved. 	<ul style="list-style-type: none"> TG: To confirm BMP procedure for handling incidental finds 	29/07/2025
2.	Alpine She-oak Skink		
2.1	<ul style="list-style-type: none"> CW: Confirm skink survey effort. Noting areas of severely burnt habitat to be retained as assumed present. AJ: Please check surveys conducted in severely burnt areas do not contribute to survey effort reduction. 	<ul style="list-style-type: none"> Confirm surveys counted towards survey effort have not been conducted in severely burnt areas. 	29/07/2025
3.	Sooty Owl		
3.1	<ul style="list-style-type: none"> CW: Acknowledging issues with survey methods layer. Survey methods form was kept to keep consistency with the BDAR. CW: In the BAVR, significant areas of supplementary constraints mapping was undertaken, however large portions of polygons are lacking this. CW: LiDAR vegetation heights still contribute significantly to this species' polygons. 	<ul style="list-style-type: none"> Ensure pre-construction priority is mapping hollows 	31/07/2025



Item	Description	Action	Date for action
	<ul style="list-style-type: none"> – CW: Will be a priority during pre-construction to map hollows – AJ: Were any qualitative habitat comments left on any hollows/HBTs, e.g. whitewash, presence of multiple hollows? – CW: No records of whitewash reported. – AJ: Recommend talking to Rowan Bilney (Forestry NSW) as he has surveyed a lot around Bago. 		
3.2	<ul style="list-style-type: none"> – TH: During first round of constraint mapping, all hollows noted for avoidance or mitigation. – TH: One option could be to rank various hollows that intersect species polygons – TH: Keep polygons in the BAVR as current with a note resolve in the RFI. Can develop this position further. – CW: Buffers to hollows included as mitigation measures. 	<ul style="list-style-type: none"> – Keep polygons in the BAVR as current with a note resolve in the RFI. 	31/07/2025
1.1	<ul style="list-style-type: none"> – TH: Effort entered by or supervised by Accredited Assessors. Is there a way to resolve this, rather than just explaining? – CW: One point per survey effort and duplicated for different species. End times have not been updated / entered consistently, but this could be amended. – EC: There appears to be issues with some doubled points attributed to different owls. – TH: Species polygons to revert back to assumed present if resolution cannot be reached. 	<ul style="list-style-type: none"> – EC to locate examples of duplicated survey point issues and email through. – Follow-up session between Niche, TG and EC regarding survey effort for owls 	29/07/2025 TBC
4.	Project general update		
4.1	<ul style="list-style-type: none"> – SP: Construction expected to begin the week of the 18th of August. 	N/A	N/A
5.	Greater Glider		
5.1	<ul style="list-style-type: none"> – CW: In the BAVR, severely burnt land considerations were added. This created inconsistencies when BDAR polygons were brought across to align to the current BAVR data. – AJ: Unsure if that will make a difference. Inconsistency noted by EC, wanted to confirm this is not an indication of a bigger issue. 	<ul style="list-style-type: none"> – 	31/07/2025



Item	Description	Action	Date for action
	<ul style="list-style-type: none"> – CW: Severely burnt status column could be populated consistently for the BDAR data. – EC: Were surveys conducted in severely burnt lands? Would prefer the column to be populated consistently. – CW: Any surveys overlapping severely burnt lands were excluded for BAVR R3. 		
6.	Additional comments on word doc		
6.1	<ul style="list-style-type: none"> – CW: Table 24 Fauna survey results table – one issue flagged was that the table calculations don't match the provisioned spatial data. – EC: BAVR areas were correct, but BDAR areas did not match up. – CW: Calculations were from consent conditions data provisioned during the BDAR. – EC: Not as concerned BDAR data does not align with provisioned BAVR data, more important for BAVR data to align. 	<ul style="list-style-type: none"> – Niche to update table heading/footnote to reflect that the BDAR result will not match the provisioned data and has been sourced from the BDAR approval provisioned data. Make reference to where the data came from. 	29/07/2025
7.	Owls		
7.1	<ul style="list-style-type: none"> – TH: Rather than discussing all details now, prefer to have a separate session for owls. 	<ul style="list-style-type: none"> – Follow-up session between Niche, TG and EC regarding survey effort for owls 	TBC



Annex 4

Survey weather conditions

Tumbarumba - Station number 072043						
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Cabramurra Station 72161 (38.6km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h)	Daily rainfall (mm)
Monday	19-Aug	3.5	17	24	Calm	0
Tuesday	20-Aug	1	16.5	67	Calm	0
Wednesday	21-Aug	8	13.7	74	Calm	0
Thursday	22-Aug	8.4	15	69	SW 9	2.8
Friday	23-Aug	1.8	15.9	52	Calm	2
Saturday	24-Aug	5.7	20.2	59	N 41	3.4
Sunday	25-Aug	9	18	119	Calm	0.6
Monday	26-Aug	7.5	14.5	96	E 2	23
Tuesday	27-Aug	5.5	17	52	Calm	0
Wednesday	28-Aug	10.5	15	89	N/A	0
Thursday	29-Aug	3.5	15	72	Calm	0.4
Friday	30-Aug	7	17	76	N 37	0
Saturday	31-Aug	6	16	87	Calm	0
Sunday	1-Sep	6	15	72	NE 22	0.6
Monday	2-Sep	4	11	109	NW 33	0
Tuesday	3-Sep	-1.5	15.8	N/A	Calm	1.2
Wednesday	4-Sep	-1.5	19.5	46	Calm	0.2
Thursday	5-Sep	6.3	22.5	57	N 19	0
Friday	6-Sep	13.5	24.3	70	N 37	0
Saturday	7-Sep	10.2	18.8	57	Calm	7
Sunday	8-Sep	1.5	16.5	78	W 17	0
Monday	9-Sep	4.5	15.5	76	W 4	0
Tuesday	10-Sep	2	19.5	50	Calm	0
Wednesday	11-Sep	2.5	19	31	Calm	0
Thursday	12-Sep	7.5	19	63	SE 13	10.6
Friday	13-Sep	-0.5	17.9	31	Calm	0
Saturday	14-Sep	1.2	15.5	50	N 4	0
Sunday	15-Sep	-2	14	52	SSE 17	4.6
Monday	16-Sep	-4	16	43	Calm	0
Tuesday	17-Sep	-1	17	43	Calm	0.4

		Tumbarumba - Station number 072043				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Cabramurra Station 72161 (38.6km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h)	Daily rainfall (mm)
Wednesday	18-Sep	0	18	85	Calm	0
Thursday	19-Sep	2.5	14.5	83	ENE 4	0
Friday	20-Sep	-0.5	14	72	Calm	1
Saturday	21-Sep	6.5	14.9	72	WNW 9	2
Sunday	22-Sep	8.2	15.5	67	W 9	0.4
Monday	23-Sep	3.5	N/A	54	Calm	0
Tuesday	24-Sep	N/A	23.7	56	N/A	0
Wednesday	25-Sep	11.1	13.3	83	N 9	20.2
Thursday	26-Sep	5.4	16	85	S 17	46.6
Friday	27-Sep	-1.5	18.4	39	Calm	0
Saturday	28-Sep	0.6	20.1	48	Calm	0
Monday	14-Oct	5.5	N/A	69	Calm	0
Tuesday	15-Oct	N/A	23.5	67	N/A	0
Wednesday	16-Oct	7	24	33	Calm	0
Thursday	17-Oct	7	25	N/A	Calm	0
Friday	18-Oct	14	20.7	94	N 4	14.8
Saturday	19-Oct	13.3	24	41	Calm	18.6
Sunday	20-Oct	5.5	26	52	SE 17	0
Monday	21-Oct	5	26	59	N/A	0
Tuesday	22-Oct	7.5	26	35	Calm	0
Wednesday	23-Oct	11	21	63	Calm	0
Thursday	24-Oct	4	20	46	Calm	0.4
Friday	25-Oct	0	18.5	43	Calm	0
Saturday	26-Oct	-0.1	20.4	33	SW 6	0
Sunday	27-Oct	4.5	23.5	44	Calm	0
Monday	28-Oct	10.5	25	43	Calm	0
Tuesday	29-Oct	4.5	25	31	N/A	0
Wednesday	30-Oct	5.3	25.5	43	Calm	0
Thursday	31-Oct	6.5	N/A	54	Calm	0

Tumbarumba - Station number 072043						
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Cabramurra Station 72161 (38.6km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h)	Daily rainfall (mm)
Friday	1-Nov	N/A	23.9	61	N/A	0
Saturday	2-Nov	4.4	24.3	52	NW 6	0
Sunday	3-Nov	12.9	30.1	80	NNW 24	0
Saturday	23-Nov	12.3	32.8	33	N 9	0
Sunday	24-Nov	15.2	30.5	48	N 9	0
Monday	25-Nov	18	33	44	Calm	0
Tuesday	26-Nov	19	27.3	54	W 6	0.2
Wednesday	27-Nov	19	21.9	70	Calm	1.8
Thursday	28-Nov	17.7	30	54	NE 6	18.6
Friday	29-Nov	14.7	28	57	Calm	0
Saturday	30-Nov	15.5	20	65	Calm	58
Sunday	1-Dec	14	25.5	63	Calm	31.2
Monday	2-Dec	10	30	54	Calm	0.6
Tuesday	3-Dec	17	25.5	78	N 37	11.8
Wednesday	4-Dec	18	30.5	N/A	Calm	16
Thursday	5-Dec	17.5	31	33	N 7	0
Friday	6-Dec	17	33.1	57	Calm	0
Saturday	7-Dec	16.8	28.7	69	N 9	21.8
Sunday	8-Dec	15.9	26	63	W 6	0.2
Monday	9-Dec	7.5	23	41	N 4	0
Tuesday	10-Dec	7	26.5	48	N/A	0
Wednesday	11-Dec	9	26	44	N 15	0
Thursday	12-Dec	8	29	39	Calm	0
Friday	13-Dec					
Saturday	14-Dec					
Sunday	15-Dec					
Monday	16-Dec					
Tuesday	17-Dec					
Wednesday	18-Dec					

		Tumbarumba - Station number 072043				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Cabramurra Station 72161 (38.6km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h)	Daily rainfall (mm)
Thursday	19-Dec					
Friday	20-Dec					
Saturday	21-Dec					
Sunday	22-Dec					
Monday	23-Dec					
Tuesday	24-Dec					
Wednesday	25-Dec					
Thursday	26-Dec					
Friday	27-Dec					
Saturday	28-Dec					
Sunday	29-Dec					
Monday	30-Dec					
Tuesday	31-Dec					
Wednesday	1-Jan					
Thursday	2-Jan					
Friday	3-Jan					
Saturday	4-Jan					
Sunday	5-Jan					
Monday	6-Jan					
Tuesday	7-Jan					
Wednesday	8-Jan					
Thursday	9-Jan					
Friday	10-Jan					
Saturday	11-Jan					
Sunday	12-Jan					
Monday	13-Jan					
Friday	24-Jan	13.5			15	0.8
Tuesday	28-Jan					
Wednesday	29-Jan					

Tumbarumba - Station number 072043						
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Cabramurra Station 72161 (38.6km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h)	Daily rainfall (mm)
Thursday	30-Jan					
Friday	31-Jan					
Saturday	1-Feb					
Sunday	2-Feb					
Monday	3-Feb					
Tuesday	4-Feb					
Wednesday	5-Feb					
Thursday	6-Feb					
Friday	7-Feb	18.5	34.2	69	N 6	0
Saturday	8-Feb	17	28	54	Calm	12.6
Sunday	9-Feb	15.4	30.5	74	Calm	0.2
Monday	10-Feb	14.6	29	65	N/A	17.8
Tuesday	11-Feb	10.5	29	54	Calm	7.4
Wednesday	12-Feb	13.5	32	39	Calm	0
Thursday	13-Feb	14.5	31	56	N/A	0
Friday	14-Feb	18	21.7	61	N 19	3.8
Saturday	15-Feb	9.3	19.9	72	NE 17	27.4
Sunday	16-Feb	3.8	20.1	41	SE 17	0
Monday	17-Feb	4.6	25	44	Calm	0
Tuesday	18-Feb	8.5	26.5	41	N/A	0
Wednesday	19-Feb	6	26.9	46	W 6	0
Thursday	20-Feb	8.8	28	43	S 17	0
Friday	21-Feb	8.5	29.4	39	W 2	0
Saturday	22-Feb	11.4	N/A	31	Calm	0
Sunday	23-Feb	N/A	31	59	N/A	0
Monday	24-Feb	11.5	31	50	N 2	0.9
Tuesday	25-Feb	10	31	46	Calm	0
Wednesday	26-Feb	10.5	31	48	Calm	N/A
Thursday	27-Feb	14	34.5	46	Calm	0
Friday	28-Feb	14.5	31.5	52	N 4	0

		Tumbarumba - Station number 072043				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Cabramurra Station 72161 (38.6km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h)	Daily rainfall (mm)
Saturday	1-Mar					
Sunday	2-Mar					
Monday	3-Mar					
Tuesday	4-Mar					
Wednesday	5-Mar					
Thursday	6-Mar					
Friday	7-Mar					
Saturday	8-Mar					
Sunday	9-Mar					
Monday	10-Mar					
Monday	17-Mar					
Tuesday	18-Mar					
Wednesday	19-Mar					
Thursday	20-Mar					
Friday	21-Mar					

		Tumut				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Mount Ginini Station 70349 (55.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 73007 (47.7km away) BOM data as its the closest with data)	Daily rainfall (mm)
Monday	19-Aug					
Tuesday	20-Aug					
Wednesday	21-Aug					
Thursday	22-Aug					
Friday	23-Aug					
Saturday	24-Aug					
Sunday	25-Aug					
Monday	26-Aug					
Tuesday	27-Aug					
Wednesday	28-Aug					
Thursday	29-Aug					
Friday	30-Aug					
Saturday	31-Aug					
Sunday	1-Sep					
Monday	2-Sep					
Tuesday	3-Sep					
Wednesday	4-Sep					
Thursday	5-Sep					
Friday	6-Sep					
Saturday	7-Sep					
Sunday	8-Sep					
Monday	9-Sep	5.2	16.7	94	ENE 9	0
Tuesday	10-Sep	2.2	19.9	41	Calm	0
Wednesday	11-Sep	1.8	19.8	41	N/A	0
Thursday	12-Sep	7.4	17.9	35	Calm	3
Friday	13-Sep	2.1	17.6	37	Calm	3.2
Saturday	14-Sep	0.4	16.8	56	Calm	0
Sunday	15-Sep	-1.1	15	57	Calm	0
Monday	16-Sep	-3.6	15.9	43	Calm	0
Tuesday	17-Sep	0.1	17.7	39	Calm	0

		Tumut				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Mount Ginini Station 70349 (55.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 73007 (47.7km away) BOM data as its the closest with data)	Daily rainfall (mm)
Wednesday	18-Sep	0.2	19.4	76	S 52	0
Thursday	19-Sep	3	16.7	91	Calm	0
Friday	20-Sep	0.8	15.4	87	Calm	0.4
Saturday	21-Sep	7.5	16.3	87	SSE 28	0.6
Sunday	22-Sep	7.8	17.9	61	N/A	0.4
Monday	23-Sep	2.8	21.8	56	N/A	0
Tuesday	24-Sep	4	25.1	50	Calm	0
Wednesday	25-Sep	10.5	16.5	87	Calm	5.8
Thursday	26-Sep					
Friday	27-Sep					
Saturday	28-Sep					
Monday	14-Oct					
Tuesday	15-Oct					
Wednesday	16-Oct	9.5	23.2	20	Calm	0
Thursday	17-Oct	6.7	26.2	30	Calm	0
Friday	18-Oct	13	22.2	78	Calm	5.4
Saturday	19-Oct	13.4	24.7	44	Calm	29.6
Sunday	20-Oct	7.1	26.6	46	Calm	0.2
Monday	21-Oct	8.2	25.9	31	N/A	0
Tuesday	22-Oct					
Wednesday	23-Oct					
Thursday	24-Oct					
Friday	25-Oct					
Saturday	26-Oct					
Sunday	27-Oct					
Monday	28-Oct					
Tuesday	29-Oct					
Wednesday	30-Oct					
Thursday	31-Oct					

		Tumut				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Mount Ginini Station 70349 (55.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 73007 (47.7km away) BOM data as its the closest with data)	Daily rainfall (mm)
Friday	1-Nov					
Saturday	2-Nov					
Sunday	3-Nov					
Saturday	23-Nov	13.2	33.9	31	Calm	0
Sunday	24-Nov	15.2	33.9	35	N/A	0
Monday	25-Nov	17.8	34.8	48	Calm	0
Tuesday	26-Nov	19.1	30	46	Calm	0
Wednesday	27-Nov	19	24.6	65	Calm	0.4
Thursday	28-Nov	18.9	31.1	54	Calm	21.8
Friday	29-Nov	17.3	26.6	50	Calm	0
Saturday	30-Nov	17.5	21.4	59	Calm	22
Sunday	1-Dec	16.2	27	54	Calm	54.2
Monday	2-Dec	11.6	31.2	67	Calm	11.6
Tuesday	3-Dec	17.2	26.2	74	Calm	1.8
Wednesday	4-Dec	18.3	31.7	33	Calm	60.4
Thursday	5-Dec					
Friday	6-Dec					
Saturday	7-Dec					
Sunday	8-Dec					
Monday	9-Dec					
Tuesday	10-Dec					
Wednesday	11-Dec					
Thursday	12-Dec					
Friday	13-Dec					
Saturday	14-Dec					
Sunday	15-Dec					
Monday	16-Dec					
Tuesday	17-Dec					
Wednesday	18-Dec					

		Tumut				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Mount Ginini Station 70349 (55.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 73007 (47.7km away) BOM data as its the closest with data)	Daily rainfall (mm)
Thursday	19-Dec					
Friday	20-Dec					
Saturday	21-Dec					
Sunday	22-Dec					
Monday	23-Dec					
Tuesday	24-Dec					
Wednesday	25-Dec					
Thursday	26-Dec					
Friday	27-Dec					
Saturday	28-Dec					
Sunday	29-Dec					
Monday	30-Dec					
Tuesday	31-Dec					
Wednesday	1-Jan					
Thursday	2-Jan					
Friday	3-Jan					
Saturday	4-Jan					
Sunday	5-Jan					
Monday	6-Jan					
Tuesday	7-Jan					
Wednesday	8-Jan					
Thursday	9-Jan					
Friday	10-Jan					
Saturday	11-Jan					
Sunday	12-Jan					
Monday	13-Jan					
Friday	24-Jan					
Tuesday	28-Jan	20.7	36.4	63	Calm	0
Wednesday	29-Jan	15.2	31.8	33	Calm	0

Tumut						
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Mount Ginini Station 70349 (55.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 73007 (47.7km away) BOM data as its the closest with data)	Daily rainfall (mm)
Thursday	30-Jan	14.5	32.4	28	Calm	0
Friday	31-Jan	15.3	32.6	26	N/A	0
Saturday	1-Feb	15.5	34.7	33	N/A	0
Sunday	2-Feb					
Monday	3-Feb					
Tuesday	4-Feb					
Wednesday	5-Feb					
Thursday	6-Feb					
Friday	7-Feb					
Saturday	8-Feb					
Sunday	9-Feb					
Monday	10-Feb					
Tuesday	11-Feb					
Wednesday	12-Feb					
Thursday	13-Feb					
Friday	14-Feb					
Saturday	15-Feb					
Sunday	16-Feb					
Monday	17-Feb	6.6	25.5	28	WNW 22	0
Tuesday	18-Feb	8.7	27.4	33	Calm	0
Wednesday	19-Feb	10.3	27.9	31	Calm	0
Thursday	20-Feb	11.9	27.8	26	Calm	0
Friday	21-Feb	11.2	29.7	28	N/A	0
Saturday	22-Feb	14.1	31.4	26	N/A	0
Sunday	23-Feb	16.6	30.3	54	N/A	0
Monday	24-Feb	15.7	31.8	48	Calm	1.6
Tuesday	25-Feb	14.1	30.3	28	Calm	0
Wednesday	26-Feb	15.8	32.9	37	Calm	0
Thursday	27-Feb	15.6	36	35	Calm	0
Friday	28-Feb	14.8	33.1	56	Calm	0

		Tumut				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Mount Ginini Station 70349 (55.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 73007 (47.7km away) BOM data as its the closest with data)	Daily rainfall (mm)
Saturday	1-Mar					
Sunday	2-Mar					
Monday	3-Mar					
Tuesday	4-Mar					
Wednesday	5-Mar					
Thursday	6-Mar					
Friday	7-Mar					
Saturday	8-Mar					
Sunday	9-Mar					
Monday	10-Mar					
Monday	17-Mar					
Tuesday	18-Mar					
Wednesday	19-Mar					
Thursday	20-Mar					
Friday	21-Mar					

		Wagga Wagga - Station number: 072150			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h)	Daily rainfall (mm)
Monday	19-Aug				
Tuesday	20-Aug				
Wednesday	21-Aug				
Thursday	22-Aug				
Friday	23-Aug				
Saturday	24-Aug				
Sunday	25-Aug				
Monday	26-Aug				
Tuesday	27-Aug				
Wednesday	28-Aug				
Thursday	29-Aug				
Friday	30-Aug				
Saturday	31-Aug				
Sunday	1-Sep				
Monday	2-Sep				
Tuesday	3-Sep				
Wednesday	4-Sep				
Thursday	5-Sep				
Friday	6-Sep				
Saturday	7-Sep				
Sunday	8-Sep				
Monday	9-Sep				
Tuesday	10-Sep				
Wednesday	11-Sep				
Thursday	12-Sep				
Friday	13-Sep				
Saturday	14-Sep				
Sunday	15-Sep				
Monday	16-Sep				
Tuesday	17-Sep				

		Wagga Wagga - Station number: 072150			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h)	Daily rainfall (mm)
Wednesday	18-Sep				
Thursday	19-Sep				
Friday	20-Sep				
Saturday	21-Sep				
Sunday	22-Sep				
Monday	23-Sep				
Tuesday	24-Sep				
Wednesday	25-Sep				
Thursday	26-Sep				
Friday	27-Sep				
Saturday	28-Sep				
Monday	14-Oct				
Tuesday	15-Oct				
Wednesday	16-Oct				
Thursday	17-Oct				
Friday	18-Oct				
Saturday	19-Oct				
Sunday	20-Oct				
Monday	21-Oct				
Tuesday	22-Oct				
Wednesday	23-Oct				
Thursday	24-Oct				
Friday	25-Oct				
Saturday	26-Oct				
Sunday	27-Oct				
Monday	28-Oct				
Tuesday	29-Oct				
Wednesday	30-Oct				
Thursday	31-Oct				

Wagga Wagga - Station number: 072150					
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h)	Daily rainfall (mm)
Friday	1-Nov				
Saturday	2-Nov				
Sunday	3-Nov				
Saturday	23-Nov				
Sunday	24-Nov				
Monday	25-Nov	19.8	36.1	50	0
Tuesday	26-Nov	21.8	31.2	41	0.2
Wednesday	27-Nov	21	26.4	41	4.6
Thursday	28-Nov	20.3	32	37	7.6
Friday	29-Nov	18.8	30.1	39	0
Saturday	30-Nov	19.1	25	35	24.6
Sunday	1-Dec	17.6	29.5	48	24.8
Monday	2-Dec	13.3	33.7	30	0
Tuesday	3-Dec	19.9	29.8	50	12
Wednesday	4-Dec	18.4	33	30	5.4
Thursday	5-Dec				
Friday	6-Dec				
Saturday	7-Dec				
Sunday	8-Dec				
Monday	9-Dec				
Tuesday	10-Dec				
Wednesday	11-Dec				
Thursday	12-Dec				
Friday	13-Dec				
Saturday	14-Dec				
Sunday	15-Dec				
Monday	16-Dec				
Tuesday	17-Dec				
Wednesday	18-Dec				

		Wagga Wagga - Station number: 072150			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h)	Daily rainfall (mm)
Thursday	19-Dec				
Friday	20-Dec				
Saturday	21-Dec				
Sunday	22-Dec				
Monday	23-Dec				
Tuesday	24-Dec				
Wednesday	25-Dec				
Thursday	26-Dec				
Friday	27-Dec				
Saturday	28-Dec				
Sunday	29-Dec				
Monday	30-Dec				
Tuesday	31-Dec				
Wednesday	1-Jan				
Thursday	2-Jan				
Friday	3-Jan				
Saturday	4-Jan				
Sunday	5-Jan				
Monday	6-Jan				
Tuesday	7-Jan				
Wednesday	8-Jan				
Thursday	9-Jan				
Friday	10-Jan				
Saturday	11-Jan				
Sunday	12-Jan				
Monday	13-Jan				
Friday	24-Jan				
Tuesday	28-Jan				
Wednesday	29-Jan				

		Wagga Wagga - Station number: 072150			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h)	Daily rainfall (mm)
Thursday	30-Jan				
Friday	31-Jan				
Saturday	1-Feb				
Sunday	2-Feb				
Monday	3-Feb				
Tuesday	4-Feb				
Wednesday	5-Feb				
Thursday	6-Feb				
Friday	7-Feb				
Saturday	8-Feb				
Sunday	9-Feb				
Monday	10-Feb				
Tuesday	11-Feb				
Wednesday	12-Feb				
Thursday	13-Feb				
Friday	14-Feb				
Saturday	15-Feb				
Sunday	16-Feb				
Monday	17-Feb				
Tuesday	18-Feb				
Wednesday	19-Feb				
Thursday	20-Feb				
Friday	21-Feb				
Saturday	22-Feb				
Sunday	23-Feb				
Monday	24-Feb				
Tuesday	25-Feb				
Wednesday	26-Feb				
Thursday	27-Feb				
Friday	28-Feb				

Wagga Wagga - Station number: 072150					
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h)	Daily rainfall (mm)
Saturday	1-Mar				
Sunday	2-Mar				
Monday	3-Mar				
Tuesday	4-Mar				
Wednesday	5-Mar				
Thursday	6-Mar				
Friday	7-Mar				
Saturday	8-Mar				
Sunday	9-Mar				
Monday	10-Mar				
Monday	17-Mar				
Tuesday	18-Mar				
Wednesday	19-Mar				
Thursday	20-Mar				
Friday	21-Mar				

Yass						
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Canberra Station 70351 (57.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burrinjuck Dam Station 703007 (34.1km away) BOM data as its the closest with that data)	Daily rainfall (mm)
Monday	19-Aug	3.8	15.9	24	N/A	0
Tuesday	20-Aug	2.9	18.5	41	N/A	0.2
Wednesday	21-Aug	6.7	15.5	57	N/A	0
Thursday	22-Aug	8.1	16.5	43	N/A	0
Friday	23-Aug	0.2	17.5	31	N/A	0
Saturday	24-Aug	5.1	20.9	57	N/A	1
Sunday	25-Aug	10.5	18.2	61	N/A	0
Monday	26-Aug	7.2	14.6	69	Calm	4
Tuesday	27-Aug	3.1	17.3	52	Calm	0.4
Wednesday	28-Aug	7.1	17.3	67	Calm	0
Thursday	29-Aug					
Friday	30-Aug					
Saturday	31-Aug					
Sunday	1-Sep					
Monday	2-Sep	11	15	85	N/A	0
Tuesday	3-Sep					
Wednesday	4-Sep					
Thursday	5-Sep					
Friday	6-Sep					
Saturday	7-Sep					
Sunday	8-Sep					
Monday	9-Sep					
Tuesday	10-Sep					
Wednesday	11-Sep					
Thursday	12-Sep					
Friday	13-Sep					
Saturday	14-Sep					
Sunday	15-Sep					
Monday	16-Sep					
Tuesday	17-Sep					

		Yass				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Canberra Station 70351 (57.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burringjuck Dam Station 703007 (34.1km away) BOM data as its the closest with that data)	Daily rainfall (mm)
Wednesday	18-Sep					
Thursday	19-Sep					
Friday	20-Sep					
Saturday	21-Sep					
Sunday	22-Sep					
Monday	23-Sep	2	21.7	48	N/A	0
Tuesday	24-Sep	3.4	25	52	Calm	0
Wednesday	25-Sep	10.5	18.9	65	Calm	1.2
Thursday	26-Sep	5.6	11.3	48	ESE 46	39.4
Friday	27-Sep	2.5	15.9	46	Calm	0.8
Saturday	28-Sep					
Monday	14-Oct					
Tuesday	15-Oct					
Wednesday	16-Oct					
Thursday	17-Oct					
Friday	18-Oct					
Saturday	19-Oct					
Sunday	20-Oct					
Monday	21-Oct					
Tuesday	22-Oct					
Wednesday	23-Oct					
Thursday	24-Oct					
Friday	25-Oct					
Saturday	26-Oct					
Sunday	27-Oct					
Monday	28-Oct					
Tuesday	29-Oct					
Wednesday	30-Oct					
Thursday	31-Oct					

Yass						
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Canberra Station 70351 (57.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burrinjuck Dam Station 703007 (34.1km away) BOM data as its the closest with that data)	Daily rainfall (mm)
Friday	1-Nov					
Saturday	2-Nov					
Sunday	3-Nov					
Saturday	23-Nov					
Sunday	24-Nov					
Monday	25-Nov	16	34.6	50	Calm	0
Tuesday	26-Nov	16.8	32.2	54	Calm	0
Wednesday	27-Nov	17.9	27	61	Calm	0.2
Thursday	28-Nov	17.6	30.3	52	Calm	3.2
Friday	29-Nov	17.6	22.7	33	Calm	6.8
Saturday	30-Nov	17.5	20.2	37	Calm	23.2
Sunday	1-Dec	16.1	25.6	43	Calm	46.8
Monday	2-Dec	12.1	31.2	56	Calm	1.8
Tuesday	3-Dec	17.2	24.1	56	Calm	0.2
Wednesday	4-Dec	18	30.8	43	Calm	2.4
Thursday	5-Dec					
Friday	6-Dec					
Saturday	7-Dec					
Sunday	8-Dec					
Monday	9-Dec					
Tuesday	10-Dec					
Wednesday	11-Dec					
Thursday	12-Dec					
Friday	13-Dec					
Saturday	14-Dec					
Sunday	15-Dec					
Monday	16-Dec					
Tuesday	17-Dec					
Wednesday	18-Dec					

		Yass				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Canberra Station 70351 (57.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burrinjuck Dam Station 703007 (34.1km away) BOM data as its the closest with that data)	Daily rainfall (mm)
Thursday	19-Dec					
Friday	20-Dec					
Saturday	21-Dec					
Sunday	22-Dec					
Monday	23-Dec					
Tuesday	24-Dec					
Wednesday	25-Dec					
Thursday	26-Dec					
Friday	27-Dec					
Saturday	28-Dec					
Sunday	29-Dec					
Monday	30-Dec					
Tuesday	31-Dec					
Wednesday	1-Jan					
Thursday	2-Jan					
Friday	3-Jan					
Saturday	4-Jan					
Sunday	5-Jan					
Monday	6-Jan					
Tuesday	7-Jan					
Wednesday	8-Jan					
Thursday	9-Jan					
Friday	10-Jan					
Saturday	11-Jan					
Sunday	12-Jan					
Monday	13-Jan					
Friday	24-Jan					
Tuesday	28-Jan					
Wednesday	29-Jan					

		Yass				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Canberra Station 70351 (57.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burrinjuck Dam Station 703007 (34.1km away) BOM data as its the closest with that data)	Daily rainfall (mm)
Thursday	30-Jan					
Friday	31-Jan					
Saturday	1-Feb					
Sunday	2-Feb					
Monday	3-Feb					
Tuesday	4-Feb					
Wednesday	5-Feb					
Thursday	6-Feb					
Friday	7-Feb					
Saturday	8-Feb					
Sunday	9-Feb					
Monday	10-Feb					
Tuesday	11-Feb					
Wednesday	12-Feb					
Thursday	13-Feb					
Friday	14-Feb					
Saturday	15-Feb					
Sunday	16-Feb					
Monday	17-Feb	6.3	24.2	31	WNW 22	0
Tuesday	18-Feb	7.1	26.2	33	Calm	0
Wednesday	19-Feb	10.1	27.8	44	Calm	0
Thursday	20-Feb	13.2	25.2	37	Calm	0
Friday	21-Feb	10.7	28.1	N/A	N/A	0
Saturday	22-Feb	14.4	30.2	28	N/A	0
Sunday	23-Feb	13.9	28.9	41	N/A	0
Monday	24-Feb	15.8	32.5	46	Calm	0
Tuesday	25-Feb	16	26.6	35	Calm	0
Wednesday	26-Feb	15.9	32.8	33	Calm	0
Thursday	27-Feb					
Friday	28-Feb					

		Yass				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used Canberra Station 70351 (57.8km away) BOM data as its the closest with that data)	9am Wind Dir/Speed (km/h) (Used Burrinjuck Dam Station 703007 (34.1km away) BOM data as its the closest with that data)	Daily rainfall (mm)
Saturday	1-Mar					
Sunday	2-Mar					
Monday	3-Mar					
Tuesday	4-Mar					
Wednesday	5-Mar					
Thursday	6-Mar					
Friday	7-Mar					
Saturday	8-Mar					
Sunday	9-Mar					
Monday	10-Mar					
Monday	17-Mar	9	20	50	Calm	0
Tuesday	18-Mar	9	29	30	Calm	0
Wednesday	19-Mar	12	33	35	Calm	0
Thursday	20-Mar					
Friday	21-Mar					

		Goulburn/Crookwell			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (<i>Used Goulburn Station 70330 (45.3km away) BOM data as its the closest with that data</i>)	Daily rainfall (mm)
Monday	19-Aug				
Tuesday	20-Aug				
Wednesday	21-Aug				
Thursday	22-Aug				
Friday	23-Aug				
Saturday	24-Aug				
Sunday	25-Aug				
Monday	26-Aug				
Tuesday	27-Aug				
Wednesday	28-Aug				
Thursday	29-Aug				
Friday	30-Aug				
Saturday	31-Aug				
Sunday	1-Sep				
Monday	2-Sep				
Tuesday	3-Sep				
Wednesday	4-Sep				
Thursday	5-Sep				
Friday	6-Sep				
Saturday	7-Sep				
Sunday	8-Sep				
Monday	9-Sep				
Tuesday	10-Sep				
Wednesday	11-Sep				
Thursday	12-Sep				
Friday	13-Sep				
Saturday	14-Sep				
Sunday	15-Sep				
Monday	16-Sep				
Tuesday	17-Sep				

		Goulburn/Crookwell			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (<i>Used Goulburn Station 70330 (45.3km away) BOM data as its the closest with that data</i>)	Daily rainfall (mm)
Wednesday	18-Sep				
Thursday	19-Sep				
Friday	20-Sep				
Saturday	21-Sep				
Sunday	22-Sep				
Monday	23-Sep				
Tuesday	24-Sep				
Wednesday	25-Sep				
Thursday	26-Sep				
Friday	27-Sep				
Saturday	28-Sep				
Monday	14-Oct				
Tuesday	15-Oct				
Wednesday	16-Oct				
Thursday	17-Oct				
Friday	18-Oct				
Saturday	19-Oct				
Sunday	20-Oct				
Monday	21-Oct				
Tuesday	22-Oct				
Wednesday	23-Oct				
Thursday	24-Oct				
Friday	25-Oct				
Saturday	26-Oct				
Sunday	27-Oct				
Monday	28-Oct				
Tuesday	29-Oct				
Wednesday	30-Oct				
Thursday	31-Oct				

		Goulburn/Crookwell			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (<i>Used Goulburn Station 70330 (45.3km away) BOM data as its the closest with that data</i>)	Daily rainfall (mm)
Friday	1-Nov				
Saturday	2-Nov				
Sunday	3-Nov				
Saturday	23-Nov	12.6	30.3	39	0
Sunday	24-Nov	13.7	31.7	39	0
Monday	25-Nov	13.2	31.5	41	0
Tuesday	26-Nov	15	30.4	52	0
Wednesday	27-Nov	16.2	27	63	0
Thursday	28-Nov	15.3	28.1	41	1.8
Friday	29-Nov	14.8	18.9	35	0
Saturday	30-Nov	15.4	18.2	39	31.6
Sunday	1-Dec				
Monday	2-Dec				
Tuesday	3-Dec				
Wednesday	4-Dec				
Thursday	5-Dec				
Friday	6-Dec				
Saturday	7-Dec				
Sunday	8-Dec				
Monday	9-Dec				
Tuesday	10-Dec				
Wednesday	11-Dec				
Thursday	12-Dec				
Friday	13-Dec				
Saturday	14-Dec				
Sunday	15-Dec				
Monday	16-Dec				
Tuesday	17-Dec				
Wednesday	18-Dec				

		Goulburn/Crookwell			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (<i>Used Goulburn Station 70330 (45.3km away) BOM data as its the closest with that data</i>)	Daily rainfall (mm)
Thursday	19-Dec				
Friday	20-Dec				
Saturday	21-Dec				
Sunday	22-Dec				
Monday	23-Dec				
Tuesday	24-Dec				
Wednesday	25-Dec				
Thursday	26-Dec				
Friday	27-Dec				
Saturday	28-Dec				
Sunday	29-Dec				
Monday	30-Dec				
Tuesday	31-Dec				
Wednesday	1-Jan				
Thursday	2-Jan				
Friday	3-Jan				
Saturday	4-Jan				
Sunday	5-Jan				
Monday	6-Jan				
Tuesday	7-Jan				
Wednesday	8-Jan				
Thursday	9-Jan				
Friday	10-Jan				
Saturday	11-Jan				
Sunday	12-Jan				
Monday	13-Jan				
Friday	24-Jan				
Tuesday	28-Jan				
Wednesday	29-Jan				

		Goulburn/Crookwell			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (<i>Used Goulburn Station 70330 (45.3km away) BOM data as its the closest with that data</i>)	Daily rainfall (mm)
Thursday	30-Jan				
Friday	31-Jan				
Saturday	1-Feb				
Sunday	2-Feb				
Monday	3-Feb				
Tuesday	4-Feb				
Wednesday	5-Feb				
Thursday	6-Feb	14.4	29.7	30	14.2
Friday	7-Feb	13.6	31.9	61	0
Saturday	8-Feb	16.3	27.8	39	0.3
Sunday	9-Feb	13.1	25.2	69	5.5
Monday	10-Feb	13.6	20.9	44	9.3
Tuesday	11-Feb	11.9	24.5	43	3
Wednesday	12-Feb	12.4	24.9	35	0
Thursday	13-Feb	15	27.1	48	0
Friday	14-Feb	16.7	23.8	57	11
Saturday	15-Feb	10.8	19.5	59	17
Sunday	16-Feb	4.2	17.3	39	0
Monday	17-Feb	3.8	20.3	22	0
Tuesday	18-Feb	5.6	23.7	37	0
Wednesday	19-Feb	9.2	24.6	35	0
Thursday	20-Feb	11.2	19.6	31	0
Friday	21-Feb	9.2	24.5	37	0
Saturday	22-Feb	11.2	19.6	30	0
Sunday	23-Feb	9.2	24.5	46	0
Monday	24-Feb	12.5	26.6	50	0
Tuesday	25-Feb	11.2	19.6	26	0
Wednesday	26-Feb	9.2	24.5	33	0
Thursday	27-Feb	12.5	26.6	39	0
Friday	28-Feb	12.1	26.4	61	0

		Goulburn/Crookwell			
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (<i>Used Goulburn Station 70330 (45.3km away) BOM data as its the closest with that data</i>)	Daily rainfall (mm)
Saturday	1-Mar				
Sunday	2-Mar				
Monday	3-Mar				
Tuesday	4-Mar				
Wednesday	5-Mar				
Thursday	6-Mar				
Friday	7-Mar				
Saturday	8-Mar				
Sunday	9-Mar				
Monday	10-Mar				
Monday	17-Mar				
Tuesday	18-Mar				
Wednesday	19-Mar				
Thursday	20-Mar				
Friday	21-Mar				

		Taralga				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used High Range Station 68262 (41.5km away) BOM data as its the closest with that data)	max wind gust (km/h) (Included Goulburn Station 70330 (45.9km away) BOM data as I'm not sure the differences in elevation)	Daily rainfall (mm)
Monday	19-Aug	5.4	13.2	28	20	0.2
Tuesday	20-Aug	4.7	16.8	30	44	0
Wednesday	21-Aug	9	15.4	52	65	0
Thursday	22-Aug	7.7	14.5	46	43	0
Friday	23-Aug	1.2	16.6	41	30	0
Saturday	24-Aug	6	19.5	72	80	0.2
Sunday	25-Aug	10.5	17.3	74	78	0
Monday	26-Aug	5.9	13.7	85	67	5.5
Tuesday	27-Aug	3.4	16.3	48	46	0
Wednesday	28-Aug	8.3	16.8	83	72	0
Thursday	29-Aug	5	15.7	48	46	0
Friday	30-Aug	6.5	18.6	83	78	0
Saturday	31-Aug	6.8	13.8	83	81	0
Sunday	1-Sep					
Monday	2-Sep	12.5	14.4	107	96	0
Tuesday	3-Sep	1.8	13.7	72	50	0
Wednesday	4-Sep					
Thursday	5-Sep					
Friday	6-Sep					
Saturday	7-Sep					
Sunday	8-Sep					
Monday	9-Sep					
Tuesday	10-Sep					
Wednesday	11-Sep					
Thursday	12-Sep					
Friday	13-Sep					
Saturday	14-Sep					
Sunday	15-Sep					
Monday	16-Sep					
Tuesday	17-Sep					

		Taralga				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used High Range Station 68262 (41.5km away) BOM data as its the closest with that data)	max wind gust (km/h) (Included Goulburn Station 70330 (45.9km away) BOM data as I'm not sure the differences in elevation)	Daily rainfall (mm)
Wednesday	18-Sep					
Thursday	19-Sep					
Friday	20-Sep					
Saturday	21-Sep					
Sunday	22-Sep					
Monday	23-Sep					
Tuesday	24-Sep					
Wednesday	25-Sep					
Thursday	26-Sep					
Friday	27-Sep					
Saturday	28-Sep					
Monday	14-Oct	7.1	21.1	50	46	0
Tuesday	15-Oct	8.2	11.8	35	35	15.6
Wednesday	16-Oct	5.2	17	24	24	0.2
Thursday	17-Oct					
Friday	18-Oct					
Saturday	19-Oct					
Sunday	20-Oct					
Monday	21-Oct					
Tuesday	22-Oct					
Wednesday	23-Oct					
Thursday	24-Oct					
Friday	25-Oct					
Saturday	26-Oct					
Sunday	27-Oct					
Monday	28-Oct					
Tuesday	29-Oct					
Wednesday	30-Oct					
Thursday	31-Oct					

		Taralga				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used High Range Station 68262 (41.5km away) BOM data as its the closest with that data)	max wind gust (km/h) (Included Goulburn Station 70330 (45.9km away) BOM data as I'm not sure the differences in elevation)	Daily rainfall (mm)
Friday	1-Nov					
Saturday	2-Nov					
Sunday	3-Nov					
Saturday	23-Nov					
Sunday	24-Nov					
Monday	25-Nov	13.7	28.8	31	41	0
Tuesday	26-Nov	15.8	31	35	52	0
Wednesday	27-Nov	20.4	29.5	48	63	0
Thursday	28-Nov	15.7	28.3	44	41	0
Friday	29-Nov	14.6	18.6	37	35	8.2
Saturday	30-Nov	15.5	18.6	56	39	31
Sunday	1-Dec	14.2	23.6	70	61	0
Monday	2-Dec	12.6	29.4	43	56	0
Tuesday	3-Dec	17.6	22.7	35	37	0
Wednesday	4-Dec	16.7	26.4	35	39	0
Thursday	5-Dec	14.3	28.2	30	30	0
Friday	6-Dec	17.4	30.9	33	48	27
Saturday	7-Dec	18.1	26.2	102	56	10
Sunday	8-Dec	16.4	26.7	50	54	16
Monday	9-Dec	12.2	23.6	33	41	0
Tuesday	10-Dec	8.8	25.1	37	46	0
Wednesday	11-Dec	12.3	25.1	37	44	0
Thursday	12-Dec	8.9	27.4	31	33	0
Friday	13-Dec	11.5	29.8	35	43	0
Saturday	14-Dec	16.6	31.8	33	52	0.2
Sunday	15-Dec	17.2	33.2	37	35	0
Monday	16-Dec	15.3	34.2	37	28	0
Tuesday	17-Dec	15.3	33.5	50	57	0
Wednesday	18-Dec	12.8	22.4	44	43	0

		Taralga				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used High Range Station 68262 (41.5km away) BOM data as its the closest with that data)	max wind gust (km/h) (Included Goulburn Station 70330 (45.9km away) BOM data as I'm not sure the differences in elevation)	Daily rainfall (mm)
Thursday	19-Dec	7.4	22.3	31	41	0
Friday	20-Dec	6.5	28.6	31	31	0
Saturday	21-Dec	8.6	31.8	50	57	0
Sunday	22-Dec	13.4	29.5	33	50	0
Monday	23-Dec	6	20.8	76	69	0
Tuesday	24-Dec	2.2	25.6	43	43	0
Wednesday	25-Dec	5.3	30	37	44	0
Thursday	26-Dec	8.6	33.4	43	50	0
Friday	27-Dec	18.7	29	50	67	0.2
Saturday	28-Dec	11.6	25.9	44	52	0
Sunday	29-Dec	5.3	28.2	39	46	0
Monday	30-Dec	14.4	29	37	31	0
Tuesday	31-Dec	13.9	27.9	41	69	0
Wednesday	1-Jan	15.1	31.3	41	48	3
Thursday	2-Jan	13.6	18.1	NA	37	0
Friday	3-Jan	12.4	28.5	39	37	0
Saturday	4-Jan	11	33	37	43	0
Sunday	5-Jan	12.4	34.9	50	63	0
Monday	6-Jan	11.4	34.5	54	52	0
Tuesday	7-Jan	13.9	17.6	48	52	7.4
Wednesday	8-Jan	11.5	18.5	43	44	0.2
Thursday	9-Jan	12.4	23.4	35	31	0
Friday	10-Jan	15.6	25.5	50	41	0
Saturday	11-Jan	16	24.2	NA	39	9.4
Sunday	12-Jan	13.7	27.5	33	41	0.2
Monday	13-Jan	13.3	31.9	35	39	4.2
Friday	24-Jan					
Tuesday	28-Jan					
Wednesday	29-Jan					

		Taralga				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used High Range Station 68262 (41.5km away) BOM data as its the closest with that data)	max wind gust (km/h) (Included Goulburn Station 70330 (45.9km away) BOM data as I'm not sure the differences in elevation)	Daily rainfall (mm)
Thursday	30-Jan					
Friday	31-Jan					
Saturday	1-Feb	13.8	24.3	35	43	0.4
Sunday	2-Feb	26.7	14.3	39	35	0
Monday	3-Feb	11.2	28.2	44	39	0
Tuesday	4-Feb	14.5	32	37	39	0
Wednesday	5-Feb	17.4	29.2	50	63	0
Thursday	6-Feb	14.7	28.9	31	30	8
Friday	7-Feb	13.9	31.4	33	61	0
Saturday	8-Feb	16.4	27.7	54	39	0
Sunday	9-Feb	13.6	24.6	24	69	0
Monday	10-Feb	14.3	20.1	46	44	64
Tuesday	11-Feb	12.3	24.4	44	43	0
Wednesday	12-Feb	12.7	24.4	41	35	2
Thursday	13-Feb	15.4	26.4	41	48	0
Friday	14-Feb	16.9	23.8	44	57	41
Saturday	15-Feb	11.5	20.3	57	59	0
Sunday	16-Feb	5	17.6	43	39	0
Monday	17-Feb	4.1	19.8	31	22	0
Tuesday	18-Feb	6	23.8	31	37	0
Wednesday	19-Feb	10.1	23.9	33	35	0
Thursday	20-Feb	11.7	17.7	30	31	0
Friday	21-Feb	9.8	23.7	37	37	0.2
Saturday	22-Feb	13.1	25.8	39	30	0
Sunday	23-Feb	12.4	26.6	35	46	0
Monday	24-Feb	15.5	31.2	33	50	0
Tuesday	25-Feb	14.2	18.2	N/A	26	1.4
Wednesday	26-Feb	13.6	28.9	41	33	1.2
Thursday	27-Feb	15.5	29.5	35	39	0
Friday	28-Feb	15.6	30.6	48	61	0

		Taralga				
Survey dates		Minimum temperature	Maximum temperature	max wind gust (km/h) (Used High Range Station 68262 (41.5km away) BOM data as its the closest with that data)	max wind gust (km/h) (Included Goulburn Station 70330 (45.9km away) BOM data as I'm not sure the differences in elevation)	Daily rainfall (mm)
Saturday	1-Mar	15.6	32.4	20	28	0.2
Sunday	2-Mar	16	32.1	26	33	0.2
Monday	3-Mar	14.7	21	39	31	0
Tuesday	4-Mar	13.4	23.2	56	52	0
Wednesday	5-Mar	11.5	25	43	19	0
Thursday	6-Mar	11.8	25.1	41	31	0
Friday	7-Mar	12.7	21.4	74	72	0
Saturday	8-Mar	12.5	23.3	67	67	0
Sunday	9-Mar	16	26.5	70	56	0
Monday	10-Mar	16	28	59	56	2.4
Monday	17-Mar					
Tuesday	18-Mar	1.7	23.1	48	44	0
Wednesday	19-Mar	11.9	24.9	37	41	0.2
Thursday	20-Mar	13.5	25.8	54	41	0
Friday	21-Mar					



Annex 5

Field personnel qualifications



Annex Table 5.1: Field personnel qualifications

Personnel name	Subconsultant	Project involvement	Years experience (approx.)	Qualifications
Thomas Burley	Ascent	Smoky Mouse surveys, Reptile surveys, Habitat mapping	7	BSc (Conservation Biology)
Hamish Dore	Ascent	Smoky Mouse surveys, Habitat mapping, Targeted flora, Targeted flora (threatened orchids)	3	BSc with Honours (Ecology)
Tom Pollard	Ascent	Targeted flora, Koala SATs, habitat mapping, vegetation validation	26	BSc (Botany) with Honours (Rainforest Ecology), PhD Vegetation Ecology
Courtney Bailey	Ascent	Targeted flora	5	BEnvSci (Coastal Management)
Edward Garlick Kelly	Ascent	Targeted flora, Bat roost field confirmation, Habitat mapping	5	Bachelor of Forest Management Science, Cert III Conservation & Land Management
Eyleen Pinna	Ascent	Targeted flora, Bat roost field confirmation, Habitat mapping	13	Bachelor of Forest Engineering, Diploma of Environmental Engineering
Kaelen Were	Ascent	Koala SAT surveys, Habitat mapping	3	Diploma of Conservation & Ecosystems Management
Byron Sinclair	Ascent	Koala SAT surveys, Habitat mapping	3	DipEnvSci
Richard Davison	Ascent	Targeted flora, Koala SAT surveys, Habitat mapping	3	BSc (Hons) Wildlife & Conservation Management (Wildlife & Conservation)
Angus Moncreiff	Ascent	Reptile surveys, Koala SAT surveys, Habitat mapping	1	Bachelor of Environmental /Marine Science and Management
Jeremy Benwell-clarke	Ascent	Koala SAT surveys, Habitat mapping, Habitat mapping	11	Bachelor of Biological Studies with Honours (Ecology, Environment & Evolution)
Matt Bailey	Bolwarra	Targeted flora (threatened orchids), Targeted flora	8	BEnvSci



Personnel name	Subconsultant	Project involvement	Years experience (approx.)	Qualifications
Michael Zavattaro	Conservation Leaders	Bird surveys, Koala drone surveys, Habitat mapping	15	BSc in Environmental Forensics
Chad Beranek	Conservation Leaders	Bird surveys, reptile surveys, Koala drone surveys	11	PhD Environmental Science
Shawn Scott	Conservation Leaders	Reptile surveys, Habitat mapping	12	BEnvSci, PhD candidate
Teagan Parker Kielniacz	Conservation Leaders	Reptile surveys, Habitat mapping	11	BA Philosophy with Masters (Research Biology), BSc Biodiversity & Conservation (Biology)
Brad Law	DPI	Koala Songmeter analysis	31	BSc, PhD
Lesley Peden	Ecology Consulting	Owl call-playback, Habitat mapping	21	BSc
Izak Schoon	EcoPlanning	Targeted flora, Targeted flora (threatened orchids), Threatened orchid reference population check	6	-
Courtney Whitton	EcoPlanning	Targeted flora, Targeted flora (threatened orchids), Threatened orchid reference population check	3	Cert III Conservation & Land Management (Horticulture)
Ben Brown	EcoPlanning	Vegetation validation, habitat mapping, Threatened orchid reference population check	8	BSc with Masters (Research)
Brian Towle	EcoPlanning	Targeted flora, Targeted flora (threatened orchids), Threatened orchid reference population check	20	BEnvSc
Robert Humphries	EcoPlanning	Targeted flora (threatened orchids), Threatened orchid reference population check	30	BAppSci with Masters



Personnel name	Subconsultant	Project involvement	Years experience (approx.)	Qualifications
Chantelle De Kock	LandEco	Owl call-playback, Habitat mapping	2	BEnvSc
Joseph Crane	LandEco	Owl call-playback, Habitat mapping	5	Bachelor of Environmental Management
Theo Kemp	LandEco	Owl call-playback, Targeted flora (threatened orchids), Targeted flora, Habitat mapping	2	BSc Biodiversity & Conservation
Serene White	LandEco	Owl call-playback, Habitat mapping	6	BSc (Zoology), BSc Natural Science with Masters (Koala Research)
Isaac Digby	LandEco	Owl call-playback, Habitat mapping	2	BSc Marine Biology
Nicholas Henson	LandEco	Owl call-playback, Habitat mapping	6	BEnvSc
Samuel Dreux	LandEco/Niche	Owl call-playback, Koala drone surveys, Targeted flora (threatened orchids), Habitat mapping, reporting	4	MZool (Zoology/Animal Biology)
Thea Kane	Niche	Project technical project manager, targeted flora, Targeted flora (threatened orchids), vegetation validation, threatened orchid reference population check, reporting, data QA	6	Bachelor of Environmental Management (Geography), BAM Accredited Assessor
Kath Huggins	Niche	Targeted flora (threatened orchids)	2	BA Ecology and Conservation
Carna Feldtmann	Niche	Targeted flora (threatened orchids), Targeted flora	10	BEnvSc
Ella Smyth	Niche	Targeted flora, Frog aural visual surveys, Habitat mapping	2	BSc Biodiversity & Conservation Biology
Stella Palmer	Niche	Targeted flora surveys, Targeted flora (threatened orchids)	2	BSc (Environmental Biology)



Personnel name	Subconsultant	Project involvement	Years experience (approx.)	Qualifications
Oscar Anderson	Niche	Camera deployment, reporting, camera trap analysis	2	BEnvSc
Jesse Paton	Niche	Camera deployment, reporting, camera trap analysis	1	BSc
Prue Bartlett	Niche	Koala SATs, habitat mapping, vegetation validation	20	BSc
Cara Parsons	Niche	Frog surveys, vegetation validation, habitat mapping, anabat analysis	6	PhD Urban Ecology, BSc (Hons I) (Wildlife Biology)
Harrison Binks	Niche	Camera deployment	4	BEnvSc (Spatial Information Science)
Dmitri Medvedko	Niche	Camera deployment	13	BSc (Molecular Biology)
Jesse Cass	Niche	Camera deployment	4	BSc (Zoology) with Masters (Environmental Science)
Alan Davies	Niche	Vegetation validation, habitat mapping, camera deployment	3	BSc with Honours (Environmental Science)
Chani Wheeler	Niche	Project technical director, reporting, species polygon development, data QA	17	BSc with Masters (Conservation Biology)
Suzy Naidoo	Niche	Species polygon development, spatial services	23	Bachelor of Horticulture, Diploma in GIS
Ishara Kotiah	Niche	Species polygon development, spatial services	38	Bachelor of Land Surveying
Jai Green-Barber	Niche	Reporting, data QA	13	BSc, PhD
Samuel Bodycomb	Phyto Ecological	Bird surveys, Habitat mapping	4	BSc
Georgeanna Story	Scats About	Scat identification	29	BSc, PhD



Personnel name	Subconsultant	Project involvement	Years experience (approx.)	Qualifications
Isaac Mammott	Sclerophyll	Vegetation validation, habitat mapping, targeted flora, targeted flora (threatened orchids)	35	BSc
Brad Gabriel	Sssafe	Frog aural visual surveys, Habitat mapping, Camera deployment	10+ years in consulting, 15 years in herpetology/ zoological experience	Bachelor of Environmental Science/ Management
Jade Clough	Sssafe	Bird surveys, Frog aural visual surveys, Camera deployment	6	BSc (Conservation Biology)
Danny Sullivan	Sssafe	Camera deployment	2	Cert III in Horticulture, Cert III in Conservation and Ecosystem Management
Jess Dahl	Sssafe	Koala SAT surveys, Camera deployment, Habitat mapping	4	Bachelor of Wildlife Conservation & Zoo Biology with Masters of Science (Wildlife Conservation)
Will Vile	Sssafe	Bird surveys, Habitat mapping	6	Bachelor of Environmental Science/ Management, Masters (Conservation Biology)
Stefan Szwedzinski	Sssafe	Bird surveys, Habitat mapping	5	BSc with Honours
Dane Wattle	Sssafe	Koala SAT surveys, Habitat mapping	2	PhD Science, BSc (Hons) (Environmental Sciences)
Brad Hilderbrandt	Sssafe	Frog aural visual surveys, Habitat mapping	1 year in consulting, 17+ in herpetology/ zoological experience	Cert III in Captive Animals, Cert II in Animal Studies
Steve Mueck	Steve Mueck Ecology	Bird surveys, Habitat mapping	23	BSc with Honours
Tim Willis	The Ecology Office	Targeted flora	28	BSc



Personnel name	Subconsultant	Project involvement	Years experience (approx.)	Qualifications
Chris Timewell	The Ecology Office	Targeted flora	29	BSc (Ecology, Zoology, Conservation, Environmental Science) with Honours (Avian Ecology)



Annex 6

Supplementary survey candidate species records



1.1 Threatened flora detections

A total of seven candidate threatened flora species were detected during the supplementary surveys. A breakdown of these records is given below in Annex Table 6.1.

Annex Table 6.1: Threatened flora recorded during supplementary surveys

Scientific name	Common name	BC Act Listing	EPBC Act Listing	Placement	PCT ID	Vegetation class	IBRA Subregion (abundance)			Species targeted for supplementary surveys?
							Crookwell	Murrumbateman	Snowy Mountains	
<i>Ammobium craspedioides</i>	Yass Daisy	Vulnerable	Vulnerable	Within project footprint	280	Low	-	21	-	Yes
						Moderate	-	100	-	
					1330	Low	-	13	-	
						Very low	-	4	-	
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	Endangered	Endangered	Outside of project footprint	N/A	N/A	50	-	-	Yes
				Within project footprint	731	Low	1000	-	-	
					952	Low	260	-	-	
					9996	Non-native	20	-	-	
<i>Pimelea bracteata</i>	-	Critically Endangered	Critically Endangered	Outside of project footprint	953	Very high	-	-	150	Yes
					N/A	N/A	-	-	251	
				Within project footprint	637	High	-	-	37	
					679	High	-	-	111	



Scientific name	Common name	BC Act Listing	EPBC Act Listing	Placement	PCT ID	Vegetation class	IBRA Subregion (abundance)			Species targeted for supplementary surveys?
							Crookwell	Murrumbat eman	Snowy Mountains	
						Low	-	-	71	
					939	High	-	-	322	
					953	Low	-	-	118	
						Very high	-	-	356	
					9997	Non-native	-	-	40	
<i>Prasophyllum bagoense</i>	Bago Leek Orchid	Critically Endangered	Critically Endangered	Within project footprint	637	High	-	-	8	Yes
					1224	High	-	-	13	
<i>Prasophyllum innubum</i>	-	Critically Endangered	Critically Endangered	Outside of project footprint	1224	High	-	-	4	Yes
				Within project footprint	637	High	-	-	1	
					679	High	-	-	1	
					1224	High	-	-	2	
<i>Prasophyllum keltonii</i>	Kelton's Leek Orchid	Critically Endangered	Critically Endangered	Outside of project footprint	1224	High	-	-	4	Yes
					N/A	N/A	-	-	3	
				Within project footprint	637	High	-	-	2	
					1224	High	-	-	13	
<i>Thelymitra alpicola</i>	Alpine Sun-orchid	Vulnerable	Not Listed	Within project footprint	679	High	-	-	8	



1.2 Threatened Fauna Detections

A total of 28 threatened fauna species were detected through supplementary survey including 12 ecosystem credit species, 10 candidate species credit species and one endangered population (Annex Table 6.2). The observation type for each detection is noted as follows: O: directly observed; C: camera image recording; H: call heard.

Annex Table 6.2: Threatened fauna recorded during supplementary surveys

Scientific Name	Common Name	BC Act Listing	EPBC Act Listing	IBRA Subregion						Species targeted?
				Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	
<i>Aphelocephala leucopsis</i>	Southern Whiteface	Vulnerable	Vulnerable	-	-	-	H	-	-	No
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Vulnerable	Not Listed	-	H, O	O	O	-	H, O	No
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vulnerable	Endangered	O	H, O	H, O	H, O	-	H, O	Yes
<i>Calyptrorhynchus lathamii lathamii</i>	South-eastern Glossy Black-Cockatoo	Vulnerable	Not Listed	-	H, O	-	-	-	H, O	No
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Vulnerable	Not Listed	-	C	-	-	-	-	Yes
<i>Chthonicola sagittata</i>	Speckled Warbler	Vulnerable	Not Listed	H, O	H	-	-	-	-	No
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	Vulnerable	Vulnerable	-	-	-	H, O	-	-	No



Scientific Name	Common Name	BC Act Listing	EPBC Act Listing	IBRA Subregion						Species targeted?
				Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	
	(eastern subspecies)									
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable	Not Listed	-	O	-	-	-	O	No
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Vulnerable	Not Listed	-	-	-	O	-	-	Yes
<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable	Not Listed	-	-	-	-	-	O	Yes
<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin	Endangered	Endangered	-	-	-	O	-	-	No
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Listed	-	-	-	O	-	H, O	No
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	Not Listed	-	H	-	-	-	O	Yes
<i>Petauroides volans</i>	Southern Greater Glider	Endangered	Endangered	-	O	-	-	-	O	Yes
<i>Petaurus australis</i>	Yellow-bellied Glider	Vulnerable	Vulnerable	-	-	-	-	-	H, O	Yes
<i>Petaurus norfolcensis</i>	Squirrel Glider	Vulnerable	Not Listed	-	O, C	-	-	-	-	Yes
<i>Petroica boodang</i>	Scarlet Robin	Vulnerable	Not Listed	O	H, O	-	H, O	-	O	No



Scientific Name	Common Name	BC Act Listing	EPBC Act Listing	IBRA Subregion						Species targeted?
				Bondo	Bungonia	Crookwell	Inland Slopes	Murrumbateman	Snowy Mountains	
<i>Petroica phoenicea</i>	Flame Robin	Vulnerable	Not Listed	O	-	-	-	-	H, O	No
<i>Polytelis swainsonii</i>	Superb Parrot	Vulnerable	Vulnerable	-	-	-	O	H, O	-	Yes
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Listed	-	-	-	O	-	-	No
<i>Pycnoptilus floccosus</i>	Pilotbird	Vulnerable	Vulnerable	O	-	-	-	-	-	No
<i>Stagonopleura guttata</i>	Diamond Firetail	Vulnerable	Vulnerable	-	-	-	H, O	-	-	No
<i>Tyto novaehollandiae</i>	Masked Owl	Vulnerable	Not Listed	-	H	-	-	-	-	Yes



Annex 7

Flora parallel traverses targeting greater than five species per growth form



A number of parallel traverses were undertaken where the total number of species targeted per growth form exceeded the recommended number, as described in Section 5.1 of the Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method. These instances accounted for 24 transects out of 614 undertaken, which is approximately 5% of the total length of all transects undertaken. Of these 24 transects that exceeded five species per growth form, 15 of these were targeting six species, and the majority of these instances were targeting multiple species in the same genus (i.e. *Swainsona*) or threatened orchids (i.e. *Prasophyllum* spp.).

Annex Table 7.1 below identifies these instances, with justification for grouping similar species

Annex Table 7.1: Threatened species survey groupings

Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
c2648	Closed	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Pterostylis alpina</i> ; <i>Pterostylis</i> <i>foliata</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting the same genus for two species.
c3986	Closed	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Pterostylis alpina</i> ; <i>Pterostylis</i> <i>foliata</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting the same genus for two species.
c3986	Closed	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Pterostylis alpina</i> ; <i>Pterostylis</i> <i>foliata</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting the same genus for two species.



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
c3988	Closed	Shrub (SG)	9	<i>Acacia bynoeana</i> ; <i>Bossiaea oligosperma</i> ; <i>Dillwynia glaucula</i> ; <i>Kunzea cambagei</i> ; <i>Persoonia mollis</i> subsp <i>revoluta</i> ; <i>Phyllota humifusa</i> ; <i>Pomaderris cotoneaster</i> ; <i>Pomaderris delicata</i> ; <i>Solanum armourense</i>	Traverse targeting two species of the same genus (<i>Pomaderris</i> spp.), and two Fabaceae (<i>Bossiaea</i> sp. and <i>Dillwynia</i> sp.)
c4007	Closed	Shrub (SG)	9	<i>Acacia bynoeana</i> ; <i>Bossiaea oligosperma</i> ; <i>Dillwynia glaucula</i> ; <i>Kunzea cambagei</i> ; <i>Persoonia mollis</i> subsp <i>revoluta</i> ; <i>Phyllota humifusa</i> ; <i>Pomaderris cotoneaster</i> ; <i>Pomaderris delicata</i> ; <i>Solanum armourense</i>	Traverse targeting two species of the same genus (<i>Pomaderris</i> spp.), and two Fabaceae (<i>Bossiaea</i> sp. and <i>Dillwynia</i> sp.)
c4007	Closed	Shrub (SG)	9	<i>Acacia bynoeana</i> ; <i>Bossiaea oligosperma</i> ; <i>Dillwynia glaucula</i> ; <i>Kunzea cambagei</i> ; <i>Persoonia mollis</i> subsp <i>revoluta</i> ; <i>Phyllota humifusa</i> ; <i>Pomaderris cotoneaster</i> ; <i>Pomaderris delicata</i> ; <i>Solanum armourense</i>	Traverse targeting two species of the same genus (<i>Pomaderris</i> spp.), and two Fabaceae (<i>Bossiaea</i> sp. and <i>Dillwynia</i> sp.)
c6063	Closed	Forb (FG)	6	<i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Pterostylis oreophila</i> ; <i>Thelymitra alpicola</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
c6066	Closed	Forb (FG)	6	<i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Pterostylis oreophila</i> ; <i>Thelymitra alpicola</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
c6066	Closed	Forb (FG)	6	<i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Pterostylis oreophila</i> ; <i>Thelymitra alpicola</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
c6071	Closed	Forb (FG)	6	<i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Pterostylis oreophila</i> ; <i>Thelymitra alpicola</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
c6076	Closed	Forb (FG)	6	<i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Pterostylis oreophila</i> ; <i>Thelymitra alpicola</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
c6076	Closed	Forb (FG)	6	<i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Pterostylis oreophila</i> ; <i>Thelymitra</i>	Traverse undertaken by orchid specialists



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
				<i>alpicola</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	targeting three threatened orchids.
c6470	Closed	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o1380	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Lepidium hyssopifolium</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum petilum</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o1380	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Lepidium hyssopifolium</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum petilum</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o1381	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Lepidium hyssopifolium</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum petilum</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
o28	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o28	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o60	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o6464	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6464	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ;	Traverse undertaken by orchid specialists



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
				<i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	targeting three threatened orchids.
o6471	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6472	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6472	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6474	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ;	Traverse undertaken by orchid specialists targeting three threatened orchids.



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
				<i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	
o6479	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6479	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6482	Open	Forb (FG)	7	<i>Calotis glandulosa</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Prasophyllum bagoense</i> ; <i>Prasophyllum innubum</i> ; <i>Pterostylis oreophila</i> ; <i>Thesium australe</i> ; <i>Xerochrysum palustre</i>	Traverse undertaken by orchid specialists targeting three threatened orchids.
o6545	Open	Shrub (SG)	6	<i>Acacia bynoeana</i> ; <i>Bossiaea oligosperma</i> ; <i>Persoonia mollis</i> subsp <i>revoluta</i> ; <i>Phyllota humifusa</i> ; <i>Pomaderris delicata</i> ; <i>Solanum armourense</i>	Traverse undertaken in an open woodland, predominantly targeting <i>Solanum armourense</i> . The field lead on this team was an



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
					experienced flora ecologist with local knowledge of the area. Teams did identify a number of <i>Solanum</i> individuals, which were collected for further identification. Following analysis of the specimens with microscopes, it was determined that these species were not the target species.
o6545	Open	Shrub (SG)	6	<i>Acacia bynoeana</i> ; <i>Bossiaea oligosperma</i> ; <i>Persoonia mollis</i> subsp <i>revoluta</i> ; <i>Phyllota humifusa</i> ; <i>Pomaderris delicata</i> ; <i>Solanum armourense</i>	Traverse undertaken in an open woodland, predominantly targeting <i>Solanum armourense</i> . The field lead on this team was an experienced flora ecologist with local knowledge of the area. Teams did identify a number of <i>Solanum</i> individuals, which were collected for further identification. Following



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
					analysis of the specimens with microscopes, it was determined that these species were not the target species.
o6553	Open	Shrub (SG)	6	<i>Acacia bynoeana</i> ; <i>Bossiaea oligosperma</i> ; <i>Persoonia mollis</i> subsp <i>revoluta</i> ; <i>Phyllota humifusa</i> ; <i>Pomaderris delicata</i> ; <i>Solanum armourense</i>	Traverse undertaken in an open woodland, predominantly targeting <i>Solanum armourense</i> . The field lead on this team was an experienced flora ecologist with local knowledge of the area. Teams did identify a number of <i>Solanum</i> individuals, which were collected for further identification. Following analysis of the specimens with microscopes, it was determined that these species were not the target species.



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
o70	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o70	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o71	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)
o96	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)



Survey ID	Vegetation density	Growth form group	Total number of species targeted	Species	Grouping justification
o96	Open	Forb (FG)	6	<i>Ammobium craspedioides</i> ; <i>Caladenia concolor</i> ; <i>Leucochrysum albicans</i> subsp <i>tricolor</i> ; <i>Senecio garlandii</i> ; <i>Swainsona recta</i> ; <i>Swainsona sericea</i>	Traverse targeting two species of the same genus (<i>Swainsona</i> spp.)



Annex 8

Solanum armourense survey effort justification



The *Solanum armourense* species polygons are located in eight discrete patches within dry sclerophyll forests within the Bungonia IBRA subregion (Figure 7). A number of surveys have been undertaken in these locations, including:

BDAR surveys conducted between September 2021 and December 2023, using the flora grid-point method and BAM plot surveys; and

- BAVR surveys conducted in October to November 2024 and February 2025, using the parallel traverse method
- We have reviewed and mapped our cumulative survey effort to identify the total survey effort for the species (see Table A 6 below). A large proportion (16.81 ha) of suitable habitat has been subject to three surveys across BDAR and BAVR efforts. Smaller areas (1.57 ha) have been surveyed twice, while another area (2.49 ha) has been surveyed only once.

During recent surveys, our field team - led by a highly experienced botanist - recorded several *Solanum* species. All specimens were collected and analysed microscopically. None were confirmed as *S. armourense*, which we believe reflects the high level of scrutiny applied to these habitats over multiple survey events.

Based on the cumulative effort and survey scrutiny, we propose that a survey effort reduction be applied to areas with two or three survey passes, while retaining assumed presence across the remaining habitats. Where feasible, remaining habitats could be targeted for prior to commencement of construction to verify species absence.



Annex 9

BAM plot data



9.1 BAM plot locations

Annex Table 9.1: BAM plot locations

Plot	PCT	Area	Patch size	Condition class	Zone	Easting	Northing	Bearing
BAM1 IG	1155	120	0	High	56	204521.61	6176608.30	110
BAM2 IG	1155	120	0	Moderate	56	204638.05	6176606.61	120
BAM3 IG	1155	120	0	Moderate	56	204354.19	6176409.03	37
101-1 IG	1330	120	0	Low	56	165886.96	6160685.74	200
BAM 35 IG	1155	120	0	High	56	204838.82	6176767.47	95
BY054-02	1155	120	0	Moderate	56	277720.24	6263960.65	94
BY054-01	1155	120	0	Moderate	56	277731.75	6263949.47	50
BY054-03	1155	120	0	Moderate	56	277703.53	6263957.37	90
BY054-04	1155	120	0	Moderate	56	277722.36	6263953.57	313
BY056-01	1155	120	0	Moderate	56	277698.64	6263953.93	4
BY056-02	1155	120	0	Moderate	56	277727.57	6263947.96	202



BY097-01	351	120	0	High	56	277727.30	6263948.31	25
BY097-02	351	120	0	High	56	277726.40	6263951.95	60



9.2 Floristic data

Annex Table 9.2: BAM floristic data

Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Acacia falciformis</i>	Broad-leaved Hickory					0.5	1					2	5		
<i>Acacia genistifolia</i>	Early Wattle														
<i>Acacia parramattensis</i>	Parramatta Wattle														
<i>Acacia terminalis</i>	Sunshine Wattle									0.5	5			0.1	1
<i>Acaena novae-zelandiae</i>	Bidgee-widgee	0.1	1												
<i>Acaena spp.</i>	Sheep's Burr														
<i>Agrostis spp.</i>	Bent Grass	10	500												
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass														
<i>Aristida spp.</i>	Aristida spp.							0.1	5						
<i>Asperula conferta</i>	Common Woodruff	0.1	5												
<i>Astroloma humifusum</i>	Native Cranberry														



Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Austrostipa bigeniculata</i>	Yanganbil			0.1	5	20	200								
<i>Billardiera scandens</i>	Hairy Apple Berry			0.1	10	0.2	20	0.2	20	0.1	5				
<i>Brachyloma daphnoides</i>	Daphne Heath			0.1	5	0.1	2			0.5	5	0.1	1	0.1	1
<i>Bromus catharticus</i>	Praire Grass	1	50												
<i>Cassinia aculeata</i>	Dolly Bush			2	20	5	15								
<i>Cassinia arcuata</i>	Sifton Bush							1	5			0.1	1		
<i>Cassinia spp.</i>	Cassinia spp.							0.2	2						
<i>Chiloglottis reflexa</i>	Short-clubbed Wasp Orchid											0.1	20		
<i>Choretrum spp.</i>	Choretrum spp.														
<i>Cirsium vulgare</i>	Spear Thistle	1	30												
<i>Dactylis glomerata</i>	Cocksfoot	30	1000												
<i>Daviesia latifolia</i>	Bitter-pea					0.1	1			0.2	3				



Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Dianella revoluta</i>	Blueberry Lily			0.1	2							0.1	5		
<i>Dianella spp.</i>	Dianella spp.							0.1	1						
<i>Dichelachne micrantha</i>	Shorthair Plumegrass			0.1	5										
<i>Dillwynia spp.</i>	Dillwynia spp.											0.1	1	0.1	1
<i>Eucalyptus dives</i>	Broad-leaved Peppermint	3	2			5	3	12	10			5	8		
<i>Eucalyptus goniocalyx</i>	Bundy														
<i>Eucalyptus macrorhyncha</i>	Red Stringybark											3	5		
<i>Eucalyptus mannifera</i>	Brittle Gum			3	2	3	1			3	2	5	8	2	3
<i>Eucalyptus radiata</i>	Narrow-leaved Peppermint			5	3	4	2	0.5	3						
<i>Eucalyptus rossii</i>	Inland Scribbly Gum											10	12	6	6
<i>Eucalyptus rubida</i>	Candlebark	10	3					8	2						



Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Eucalyptus sieberi</i>	Silvertop Ash			18	25	12	10			20	30			12	20
<i>Exocarpos cupressiformis</i>	Cherry Ballart			0.1	1										
<i>Festuca arundinacea</i>	Tall fescue	5	100												
<i>Gonocarpus tetragynus</i>	Poverty Raspwort			0.2	30	1	80	1	80	0.1	20	0.2	30		
<i>Goodenia hederacea</i>	Ivy Goodenia			0.2	20	0.5	30	0.5	30	0.2	30				
<i>Hardenbergia violacea</i>	False Sarsaparilla							0.1	1	0.2	5	0.1	2		
<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower			0.2	10	0.5	10	0.5	20	0.5	10	0.5	15	0.2	20
<i>Hovea heterophylla</i>	Creeping Hovea			0.1	10	0.5	30	0.2	30	0.1	10	0.2	20		
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort			0.1	5	0.3	20								
<i>Hypericum perforatum</i>	St. Johns Wort														
<i>Hypochaeris radicata</i>	Catsear	1	100	0.1	2	0.1	2	0.1	5						
<i>Juncus spp.</i>	Juncus spp.	0.1	2	0.1	1										



Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Leptorhynchos squamatus</i>	Scaly Buttons					0.2	30	0.1	10						
<i>Lomandra filiformis</i>	Wattle Matt-rush			0.1	10	1	30	0.2	10	0.5	20	1	20	0.2	20
<i>Melichrus urceolatus</i>	Urn Heath					0.1	1	0.1	2						
<i>Microlaena stipoides</i>	Weeping Grass	1	50	0.1	10	30	1000	30	1000			0.2	30		
<i>Monotoca scoparia</i>	Prickly Broom Heath							0.1	2					0.1	2
<i>Olearia</i> spp.	Olearia spp.														
<i>Opercularia aspera</i>	Coarse Stinkweed					0.1	10								
<i>Oxalis</i> spp.	Oxalis spp.					0.1	5								
<i>Persoonia linearis</i>	Narrow-leaved Geebung			0.3	5			0.1	1	0.1	1	0.1	1	0.1	2
<i>Phalaris aquatica</i>	Phalaris	5	100												
<i>Phytolacca octandra</i>	Inkweed														
<i>Pimelea linifolia</i>	Slender Rice Flower											0.1	5		



Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Platysace lanceolata</i>	Shrubby Platysace														
<i>Poa labillardierei</i>	Tussock grass	24	30												
<i>Poa sieberiana</i>	Snowgrass			10	200	20	200	30	200	5	50	5	50	0.1	5
<i>Poranthera microphylla</i>	Small Poranthera			0.1	10	0.1	5								
<i>Pteridium esculentum</i>	Bracken			0.3	15	0.5	20			0.1	1				
<i>Pultenaea</i> spp.	Pultenaea spp.														
<i>Rhytidosporum procumbens</i>	White Marianth									0.1	10				
<i>Rosa rubiginosa</i>	Sweet Briar	2	200												
<i>Rubus fruticosus</i>	Blackberry complex	0.1	1			0.2	5								
<i>Rubus parvifolius</i>	Native Raspberry							0.1	1						
<i>Rumex acetosella</i>	Red Sorrel	2	200												
<i>Rumex brownii</i>	Swamp Dock	0.1	5												



Scientific Name	Common Name	101-1 IG		BAM 35 IG		BAM1 IG		BAM2 IG		BAM3 IG		BY054-01		BY054-02	
		C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Rytidosperma pallidum</i>	Redanther Wallaby Grass			15	200			5	50	10	80			1	30
<i>Rytidosperma procerum</i>	-			0.1	5										
<i>Rytidosperma racemosum</i>	Wallaby Grass														
<i>Rytidosperma spp.</i>	Wallaby Grass			0.1	10			0.1	10			0.1	5		
<i>Schoenus apogon</i>	Fluke Bogrush			0.1	5										
<i>Senecio prenanthoides</i>	-			0.1	1										
<i>Stellaria pungens</i>	Prickly Starwort														
<i>Stylidium graminifolium</i>	Grass Triggerplant									0.1	5				
<i>Themeda triandra</i>	Kangaroo Grass					1	30	0.2	10						
<i>Trifolium repens</i>	White Clover	1	100												
<i>Veronica plebeia</i>	Trailing Speedwell					0.1	5								



9.3 Function data

Annex Table 9.3: BAM plot function data

Plot	Composition						Structure						Function										
	TG	SG	GG	FG	EG	OG	TG	SG	GG	FG	EG	OG	Large Trees	HBT	LC	FLL	5-10	10-20	20-30	30-50	50-80	Regen	HTW
BAM1 IG	4	6	5	9	1	1	24	6.3	72	2.9	0.5	0.2	6	4	40.4	35	1	1	1	1	1	1	0
BAM2 IG	3	7	7	5	0	2	20.5	2.1	65.6	1.9	0	0.3	1	0	55	12	1	1	1	1	0	0	0
BAM3 IG	2	6	3	4	1	2	23	1.9	15.5	0.5	0.1	0.3	3	0	94	19	0	1	1	1	1	0	0
101-1 IG	2	0	4	3	0	0	13	0	35.1	0.3	0	0	0	3	2.2	45	0	1	1	0	0	0	2
BAM 35 IG	3	5	9	7	1	1	26	2.7	10.8	0.9	0.3	0.1	1	1	90.2	45	0	1	1	1	1	1	0
BY054-02	3	6	3	0	0	0	20	0.7	1.3	0	0	0	3	4	83.6	480	1	1	1	1	1	1	0
BY054-01	4	7	4	4	0	1	23	3	6.3	0.6	0	0.1	3	1	75	425	1	1	1	1	1	0	0



Plot	Composition						Structure						Function										
	TG	SG	GG	FG	EG	OG	TG	SG	GG	FG	EG	OG	Large Trees	HBT	LC	FLL	5-10	10-20	20-30	30-50	50-80	Regen	HTW
BY054-03	3	6	1	1	0	0	21	1.8	1	0.1	0	0	2	2	70	260	1	1	1	1	1	0	0
BY054-04	4	12	5	4	0	0	16	4	15.5	0.5	0	0	2	2	86	430	1	1	1	1	1	0	0
BY056-01	5	4	4	0	0	0	22	0.9	2.4	0	0	0	3	4	79	325	1	1	1	1	1	0	0
BY056-02	3	5	5	5	0	0	21	1.4	1.7	0.5	0	0	3	2	68	290	1	1	1	1	1	0	0
BY097-01	3	3	4	6	0	1	23.2	15.6	25	0.8	0	0.1	5	2	87	290	1	1	1	1	1	1	0
BY097-02	3	4	5	4	1	0	22	2.3	35.4	0.6	5	0	3	1	81	170	1	1	1	1	1	1	0.1



9.4 VI Scores

Annex Table 9.4: VI Scores from BAM Calculator

Plot	PCT	Condition	Composition Score	Structure Score	Function Score	VI Score
BAM1 IG	1155	High	78.11	60.24	82.08	72.83
BAM2 IG	1155	Moderate	74.46	45.25	38.34	50.55
BAM3 IG	1155	Moderate	52.15	48.05	65.92	54.87
101-1 IG	1330	Low	20.29	69.04	28.59	34.22
BAM 35 IG	1155	High	70.85	50.64	65.91	61.84
BY054-02	1155	Moderate	37.06	22.13	100.00	43.45
BY054-01	1155	Moderate	64.50	35.61	84.89	57.99
BY054-03	1155	Moderate	29.67	24.47	79.18	38.59
BY054-04	1155	Moderate	76.27	35.46	79.50	59.91
BY056-01	1155	Moderate	35.19	26.90	84.98	43.17
BY056-02	1155	Moderate	56.82	24.61	84.56	49.08
BY097-01	351	High	52.03	76.74	100.00	73.64
BY097-02	351	High	78.11	60.24	82.08	72.83



Annex 10

Stuttering Frog (*Mixophyes balbus*) habitat assessment



This annexure documents a review of supplementary habitat assessment results against relevant habitat prescriptions for the Stuttering Frog (*Mixophyes balbus*). The outcomes of this assessment were used to inform the revised extent of streams offering suitable breeding opportunities for the species. Where suitable stream environments were confirmed through field observations, a 500 metre buffer was applied to these streams and these habitats included in the species polygon. Similarly, where there was a lack of data to inform stream suitability, a conservative approach has been adopted and stream suitability assumed. As such, streams where suitability is assumed have also contributed to the species polygon extent. The outcomes of the assessment are presented below and are captured within the suitable streams spatial layer.

10.1 Habitat prescriptions

A review of the following information was undertaken to inform the habitat prescriptions applied for Stuttering Frog:

- Stuttering frog (*Mixophyes balbus*) - endangered species listing NSW Scientific Committee - final determination 13 Dec 2002 (OEH, 2002)
- Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DEWHA, 2010b)
- NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE, 2020)
- Based on the review, the following habitat prescriptions were identified and applied to the assessment:
 - The species inhabits rainforest, Antarctic beech and wet sclerophyll forests (DEWHA, 2010b; OEH, 2002; DPIE, 2020). As such, stream environments that did not support these vegetation communities were considered unsuitable.
 - Intact vegetation is considered necessary for breeding and habitation and no records of the species are known from riparian habitat that has been disturbed (DEWHA, 2010b; OEH, 2002). Furthermore, leaf litter and dense vegetation is considered essential for shelter. As such, disturbed stream environments lacking these essential microhabitats or subject to considerable weed invasion or erosion were considered unsuitable.
 - According to OEH (2002) and DPIE (2020), the species depends on permanent freshwater streams or ephemeral streams with permanent pools. As such, streams that did not support pools or surface water at the time of survey were considered unsuitable

10.2 Habitat Assessment results

Approximately 25,044 m of stream environments were determined at the BDAR phase to offer potential habitat for Stuttering Frog, including:

- 2,666 m of Bannaby Creek - consisting of 982 m of suitable stream habitat, and 1,068 m of unsuitable stream habitat
- 11,843 m of Connors Creek - consisting of 6,713 m of suitable stream habitat, and 5,130 m of unsuitable stream habitat
- 10,535 m of Kerraway Creek - consisting of 7,564 m of suitable stream habitat, and 2,972 m of unsuitable stream habitat

A total of 238 supplementary field assessments were undertaken to assess the suitability of these streams and surrounding vegetation (Figure 3c). The results of the supplementary habitat assessment are presented below.



10.2.1 Stream portion 1

Hawkesbury-Nepean CMA: Bannaby Creek

TopoID: 500498415


Breeding habitat assessment: Unsuitable

Length: 320 m







Annex Table 10.1: Stream portion 1 survey results

Site ID	Vegetation formation	Field observations	Photos	Habitat assessment results
501	Dry Sclerophyll Forests (Shrubby sub-formation)	Thick scrub bordering open farmland, dense understorey, with grassy ground cover. No pools or water present.		Habitat is not suitable for Stuttering Frog breeding as it lacks permanent water, appropriate riparian vegetation, and leaf litter cover.




Site ID	Vegetation formation	Field observations	Photos	Habitat assessment results
502	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry underfoot. Steep rocky slope. Ground cover consists of tussock grasses with leaf litter and fallen timber interspersed. No pools or watercourses present.		Habitat is not suitable for Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.




Site ID	Vegetation formation	Field observations	Photos	Habitat assessment results
474	Dry Sclerophyll Forests (Shrubby sub-formation)	Small dry watercourse, no evidence of recent water flow. Steep rocky slope either side. Ground cover consists of tussock grasses with leaf litter and fallen timber interspersed. No pools or watercourses present.		Habitat is not suitable for Stuttering Frog breeding as it lacks permanent water and appropriate riparian vegetation.



Annex Table 10.2: Stream portion 2 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
508	Not mapped - nearest is Dry Sclerophyll Forests (Shrubby sub-formation)	Open grass slope, small regrowth trees, no pools of water present.		Habitat is not suitable for Stuttering Frog breeding as it lacks permanent water, appropriate riparian vegetation, and leaf litter cover.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
506	Not mapped - nearest is Dry Sclerophyll Forests (Shrubby sub-formation)	Dry Stringybark Forest, 50% bare ground, tussock ground cover, no pools or water present.		Habitat is not suitable for Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



10.2.3 Stream portion 3

Hawkesbury-Nepean CMA: Connors Creek

TopoID: 500498447


Breeding habitat assessment: Unsuitable

Length: 448 m






Annex Table 10.3: Stream portion 3 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
472	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry Stringybark Forest, tussock ground cover, no pools or water present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
473	Dry Sclerophyll Forests (Shrubby sub-formation)	Deep drainage channel. Heavily overgrown with weeds and bushes, no water or pools present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
				



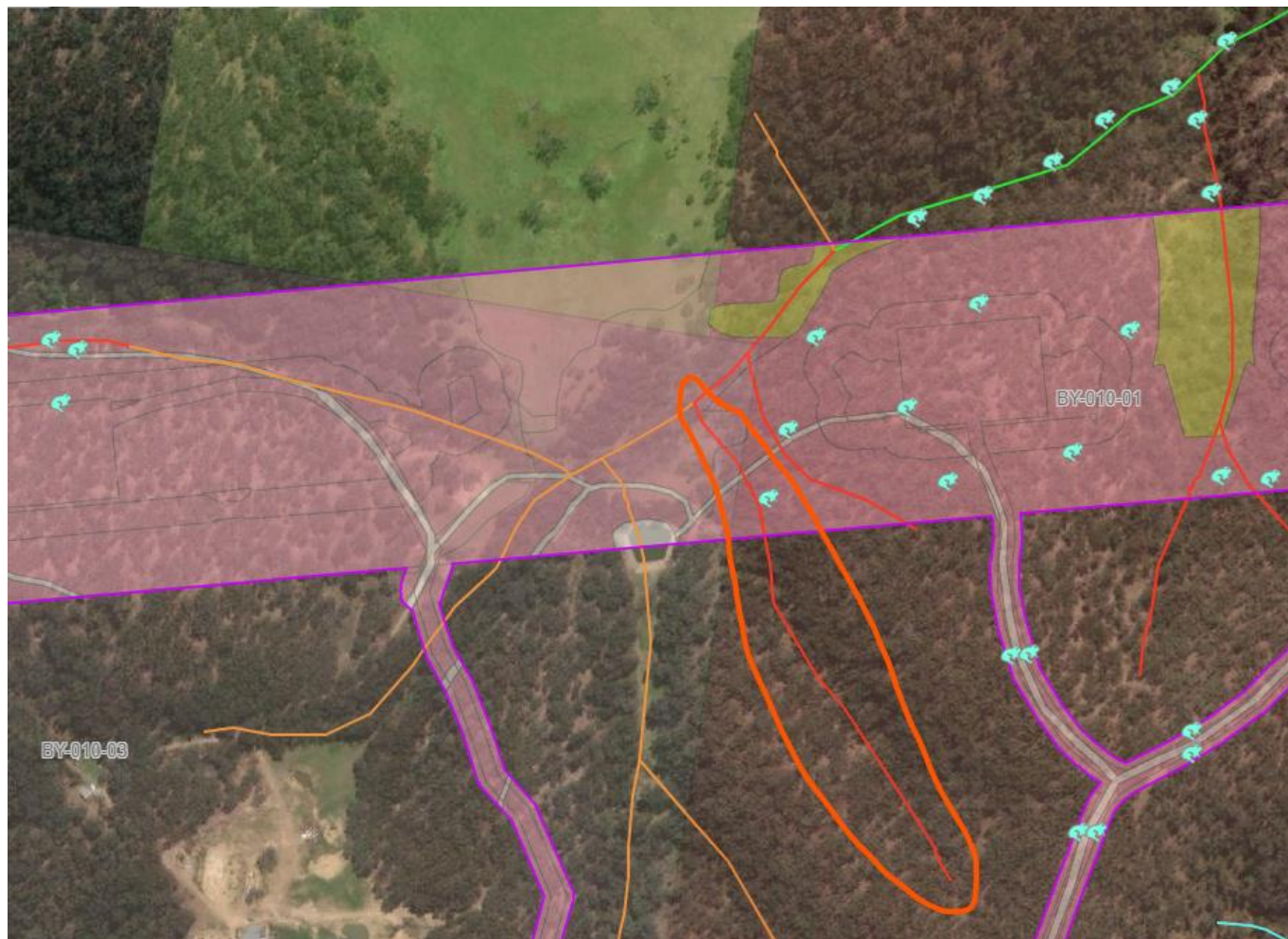
10.2.4 Stream portion 4

Hawkesbury-Nepean CMA: Connors Creek

Breeding habitat assessment: Unsuitable


TopoID: 500498395

Length: 388 m





Annex Table 10.4: Stream portion 4 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
156	Not all mapped – extends from Dry Sclerophyll Forests (Shrubby sub-formation)	Patches of small tussocks. No pools or stream present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



10.2.5 Stream portion 5

Hawkesbury-Nepean CMA: Connors Creek

TopoIDs: 500498444, 500498462,
500498466


Breeding habitat assessment: Unsuitable

Length: 321 m






Annex Table 10.5: Stream portion 5 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
162	Dry Sclerophyll Forests (Shrubby sub-formation)	Very rocky, lots of fallen timber, scattered grasses. No pools or stream present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
136	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep dry rocky ground, dominated by Stringybark trees, no grass tussocks, small amount of regrowth wattle type species. No pools or stream present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



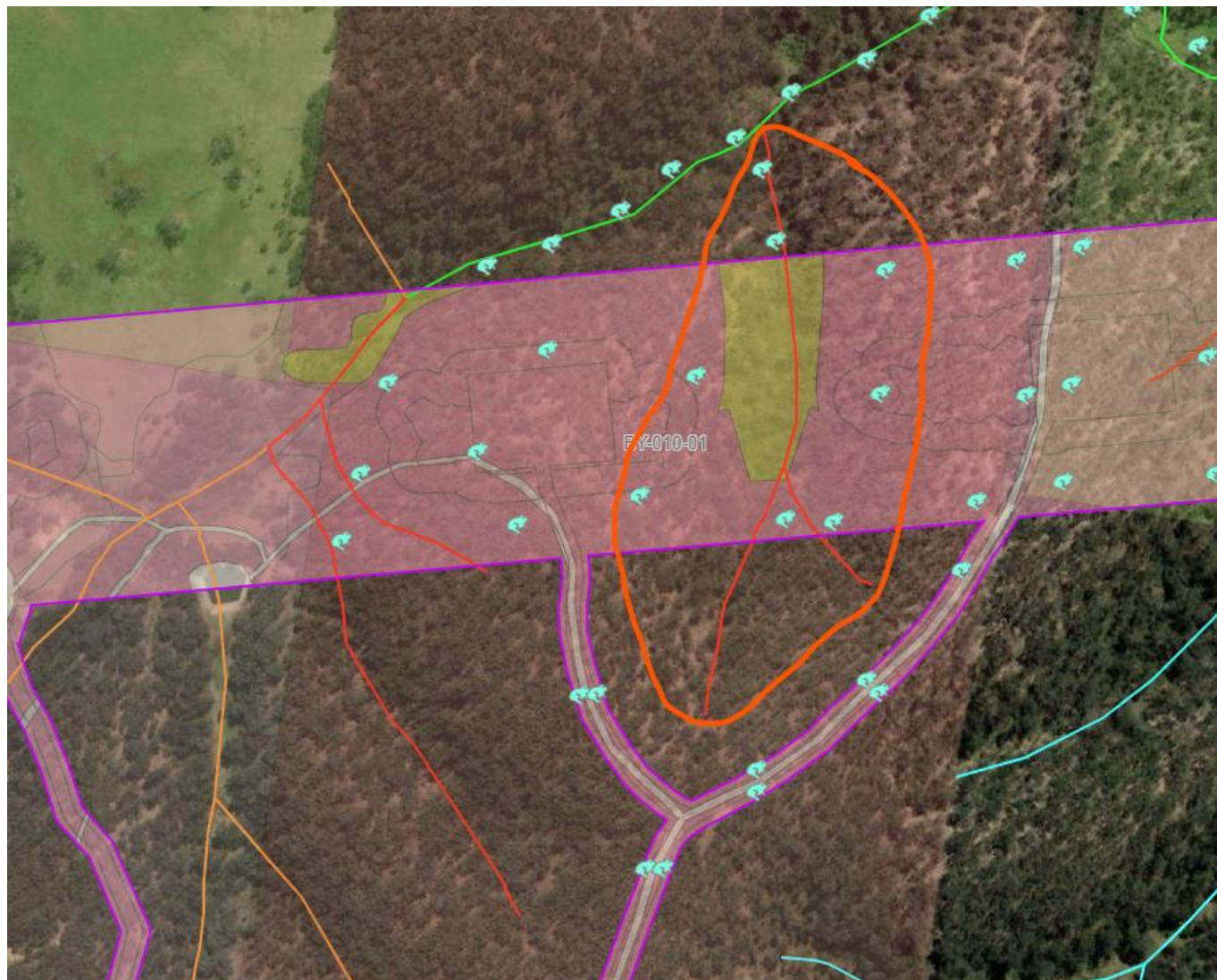
10.2.6 Stream portion 6

Hawkesbury-Nepean CMA: Connors Creek

TopoIDs: 500498413, 500498438,
500498460


Breeding habitat assessment: Unsuitable

Length: 546 m







Annex Table 10.6: Stream portion 6 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
3196, 3199	Not all mapped – extends from Wet Sclerophyll Forests (Shrubby sub-formation)	Thick brush understory, dry underfoot with no evidence of recent flow through watercourse.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.





Site ID	Vegetation formation	Habitat comments	Photos	Determination
132, 139	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep dry rocky ground, occasional Grey Gum type trees, no grass tussocks, small amount of regrowth wattle type species.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
128, 141, 144	Not all mapped - extends from Dry Sclerophyll Forests (Shrubby sub-formation)	No water course or ponds present, dominated by Stringybark and Blackbutt type species, no flora ground cover, no tussocks or grasses, dry rocky ground, lots of dead fallen timber.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
				
129	Not all mapped - extends from Dry Sclerophyll Forests (Shrubby sub-formation)	Very dry rocky area with no flora ground cover, lots of fallen timber, no water course or ponds present dominated by Stringybark species.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



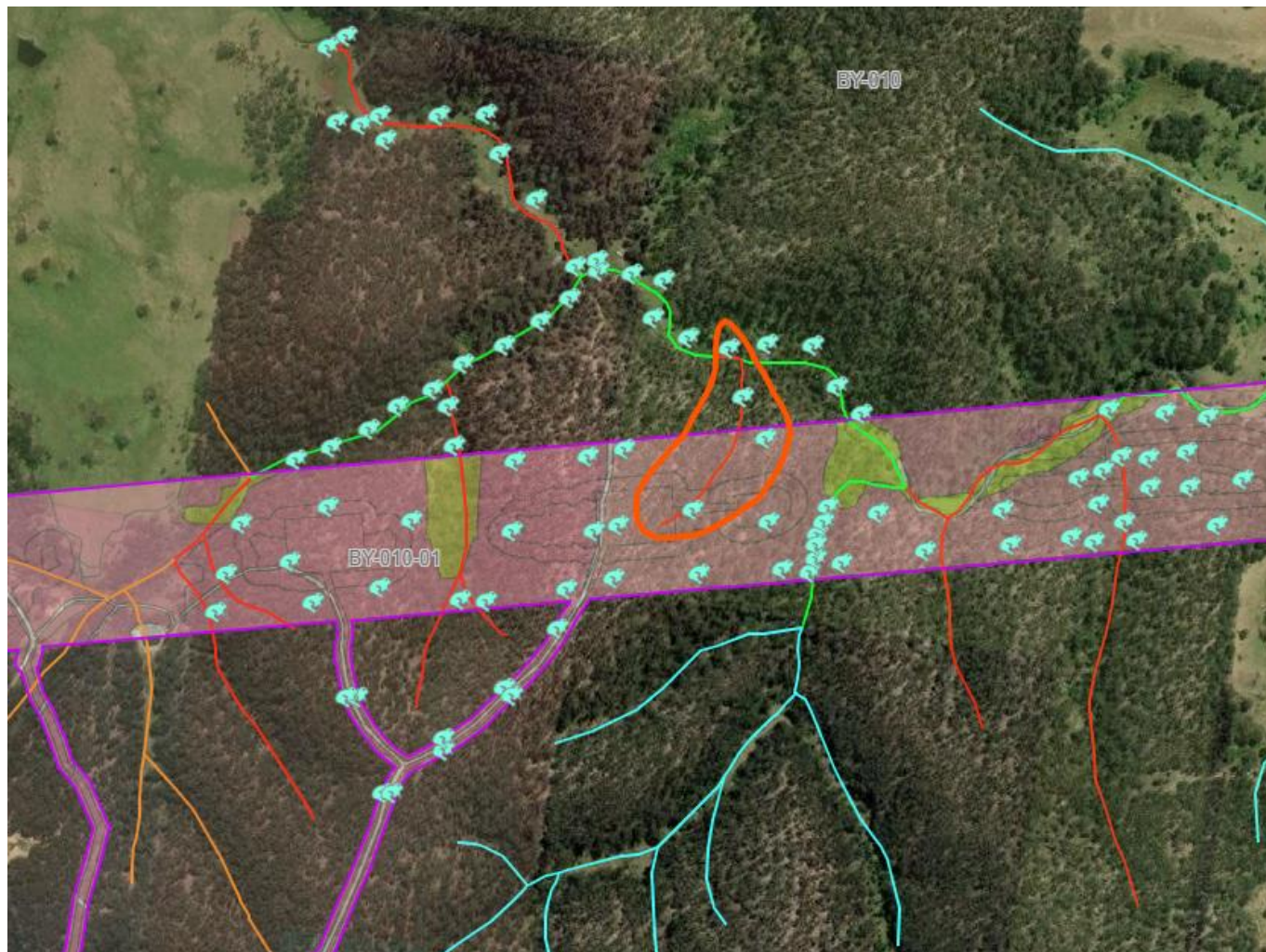
10.2.7 Stream portion 7

Hawkesbury-Nepean CMA: Connors Creek

Breeding habitat assessment: Unsuitable


TopoIDs: 500498474, 500498513

Length: 271 m







Annex Table 10.7: Stream portion 7 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
3229		Shallow stream, heavily overgrown with grass, tussocks and weeds. Surrounded by open grass area and dry Eucalypt Forest.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
3202		Small dry drainage channel. Heavily overgrown, no evidence of recent water flow.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
189, 190	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry open rocky slope, no ground cover. Fallen logs and dead timber, no water course or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



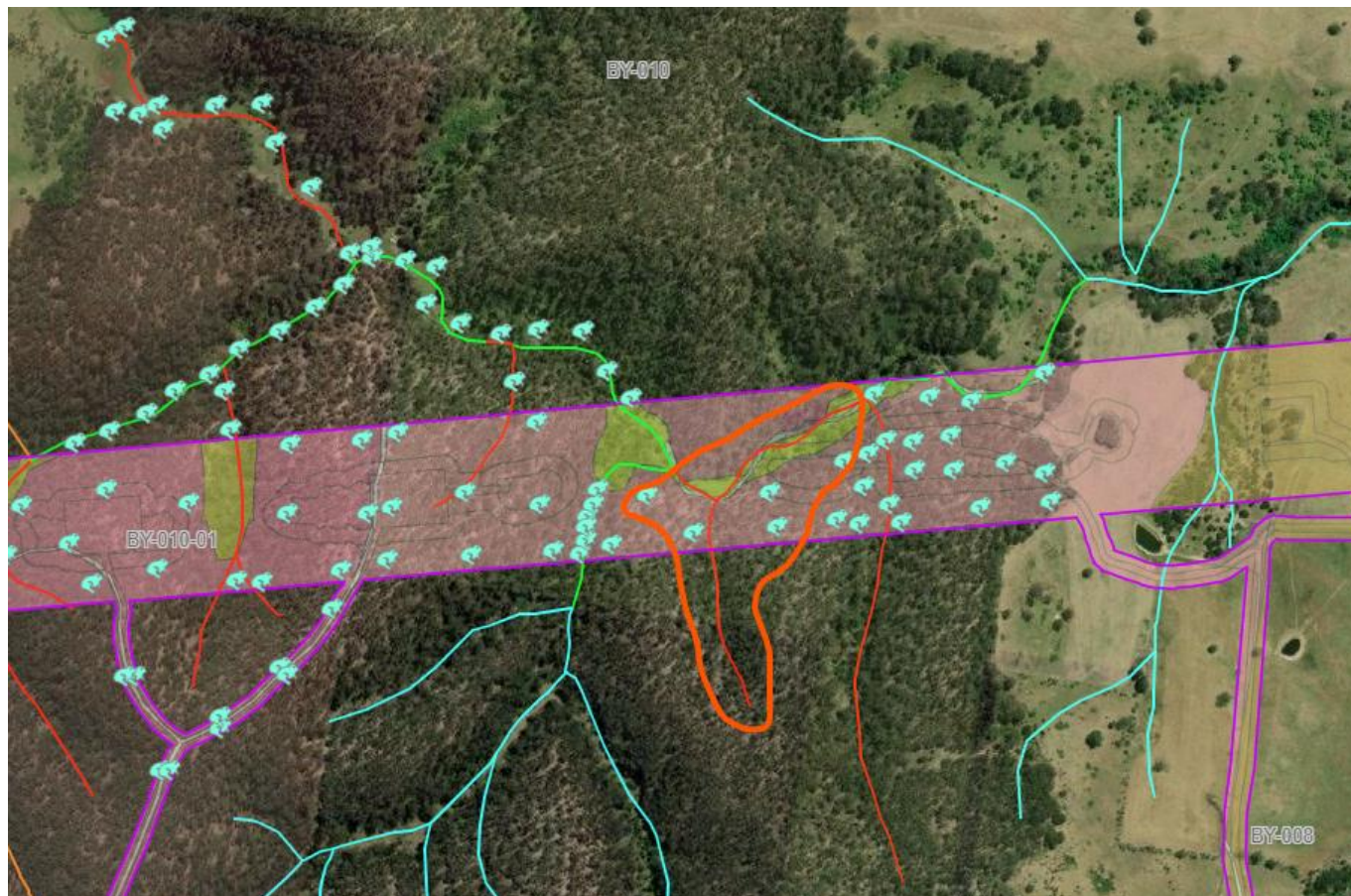
10.2.8 Stream portion 8

Hawkesbury-Nepean CMA: Connors Creek

TopoIDs: 500498480, 500498405,
500498473


Breeding habitat assessment: Unsuitable

Length: 597 m







Annex Table 10.8: Stream portion 8 survey results

Site ID	Veg formation	Habitat comments	Photos	Determination
193	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry open rocky slope, sparse small shrubs as understory, no ground cover. fallen logs and dead timber, no water course or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Veg formation	Habitat comments	Photos	Determination
201	Dry Sclerophyll Forests (Shrubby sub-formation)	Rocky slope, no tussocks present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Veg formation	Habitat comments	Photos	Determination
191, 196, 198	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry open rocky slope, sparse small shrubs as understory, no ground cover. fallen logs and dead timber, no water course or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



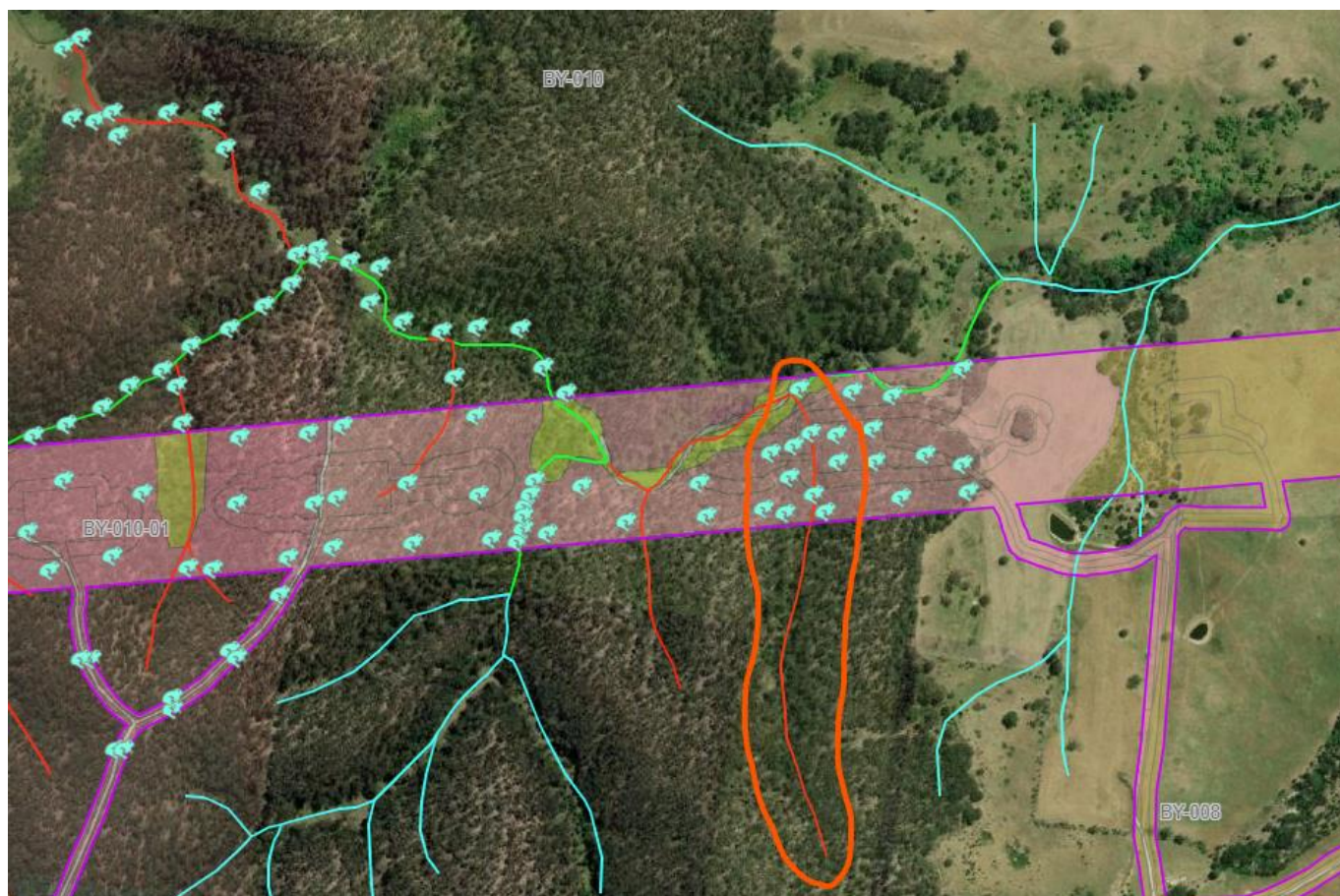
10.2.9 Stream portion 9

Hawkesbury-Nepean CMA: Connors Creek

Breeding habitat assessment: Unsuitable



TopoID: 500498375

Length: 656 m







Annex Table 10.9: Stream portion 9 survey results

Site ID	Vegetation formation	Habitat comments	Photos		Determination
147	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry creekbed, possibly holds water after large rains, but dry at time of survey. Overgrown and washed out in some areas. Leads down to Coopers Creek.			Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.




Site ID	Vegetation formation	Habitat comments	Photos	Determination
148, 149	Dry Sclerophyll Forests (Shrubby sub-formation)	Dense weedy understory, limited ground cover e.g. no tussocks or grasses.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
146, 149	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep dry slope, with limited ground cover, limited surface rocks, no water course or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
82	Non-native	Dry creekline with occasional small puddle from overnight rain, flowing down to rocky flowing clear creek.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



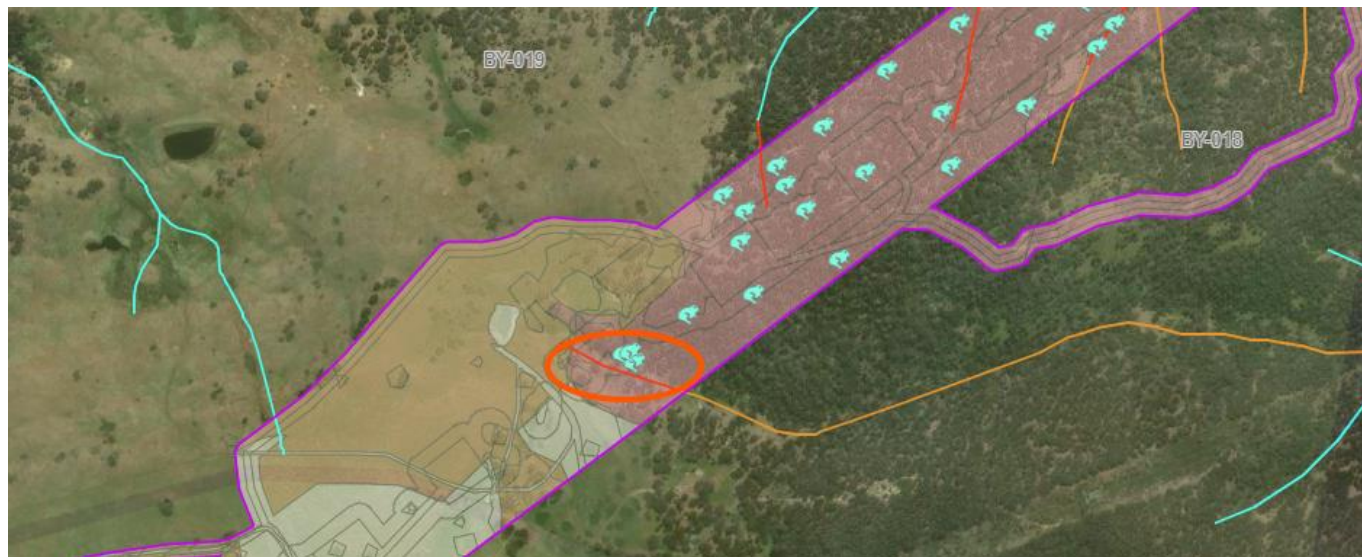
10.2.10 Stream portion 10

Hawkesbury-Nepean CMA: Kerrawary Creek

TopoID: 500497895


Breeding habitat assessment: Unsuitable

Length: 172 m








Annex Table 10.10: Stream portion 10 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
86, 155	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep gully coming from dam overflow. Uphill from dam in open space. Suitable vegetation is not present surrounding dam.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
154	Dry Sclerophyll Forests (Shrubby sub-formation)	No water present, high weed/grass coverage.	  	Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water, appropriate riparian vegetation and leaf litter cover.



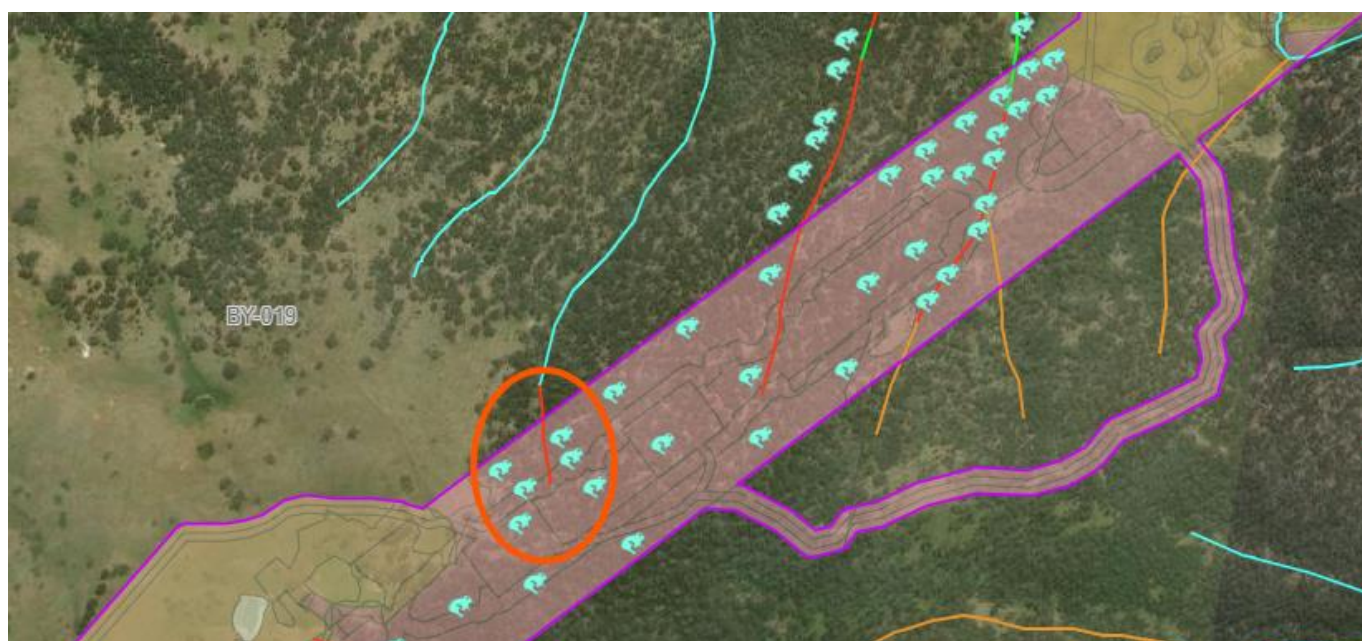
10.2.11 Stream portion 11

Hawkesbury-Nepean CMA: Kerrawary Creek

Breeding habitat assessment: Unsuitable



TopoID: 500497981

Length: 117 m








Annex Table 10.11: Stream portion 11 survey results

Site ID	Vegetation formation	Habitat comments	Photos		Determination
169, 173	Dry Sclerophyll Forests (Shrubby sub-formation)	Rocky slope, a few tussocks, no nearby water.			Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.




Site ID	Vegetation formation	Habitat comments	Photos	Determination
171	Dry Sclerophyll Forests (Shrubby sub-formation)	Open grassy area, not much canopy cover, no water nearby.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
174	Dry Sclerophyll Forests (Shrubby sub-formation)	Large open rocky area, no tussocks, no nearby water.		Habitat is not suitable for Suttering Frog breeding as it lacks permanent water and appropriate riparian vegetation.
170	Dry Sclerophyll Forests (Shrubby sub-formation)	Very rocky slope, not many tussocks.		Habitat is not suitable for Suttering Frog breeding as it lacks permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
181	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep rocky slope, no tussocks or ground cover, no water course or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



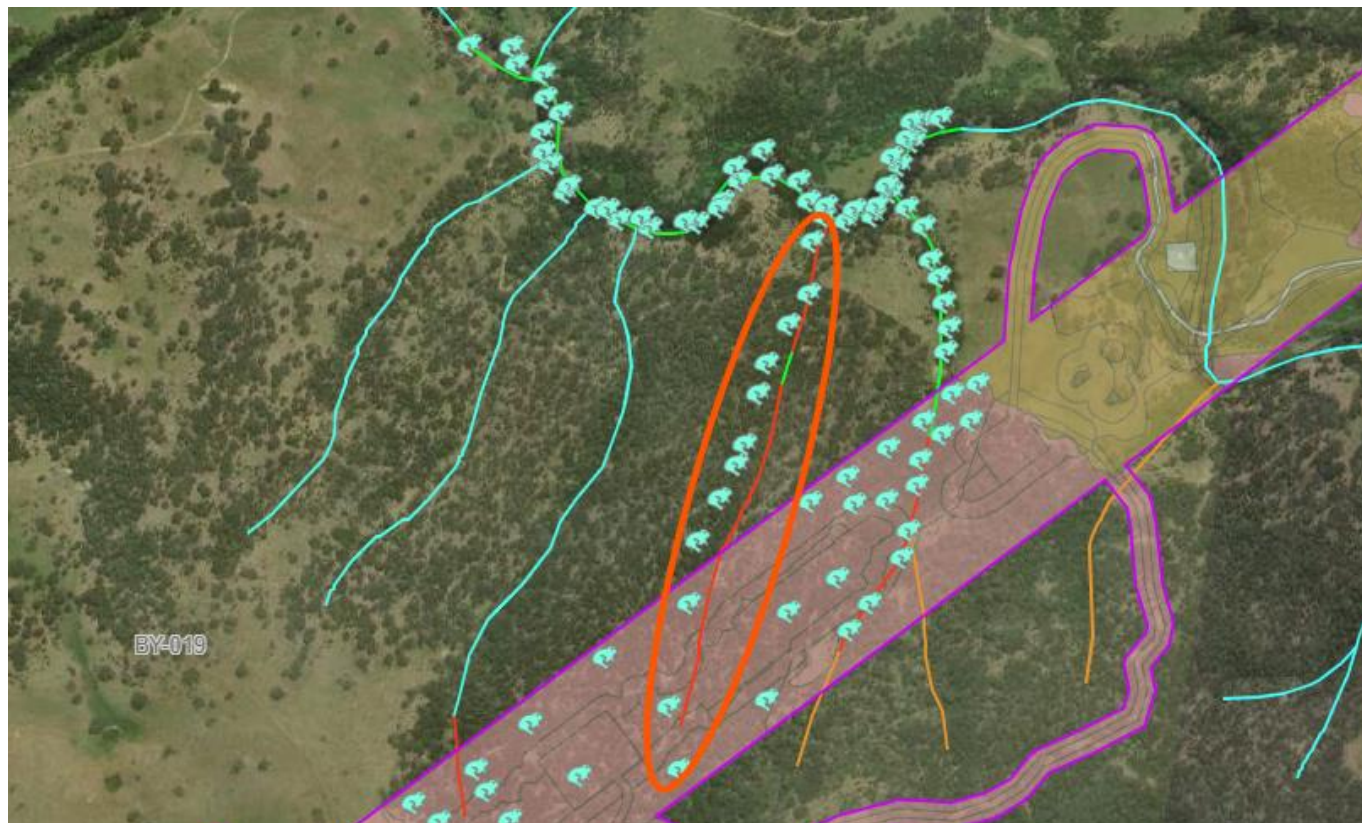
10.2.12 Stream portion 12

Hawkesbury-Nepean CMA: Kerrawary Creek

TopoID: 500498009


Breeding habitat assessment: Unsuitable

Length: 623 m







Annex Table 10.12: Stream portion 12 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
178	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep rocky ground, 50% grassy ground cover, 50% shrubby understory, no water course or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
183	Dry Sclerophyll Forests (Shrubby sub-formation)	Open area, rocky slope.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.




Site ID	Vegetation formation	Habitat comments	Photos	Determination
179	Dry Sclerophyll Forests (Shrubby sub-formation)	Steep dry rocky slope, sparse small grass tussocks, mostly bare ground, dry creek, no water or ponds present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.




Site ID	Vegetation formation	Habitat comments	Photos	Determination
3000, 3029, 3021	Not all mapped – extends from Dry Sclerophyll Forests (Shrubby sub-formation)	Steep eroded drainage, no flowing water, small stagnant pools. grassy ground cover, overgrown with small shrubs.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.




Site ID	Vegetation formation	Habitat comments	Photos	Determination
				



Site ID	Vegetation formation	Habitat comments	Photos	Determination
3081, 3082	Not all mapped - extends from Dry Sclerophyll Forests (Shrubby sub-formation)	Steep drainage channel. Thick, dense vegetation with some surface rock present. Damp in areas with some very small stagnant pools. Minimal evidence of recent water flow.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
3075	Not all mapped - extends from Dry Sclerophyll Forests (Shrubby sub-formation)	Small drainage channel. Thick, dense vegetation with some surface rock present. Damp in areas with very small (<1 sqm) puddles present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



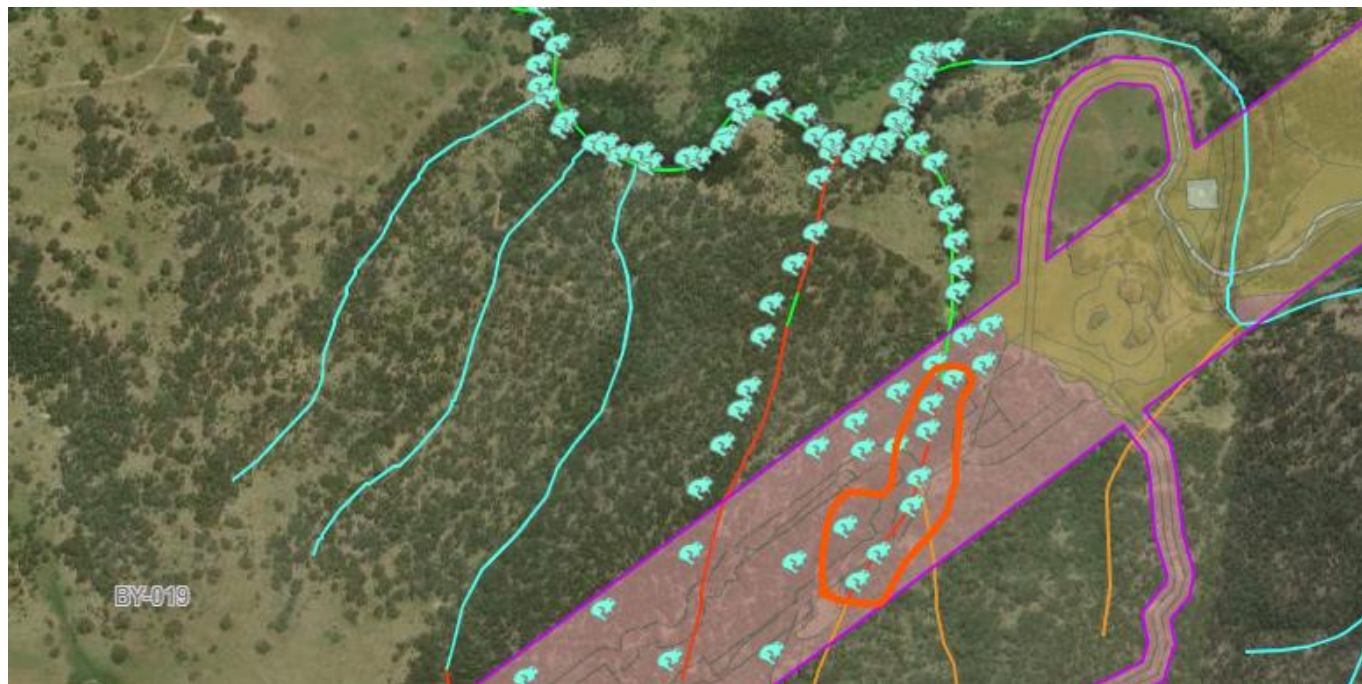
10.2.13 Stream portion 13

Hawkesbury-Nepean CMA: Kerrawary Creek

Breeding habitat assessment: Unsuitable


TopoIDs: 500498000, 500498066

Length: 275 m






Annex Table 10.13: Stream portion 13 survey results

Site ID	Vegetation formation	Habitat comments	Photos	Determination
352, 516	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry overgrown drainage creekline, only holds water in heavy rain. No ponds or pools, significant blackberry infestation.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Site ID	Vegetation formation	Habitat comments	Photos	Determination
355, 513, 514, 515	Dry Sclerophyll Forests (Shrubby sub-formation)	Dry drainage channel, no ponds pools or water present.		Habitat is not suitable Stuttering Frog breeding habitat as lacking permanent water and appropriate riparian vegetation.



Annex 11

Large-eared Pied Bat (*Chalinobolus dwyeri*) habitat assessment



This annexure documents a review of supplementary habitat assessment results against relevant habitat prescriptions for the Large-eared Pied Bat (*Chalinolobus dwyeri*). The outcomes of this assessment were used to inform the revised extent of suitable habitat opportunities for the species within the project footprint in accordance with the TBDC, which defines potential breeding habitat as “PCTs associated with the species within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings”. The extent of conservative potential breeding habitats mapped during the BDAR phase were subject to further review using LiDAR high-resolution imagery, to determine the presence and extent of potential karst and cliffline mapping, to assign a habitat suitability likelihood prior to surveys (Table 8 of the BAVR).

Following analysis of the potential bat roost using high-resolution LiDAR imagery, areas were assigned as containing a habitat suitability likelihood outcome of marginal habitat or habitat was considered unsuitable. None of the habitat was considered to be higher than potentially marginally suitable. A visual field inspection of these areas of rocky habitat was undertaken to record the presence / absence of suitable habitats, as documented below

11.1 Habitat prescriptions

A review of the following information was undertaken to inform the habitat prescriptions applied for Large-eared Pied Bat (*Chalinolobus dwyeri*):

- Large-eared Pied Bat (*Chalinolobus dwyeri*) - endangered species listing NSW Scientific Committee - final determination 9 August 2024 (OEH, 2024)
- Conservation Advice for *Chalinolobus dwyeri* (large-eared pied bat). Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023).
- National recovery plan for the large-eared pied bat *Chalinolobus dwyeri*. Department of Environment and Resource Management (DERM, 2011)
- Survey guidelines for Australia’s threatened bats. Commonwealth Department of the Environment, Water, Heritage and the Arts (DAWHA, 2010)

Based on the review, the following habitat prescriptions were identified and assessed in the field during the visual assessments:

- The species roosts in caves (near their entrances), crevices in cliffs, old mine working and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features (OEH, 2024, DERM, 2011).
- The structure of maternity roosts appears to be very specific (arch caves with dome roofs). Caves need to be high and deep enough to allow juvenile bats to learn to fly safely inside and have indentations in the roof (DERM, 2011).
- Almost all records of the species are within several kilometres of clifflines or rocky terrain, although extensive trapping and call data indicates that bats do not usually forage in sandstone habitat. Modelling based on presence-only data indicates that bats forage in fertile valleys and plains, as well as areas with moderately-tall to taller trees along water courses. The majority of records are from canopied habitat, suggesting a sensitivity to clearing (DERM, 2011).



11.2 Habitat assessment results

Following a desktop review of this habitat using high-resolution imagery, approximately 13.18 ha of rocky habitat was identified as being unsuitable, based on conservative assessment of the habitat features present (Annex Table 11.1).

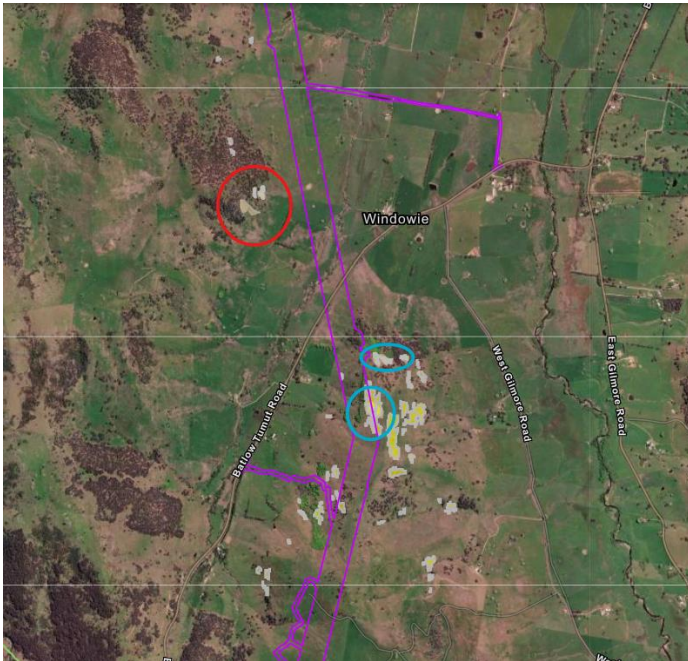

The remaining 0.50 ha was subject to further visual field assessments to confirm the presence of suitable habitats (i.e. crevices, overhangs, etc). Where field teams had access to areas of habitat deemed unsuitable during the desktop assessment, opportunistic field assessments were also undertaken to supplement the desktop assessments. These areas have been described and identified within the imagery provided in Annex Table 11.2 below. Habitat absence polygons were collected which delineated the extent and justification for unsuitable habitat for the species.

The results of the supplementary habitat assessment are presented in Annex Table 11.1 and Annex Table 11.2 below, Figure 3a of the BAVR, and refer to the following spatial datasets:


- Potential bat roost - delineating the total extent of potential habitat, and habitats identified as being unsuitable, either through desktop or field assessment
- Habitat absent - delineating areas of potential habitat subject to field survey and general notes on habitat features that were absent.



Annex Table 11.1: Large-eared Pied Bat habitat suitability assessment results - desktop assessment

Description of potential habitat features analysed on aerial imagery	Imagery of potential bat roost locations subject to desktop assessment (supplementary field assessment locations circled)	Supplementary field observations and plates (Habitat Absence SiteID)	Habitat assessment results
<p>Terrain within the area of potential habitat is of low relief.</p> <p>Area in proximity to the potential habitat does not contain fertile valleys or plains with tall trees, required to sustain the species (DERM, 2011).</p> <p>The area contains rocky outcrops which do not support habitat features required to support maternity roosts, such as arch caves with domed roof (DERM, 2011).</p> <p>The area or area directly adjacent to the potential habitat is highly disturbed and not likely to contain suitable habitat for the species.</p>		<p>(172, 176, 181, 182, 184) - location identified in red on imagery.</p> <p>No suitable fissures or cracks present on rocks.</p> <p>Area of low relief with very small surface cracks, not suitable for the species.</p> 	<p>Unsuitable - desktop assessment</p>




Description of potential habitat features analysed on aerial imagery	Imagery of potential bat roost locations subject to desktop assessment (supplementary field assessment locations circled)	Supplementary field observations and plates (Habitat Absence SiteID)	Habitat assessment results
		 <p>(178, 180, 190, 191, 192, 193, 209) – location identified in blue on imagery.</p> <p>No visible rocky outcropping or overhangs suitable for the species.</p> <p>Scattered small overhangs located at ground height but with very little habitat value (absence of crevices).</p> <p>Rocky habitats inhabited by other fauna species (wombat).</p> <p>Other areas of rocky outcrops contain low-quality habitat with entrances located at ground height.</p>	



Description of potential habitat features analysed on aerial imagery	Imagery of potential bat roost locations subject to desktop assessment (supplementary field assessment locations circled)	Supplementary field observations and plates (Habitat Absence SiteID)	Habitat assessment results
			



Description of potential habitat features analysed on aerial imagery	Imagery of potential bat roost locations subject to desktop assessment (supplementary field assessment locations circled)	Supplementary field observations and plates (Habitat Absence SiteID)	Habitat assessment results
			



Annex Table 11.2: Large-eared Pied Bat habitat suitability assessment results - field assessment

SiteID (Habitat absence)	Relevant field observations	Plates	Habitat assessment results
175, 179	Rock overhangs and outcrops not present. Dense stand of exotic vegetation.		Unsuitable



Annex 12

Revised mitigation measures



Annex Table 12.1: Revised mitigation measures

ID	Matter	Timing	Impact	Measure category	Mitigation measure
MM 1	All matters	Pre-construction/Detailed design	Direct	Finalising project impacts and offset requirements	A revised biodiversity impact assessment must be carried out adopting the Final Layout Plans issued for construction. The Biodiversity Assessment Method Calculator (BAM-C) must be updated to calculate the credit liability reduction following completion of the revised assessment.
MM 2	All matters	Pre-construction/Detailed design	Direct	Finalising project impacts and offset requirements	<p>The design will avoid and minimise impacts to remaining biodiversity values, including threatened species and communities, to the greatest extent practicable. The Final Layout Plans issued for construction must demonstrate these measures have been effectively implemented.</p> <p>Further survey or design refinement must be considered to ensure clearing limits are not exceeded for species, where presence is known or assumed to occur.</p>
MM 3	Threatened fauna	Pre-construction/Detailed design	Direct	Additional mitigation measures and revised BMP	<p>Revised constraint mapping must be prepared capturing the outcomes of detailed habitat mapping (as per MM 3), the location of suitable hollows for candidate threatened fauna.</p> <p>The revised constraint mapping must be to inform further design avoidance and management of remaining biodiversity risks as a part of the BMP.</p>
MM 4	Threatened species	Pre-construction/Construction	Direct	Unexpected finds - preclearing	<p>In the event of an unexpected find, as defined as any biodiversity values detected during pre-clearing activities that requires offsets which were not assessed in the Revised BDAR and/or the BAVR. This includes candidate species predicted but subsequently excluded from the BDAR.</p> <p>Should an unexpected find be detected during pre-clearing, the population extent would be identified by the field ecologist and mapped using handheld GPS and visual markers established to clearly demarcate the extent of habitat. The relevant vegetation mapping values would be overlaid with the area where the population extent intersects with the impact area, which would be used to determine the species credit requirements adopted to address impacts. Mitigation measures and protocols for the species would be implemented. This could include staged clearing, fauna relocation process or flora salvage process, as necessary. Consultation with CPHR and/or Commonwealth DCCEEW would be undertaken, as relevant, in conjunction with Transgrid.</p>



ID	Matter	Timing	Impact	Measure category	Mitigation measure
MM 5	Threatened species	Pre-construction/Construction	Direct	Unexpected finds - during clearing or other works	<p>In the event of an unexpected find, as defined as any biodiversity values detected during pre-clearing activities that requires offsets which were not assessed in the Revised BDAR and/or the BAVR. This includes candidate species predicted but subsequently excluded from the BDAR or BAVR.</p> <p>Should an unexpected find be detected during clearing, an immediate stop works would be issued, the project ecologist would identify and map the population extent using handheld GPS, including extents of habitat remaining and those subject to impacts as a result of clearing works carried out. These areas are to be clearly demarcated using visual markers, such as flagged tape or fencing as soon as practically possible. The relevant vegetation mapping values would be overlaid with the area where the population extent intersects with the impact area, which would be used to determine the species credit requirements adopted to address impacts. Mitigation measures and protocols for the relevant species would be implemented. This will include staged clearing, fauna relocation process or flora salvage process, as necessary. Consultation with CPHR and/or Commonwealth DCCEEW would be undertaken, as relevant, in conjunction with Transgrid.</p>
MM 6	Threatened orchids	Pre-construction	Direct	Additional mitigation measures and revised BMP	<p>Prior to the commencement of any works in areas of known or potential habitat, an OMP must be prepared in consultation with a qualified orchid ecologist and submitted to Department of Climate Change, Energy, the Environment and Water (DCCEEW) for approval.</p> <p>The OMP must be prepared in accordance with the Commonwealth Environmental Management Plan Guidelines (2024), and must include (but not be limited to):</p> <ul style="list-style-type: none"> – Detailed mapping and descriptions of all orchid habitat within the project and impact area, based on seasonal surveys and expert advice – Clear avoidance and mitigation measures, including site design modifications to avoid high-quality habitat, micro-siting of towers and access tracks, installation of physical exclusion fencing around retained habitat prior to construction. – Timing and constructability controls, including: – Scheduling of high-risk activities outside the flowering and active growth period and requirements for supervision during high-risk works adjacent to habitats – A comprehensive unexpected finds protocol, which must be implemented throughout construction in all areas of habitat, include immediate stop-work



ID	Matter	Timing	Impact	Measure category	Mitigation measure
					<p>provisions, assessment by a suitably qualified orchid ecologist within 24 hours and notification to DCCEEW, and procedures for temporary protection, assessment of significance, and determination of appropriate avoidance, salvage or offsetting requirements</p> <ul style="list-style-type: none"> – Monitoring and reporting requirements, including baselines condition assessments of retained habitat, post-construction monitoring of any translocation or nearby populations for at least 10 years, and reporting requirements on implementation, compliance and outcomes. <p>No works may commence in areas of orchid habitat until the OMP has been approved by DCCEEW, and all avoidance measures and exclusion zones have been established and verified by a qualified orchid specialist.</p>
MM 7	Threatened species	Pre-construction	Direct	Avoidance, rehabilitation and monitoring	Transgrid must undertake additional targeted surveys where feasible prior to commencement of construction in a specific area to address survey shortfalls and/or remaining data gaps associated with access and/or seasonal constraints and to delineate the extent of habitats within inaccessible lands, subject to the pre-conditions outlined in Section 1.4.
MM 8	Threatened fauna	Construction	Direct	Avoidance, rehabilitation and monitoring	<p>Establishment of biodiversity exclusion zones with visual markers (i.e. flagging tape) to demarcate confirmed habitat areas as no-go zones during the construction phase.</p> <p>Any active, or known nests or occupancy of hollows is to be identified, and a 100 m exclusion area maintained for the duration of the breeding season for Gang-gang Cockatoo, Glossy Black-cockatoo, Pink Robin and Superb Parrot (seasons and suitable hollow size identified in the BMP and TBDC). Clearing of known habitats for these species would be undertaken outside of the known breeding season to avoid disruption to the breeding cycle where feasible.</p>
MM 9	Threatened owls	Construction	Direct	Avoidance, rehabilitation and monitoring	Owl suitable HBTs, i.e. trees with hollows >20cm in diameter and >4m above the ground, are to be retained during construction where practical. Individual trees are to be poisoned and trimmed but remain within the easement.
MM 10	Threatened owls	Pre-construction	Direct	Avoidance, rehabilitation and monitoring	Constraints mapping will be updated by Transgrid, including suitable HBTs for threatened owls, to be identified as a high constraint. This would include LiDAR assessed habitat gaps.



ID	Matter	Timing	Impact	Measure category	Mitigation measure
MM 11	Threatened fauna	Construction	Direct/Indirect	Additional mitigation measures and revised BMP	The BMP must be updated to include reference to distribution of species beyond the species polygons, and that the identified measures to mitigate impacts to species must be in place – e.g fauna collision.
MM 12	All threatened entities	Pre-construction / Construction	Direct	Additional mitigation measures and revised BMP	The BMP must be updated to include the identification of unsurveyed areas during the pre-clearing process. A desktop assessment of ecological values potentially present in unsurveyed areas must be undertaken and consideration given to likely species during pre-clearance surveys (i.e unsurveyed areas does not mean threatened biodiversity values are absent).



Annex 13

Koala SAT justification

A review of available literature was undertaken to inform considerations for scat detection post-rain. Notably:

- Cristescu RH, Goethals K, Banks PB, Carrick FN and Frère C 2012, Experimental evaluation of koala scat persistence and detectability with implications for pellet-based fauna census, *International Journal of Zoology*, vol.12, p.631856. doi: 10.1155/2012/631856
- Melzer A, Schneider MA and Lamb D 1994, Insects associated with the faecal pellets of the koala, *Phascolarctos cinereus* Goldfuss, *Australian Entomologist*, vol.21, no.3, pp.69–70.
- Rhodes JR, Lunney D, Moon C, Matthews A and McAlpine CA 2011, The consequences of using indirect signs that decay to determine species' occupancy, *Ecography*, vol.34, pp.141– 150, doi: 10.1111/j.1600-0587.2010.05908.x.

Unfortunately, these resources did not offer tangible rainfall thresholds that could be applied to inform the suitability of SAT survey effort undertaken. In the absence of available literature, the following was undertaken:

- a. Rainfall in the three days preceding each SAT survey was noted. Note, rainfall was not available for
- b. Rainfall was categorised according to Bureau of Meteorology (BOM) classifications, as follows:
- c. Light: 1 to 10 mm
- d. Moderate: 10 to 30 mm
- e. Heavy: > 30 mm.
- f. Field observations including incidental possum and pest-animal scat detections were reviewed to determine if these coincided with post-rain survey periods.

Of the 195 SATs conducted for koalas, 114 SATs were conducted within three days following rainfall (Table A 28). However, preceding rainfall was generally light (i.e. less than 10mm) for the majority (i.e. 77%) of SATs completed. Only 26 SATs were conducted within three days of moderate rainfall (i.e. greater than 10 mm). A review of field data suggests that possum and pest animal scats were detected during this survey time period, suggesting that where Koala scats were present, these too would have been detected. No SATs were completed following heavy rainfall.

Annex Table 13.1 presents a summary of this analysis. Full weather details are recorded in Annex 4.

Based on the outcomes of the analysis, SAT survey effort undertaken post-rain was considered suitable for Koala scat detection.

Annex Table 13.1: Koala SAT weather observations

Site ID	IBRA Subregion	Date	Easting	Northing	Average daily rainfall over 3 days prior (mm)	Total rainfall over 3 days prior (mm)	BOM Rainfall category
BY103-02_2LD	Murrumbateman	21/09/2023	692655.7	6155458	0	0	Dry
BY106_1LD	Murrumbateman	22/09/2023	708833.8	6162410	0	0	Dry
BY106_2AB	Murrumbateman	22/09/2023	709058.6	6162503	0	0	Dry
BY106_3AB	Murrumbateman	22/09/2023	709304.2	6162505	0	0	Dry
BY113	Murrumbateman	24/09/2023	702848.9	6160128	0	0	Dry
BY-115_SAT1	Murrumbateman	26/09/2023	701990.1	6159754	0	0	Dry
BY-115_SAT10	Murrumbateman	26/09/2023	701454.1	6159353	0	0	Dry
BY-115_SAT2	Murrumbateman	25/09/2023	701574.3	6159575	0	0	Dry
BY-115_SAT3	Murrumbateman	25/09/2023	701758.5	6159620	0	0	Dry
BY-115_SAT4	Murrumbateman	26/09/2023	701720.2	6159564	0	0	Dry
BY-115_SAT5	Murrumbateman	26/09/2023	702134.9	6159679	0	0	Dry
BY-115_SAT6	Murrumbateman	26/09/2023	701177.7	6159363	0	0	Dry
BY-115_SAT7	Murrumbateman	26/09/2023	701091.1	6159292	0	0	Dry
BY-115_SAT8	Murrumbateman	26/09/2023	702326.6	6159961	0	0	Dry
BY-115_SAT9	Murrumbateman	26/09/2023	702094.7	6159803	0	0	Dry
BY-128_SAT1	Murrumbateman	25/09/2023	696641.1	6157181	0	0	Dry
BY-128_SAT2	Murrumbateman	25/09/2023	696258	6157118	0	0	Dry
BY130-02_1LD	Murrumbateman	21/09/2023	692425.9	6155353	0	0	Dry
BY130-02_4AB	Murrumbateman	21/09/2023	693103	6155673	0	0	Dry
BY130-02_5AB	Murrumbateman	21/09/2023	693349.1	6155757	0	0	Dry
BY-130-09_SAT2	Murrumbateman	22/09/2023	691360.8	6154820	0	0	Dry
BY-130-09_SAT4	Murrumbateman	22/09/2023	691617.3	6154892	0	0	Dry
BY-130-11_SAT2	Murrumbateman	20/09/2023	689323.7	6153762	0	0	Dry
BY-130-12_SAT1	Murrumbateman	21/09/2023	688799.6	6153665	0	0	Dry
BY-130-12_SAT3	Murrumbateman	21/09/2023	688260.9	6153394	0	0	Dry
BY-130-14_SAT1	Murrumbateman	20/09/2023	687519.7	6152934	0	0	Dry
BY130-15_1	Murrumbateman	23/09/2023	686807.3	6152545	0	0	Dry

BY-128_SAT3	Murrumbateman	25/09/2023	696149.7	6156970	0	0	Dry
BY130-01_1	Murrumbateman	26/09/2023	693605.2	6155825	0	0	Dry
BY130-02_1LD	Murrumbateman	21/09/2023	692425.9	6155353	0	0	Dry
BY130-02_3AB	Murrumbateman	21/09/2023	692881.1	6155578	0	0	Dry
BY130-02_4AB	Murrumbateman	21/09/2023	693103	6155673	0	0	Dry
BY130-02_5AB	Murrumbateman	21/09/2023	692846.3	6155444	0	0	Dry
BY130-02_5AB	Murrumbateman	21/09/2023	693349.1	6155757	0	0	Dry
BY-130-09_SAT1	Murrumbateman	22/09/2023	690749.3	6154565	0	0	Dry
BY-130-09_SAT2	Murrumbateman	22/09/2023	691360.8	6154820	0	0	Dry
BY-130-09_SAT3	Murrumbateman	22/09/2023	690920.7	6154648	0	0	Dry
BY-130-09_SAT4	Murrumbateman	22/09/2023	691617.3	6154892	0	0	Dry
BY-130-11_SAT1	Murrumbateman	20/09/2023	689818.8	6153991	0	0	Dry
BY-130-11_SAT2	Murrumbateman	20/09/2023	689323.7	6153762	0	0	Dry
BY-130-11_SAT3	Murrumbateman	20/09/2023	689457.3	6153881	0	0	Dry
BY-130-12_SAT1	Murrumbateman	21/09/2023	688799.6	6153665	0	0	Dry
BY-130-12_SAT2	Murrumbateman	21/09/2023	688496.3	6153501	0	0	Dry
BY-130-12_SAT3	Murrumbateman	21/09/2023	688260.9	6153394	0	0	Dry
BY-130-12_SAT4	Murrumbateman	21/09/2023	687998.3	6153209	0	0	Dry
BY-130-14_SAT1	Murrumbateman	20/09/2023	687519.7	6152934	0	0	Dry
BY-130-14_SAT2	Murrumbateman	20/09/2023	687421.4	6152869	0	0	Dry
BY130-15_1	Murrumbateman	23/09/2023	686807.3	6152545	0	0	Dry
BY-130-15_SAT1	Murrumbateman	20/10/2023	687065.4	6152795	0	0	Dry
BY130-16	Murrumbateman	24/09/2023	685812.2	6152073	0	0	Dry
BY130-16_1	Murrumbateman	23/09/2023	686373.3	6152298	0	0	Dry
BY130-16_2LD	Murrumbateman	24/09/2023	686579	6152509	0	0	Dry
BY-130-19_SAT1	Murrumbateman	23/09/2023	683234.5	6150349	0	0	Dry
BY-130-19_SAT2	Murrumbateman	23/09/2023	684492	6150506	0	0	Dry
BY-130-19_SAT3	Murrumbateman	23/09/2023	684481.8	6150709	0	0	Dry
BY-130-19_SAT4	Murrumbateman	23/09/2023	683751.5	6150396	0	0	Dry
BY-130-19_SAT5	Murrumbateman	23/09/2023	682854.1	6150317	0	0	Dry
BY-130-19_SAT6	Murrumbateman	23/09/2023	684376.7	6150584	0	0	Dry
BY-130-19_SAT7	Murrumbateman	23/09/2023	682706.9	6150416	0	0	Dry

KOALASAT_2109_4D0	Murrumbateman	14/09/2021	691051	6154572	2.1	6.2	Light
KOALASAT_2109_51C	Murrumbateman	13/09/2021	688353.1	6153304	0	0	Dry
KOALASAT_2109_51F	Murrumbateman	14/09/2021	688794.1	6153553	2.1	6.2	Light
KOALASAT_2109_A01	Murrumbateman	14/09/2021	687050.8	6152636	2.1	6.2	Light
KOALASAT_2110_038	Bungonia	1/10/2021	772805.5	6186455	15	46	Moderate
KOALASAT_2110_100	Bungonia	1/10/2021	772812.1	6186468	15	46	Moderate
KOALASAT_2110_314	Bungonia	1/10/2021	772813.7	6186429	15	46	Moderate
KOALASAT_2110_374	Bungonia	1/10/2021	772834.3	6186438	15	46	Moderate
KOALASAT_2110_57E	Bungonia	1/10/2021	772806.8	6186429	15	46	Moderate
KOALASAT_2110_86C	Bungonia	1/10/2021	772831.1	6186417	15	46	Moderate
KOALASAT_2110_9EA	Bungonia	1/10/2021	772809	6186427	15	46	Moderate
KOALASAT_2110_A3B	Bungonia	1/10/2021	772825.1	6186420	15	46	Moderate
KOALASAT_2110_B95	Bungonia	1/10/2021	772807.6	6186451	15	46	Moderate
KOALASAT_2110_B97	Bungonia	1/10/2021	772797	6186439	15	46	Moderate
KOALASAT_2110_C4F	Bungonia	1/10/2021	772810.1	6186447	15	46	Moderate
KOALASAT_2110_C93	Bungonia	1/10/2021	772819.8	6186465	15	46	Moderate
KOALASAT_2110_C94	Bungonia	1/10/2021	772827.8	6186465	15	46	Moderate
KOALASAT_2110_E72	Bungonia	1/10/2021	772833.7	6186450	15	46	Moderate
KOALASAT_2110_F7C	Bungonia	1/10/2021	772827.3	6186465	15	46	Moderate
KOALASAT_2112_CFC	Snowy Mountains	17/12/2021	613922	6044313	0.9	2.6	Light
KOALASAT_2112_C28	Snowy Mountains	17/12/2021	614981.2	6042984	0.9	2.6	Light
KOALASAT_2112_80F	Snowy Mountains	17/12/2021	615428.4	6042386	0.9	2.6	Light
KOALASAT_2201_1F0	Bungonia	25/01/2022	768241.4	6185371	0	0	Dry
KOALASAT_2201_67B	Bungonia	26/01/2022	767549.1	6184921	0	0	Dry
KOALASAT_2201_EBD	Bungonia	27/01/2022	771866	6186486	0	0	Dry
MA-011_SAT1	Snowy Mountains	21/09/2023	607730	6056901	0	0	Dry
MA011-2	Snowy Mountains	22/09/2023	607026.2	6057155	0	0	Dry
MA-011_SAT2	Snowy Mountains	23/09/2023	606331.1	6057579	0	0	Dry
MA-009_SAT3	Snowy Mountains	8/10/2023	612890	6045523	0	0	Dry
MA-009_SAT2	Snowy Mountains	8/10/2023	613090.3	6045298	0	0	Dry
MA-009_SAT1	Snowy Mountains	8/10/2023	613271.6	6045016	0	0	Dry
MA-009_SAT4	Snowy Mountains	8/10/2023	613501.6	6044796	0	0	Dry

MA-005	Snowy Mountains	27/10/2023	614443	6043584	0	0	Dry
MA-005	Snowy Mountains	27/10/2023	614631.2	6043461	0	0	Dry
MA-004	Snowy Mountains	27/10/2023	614766.9	6043281	0	0	Dry
Koalaspotassessment_251	Snowy Mountains	26/11/2024	618238.9	6038869	0.1	0.2	Light
Koalaspotassessment_249	Snowy Mountains	26/11/2024	618175.5	6039065	0.1	0.2	Light
Koalaspotassessment_240	Snowy Mountains	26/11/2024	617948	6039295	0.1	0.2	Light
Koalaspotassessment_236	Snowy Mountains	26/11/2024	617812.5	6039577	0.1	0.2	Light
Koalaspotassessment_234	Snowy Mountains	26/11/2024	617591.5	6039403	0.1	0.2	Light
Koalaspotassessment_233	Snowy Mountains	26/11/2024	617626.1	6039825	0.1	0.2	Light
Koalaspotassessment_231	Snowy Mountains	26/11/2024	617398.5	6039665	0.1	0.2	Light
Koalaspotassessment_229	Snowy Mountains	26/11/2024	617268.5	6039922	0.1	0.2	Light
Koalaspotassessment_228	Snowy Mountains	27/11/2024	617080.7	6040133	0.7	2.0	Light
Koalaspotassessment_227	Snowy Mountains	27/11/2024	616929.5	6040378	0.7	2.0	Light
Koalaspotassessment_224	Snowy Mountains	27/11/2024	616767.1	6040651	0.7	2.0	Light
Koalaspotassessment_220	Snowy Mountains	28/11/2024	615983.5	6041679	6.9	20.6	Light
Koalaspotassessment_219	Snowy Mountains	28/11/2024	615811.6	6041860	6.9	20.6	Light
Koalaspotassessment_218	Snowy Mountains	28/11/2024	615637.5	6042037	6.9	20.6	Light
Koalaspotassessment_216	Snowy Mountains	29/11/2024	615178.5	6042628	6.8	20.4	Light
Koalaspotassessment_212	Snowy Mountains	29/11/2024	614980.5	6042770	6.8	20.4	Light
Koalaspotassessment_203	Snowy Mountains	30/11/2024	614172.6	6043962	25.5	76.6	Moderate
Koalaspotassessment_186	Snowy Mountains	1/12/2024	612989.2	6045883	29.7	89.2	Moderate
Koalaspotassessment_148	Snowy Mountains	1/12/2024	612671.7	6045824	29.7	89.2	Moderate
Koalaspotassessment_162	Snowy Mountains	1/12/2024	612754.5	6046073	29.7	89.2	Moderate
Koalaspotassessment_197	Snowy Mountains	2/12/2024	613710.5	6044554	29.9	89.8	Moderate
Koalaspotassessment_179	Snowy Mountains	2/12/2024	612883.9	6046375	29.9	89.8	Moderate
Koalaspotassessment_185	Snowy Mountains	3/12/2024	612935.5	6046772	14.5	43.6	Moderate
Team 2/3 Koala SAT 1	Snowy Mountains	4/12/2024	612902.2	6046528	9.5	28.4	Light
Team 2/3 Koala SAT 2	Snowy Mountains	4/12/2024	612914.7	6046655	9.5	28.4	Light
Team 2/3 Koala SAT 3	Snowy Mountains	4/12/2024	612882.6	6046847	9.5	28.4	Light
Team 2/3 Koala SAT 4	Snowy Mountains	4/12/2024	612945.5	6046924	9.5	28.4	Light
Team 2/3 Koala SAT 5	Snowy Mountains	4/12/2024	612913.8	6047051	9.5	28.4	Light
Team 2/3 Koala SAT 6	Snowy Mountains	4/12/2024	612883.5	6047177	9.5	28.4	Light

Team 2/3 Koala SAT 7	Snowy Mountains	4/12/2024	612898.5	6047313	9.5	28.4	Light
Team 2/3 Koala SAT 8	Snowy Mountains	4/12/2024	612777.1	6047352	9.5	28.4	Light
Team 2/3 Koala SAT 9	Snowy Mountains	4/12/2024	612794.4	6047195	9.5	28.4	Light
Team 2/3 Koala SAT 10	Snowy Mountains	5/12/2024	612747.4	6048121	9.3	27.8	Light
Team 2/3 Koala SAT 12	Snowy Mountains	5/12/2024	612762.2	6047620	9.3	27.8	Light
Team 2/3 Koala SAT 13	Snowy Mountains	5/12/2024	612529.5	6051065	9.3	27.8	Light
Team 2/3 Koala SAT 13	Snowy Mountains	5/12/2024	612381.4	6051220	9.3	27.8	Light
Team 2/3 Koala SAT 14	Snowy Mountains	5/12/2024	612251	6051422	9.3	27.8	Light
SAT 1	Murrumbateman	18/02/2025	705360.5	6161343	0	0	Dry
SAT 2	Murrumbateman	18/02/2025	704333.5	6160839	0	0	Dry
Sat 3	Murrumbateman	24/09/2023	686115.3	6152180	0	0	Dry
SAT 3	Murrumbateman	18/02/2025	703804.5	6160502	0	0	Dry
SAT 4	Murrumbateman	18/02/2025	704864.6	6161072	0	0	Dry
SAT01	Bungonia	30/10/2021	772833.7	6186450	0.1	0.4	Light
SAT-1	Bungonia	22/02/2025	772483.3	6186514	0.1	0.2	Light
SAT-1	Bungonia	22/02/2025	779920.6	6185608	0.1	0.2	Light
SAT-1	Bungonia	23/02/2025	778397.2	6186689	0.1	0.2	Light
SAT-1	Bungonia	23/02/2025	775220.9	6186637	0.1	0.2	Light
SAT-1	Bungonia	24/02/2025	766153.8	6183955	0	0	Dry
SAT-1	Bungonia	24/02/2025	766776.8	6184350	0	0	Dry
SAT-1	Murrumbateman	19/02/2025	698791.3	6158257	0	0	Dry
SAT-1	Murrumbateman	19/02/2025	685493.9	6151572	0	0	Dry
SAT-1	Murrumbateman	20/02/2025	685586.6	6151868	0	0	Dry
SAT-1	Murrumbateman	20/02/2025	700669.9	6159108	0	0	Dry
SAT-1	Murrumbateman	19/02/2025	681419.9	6150895	0	0	Dry
SAT-2	Bungonia	21/02/2025	773281.9	6186592	0.1	0.2	Light
SAT-2	Bungonia	22/02/2025	780241.4	6185072	0.1	0.2	Light
SAT-2	Bungonia	23/02/2025	771846.6	6186024	0.1	0.2	Light
SAT-2	Bungonia	23/02/2025	775826	6186716	0.1	0.2	Light
SAT-2	Bungonia	24/02/2025	767090.7	6184545	0	0	Dry
SAT-2	Bungonia	24/02/2025	766584.4	6184093	0	0	Dry
SAT-2	Murrumbateman	20/02/2025	702197.9	6159817	0	0	Dry

SAT-2	Murrumbateman	19/02/2025	681938.7	6150813	0	0	Dry
SAT-3	Bungonia	21/02/2025	772991.1	6186513	0.1	0.2	Light
SAT-3	Bungonia	23/02/2025	772132.8	6186409	0.1	0.2	Light
SAT-3	Bungonia	24/02/2025	767139.2	6184215	0	0	Dry
SAT-4	Bungonia	21/02/2025	773943.5	6186557	0.1	0.2	Light
SAT-4	Bungonia	24/02/2025	766870.9	6184018	0	0	Dry
SAT-5	Bungonia	21/02/2025	774763.2	6186514	0.1	0.2	Light
SAT-6	Bungonia	21/02/2025	774572.2	6186655	0.1	0.2	Light
SAT-7	Bungonia	21/02/2025	774410.9	6186553	0.1	0.2	Light
Team 2/3 Koala SAT 15	Snowy Mountains	5/12/2024	612279.2	6051603	9.3	27.8	Light
Team 2/3 Koala SAT 16	Snowy Mountains	6/12/2024	610567	6054523	5.3	16.0	Light
Team 2/3 Koala SAT 17	Snowy Mountains	6/12/2024	610457	6054636	5.3	16.0	Light
Team 2/3 Koala SAT 18	Snowy Mountains	6/12/2024	610391.5	6054765	5.3	16.0	Light
Team 2/3 Koala SAT 19	Snowy Mountains	6/12/2024	610649.3	6054390	5.3	16.0	Light
Team 2/3 Koala SAT 20	Snowy Mountains	6/12/2024	610748.2	6054275	5.3	16.0	Light
Team 2/3 Koala SAT 21	Snowy Mountains	6/12/2024	610859.2	6054192	5.3	16.0	Light
Team 2/3 Koala SAT 22	Snowy Mountains	6/12/2024	610911.6	6054135	5.3	16.0	Light
Team 2/3 Koala SAT 24	Snowy Mountains	7/12/2024	605490.4	6057913	7.3	21.8	Light
Team 2/3 Koala SAT 25	Snowy Mountains	7/12/2024	605611.6	6057879	7.3	21.8	Light
Team 2/3 Koala SAT 26	Snowy Mountains	7/12/2024	605824.6	6057696	7.3	21.8	Light
Team 2/3 Koala SAT 27	Snowy Mountains	7/12/2024	606100.2	6057558	7.3	21.8	Light
Team 2/3 Koala SAT 28	Snowy Mountains	7/12/2024	606458.3	6057416	7.3	21.8	Light
Team 2/3 Koala SAT 29	Snowy Mountains	8/12/2024	611187	6053764	7.3	22.0	Light
Team 2/3 Koala SAT 31	Snowy Mountains	8/12/2024	611415	6053285	7.3	22.0	Light
Team 2/3 Koala SAT 32	Snowy Mountains	8/12/2024	611319	6053504	7.3	22.0	Light
Team 2/3 Koala SAT 30	Snowy Mountains	8/12/2024	611076.4	6053979	7.3	22.0	Light
Team 2/3 Koala SAT 33	Snowy Mountains	8/12/2024	612058.6	6052122	7.3	22.0	Light
Team 2/3 Koala SAT 34	Snowy Mountains	8/12/2024	612164.9	6051763	7.3	22.0	Light
Team 2/3 Koala SAT 35	Snowy Mountains	8/12/2024	612098.6	6051924	7.3	22.0	Light
Team 2/3 Koala SAT 36	Snowy Mountains	9/12/2024	610125.9	6054975	7.3	22.0	Light
Team 2/3 Koala SAT 37	Snowy Mountains	9/12/2024	609978.7	6055152	7.3	22.0	Light
Team 2/3 Koala SAT 38	Snowy Mountains	9/12/2024	609854.3	6055345	7.3	22.0	Light

Team 2/3 Koala SAT 39	Snowy Mountains	9/12/2024	609675.5	6055515	7.3	22.0	Light
Team 2/3 Koala SAT 40	Snowy Mountains	9/12/2024	609449.5	6055693	7.3	22.0	Light
Team 2/3 Koala SAT 41	Snowy Mountains	9/12/2024	609341.1	6055970	7.3	22.0	Light
Team 2/3 Koala SAT 11	Snowy Mountains	10/12/2024	612801	6047830	0.1	0.2	Light
MA011	Snowy Mountains	8/02/2025	613139.8	6047031	4.7	12.6	Light
MA-011	Snowy Mountains	8/02/2025	612986.7	6047703	4.7	12.6	Light
MA-011	Snowy Mountains	8/02/2025	612766.4	6051852	4.7	12.6	Light
MA-011	Snowy Mountains	8/02/2025	612344	6052049	4.7	12.6	Light
MA-011	Snowy Mountains	9/02/2025	611134.5	6053299	4.3	12.8	Light
MA-011	Snowy Mountains	9/02/2025	610960.4	6053425	4.3	12.8	Light
MA-011	Snowy Mountains	9/02/2025	612670.7	6051436	4.3	12.8	Light
MA011	Snowy Mountains	10/02/2025	613190.3	6047363	10.2	30.6	Moderate
MA011	Snowy Mountains	10/02/2025	613185	6046542	10.2	30.6	Moderate
MA011	Snowy Mountains	10/02/2025	613201.5	6046087	10.2	30.6	Moderate
MA011	Snowy Mountains	10/02/2025	612541.6	6045386	10.2	30.6	Moderate
MA-011	Snowy Mountains	11/02/2025	610585.5	6053876	8.5	25.4	Light
MA-011	Snowy Mountains	11/02/2025	610929.6	6054481	8.5	25.4	Light
MA-011	Snowy Mountains	11/02/2025	610893.2	6053755	8.5	25.4	Light



Annex 14

Figures

Figure 1: Flora survey methods

Figure 2: Fauna survey methods

Figure 3a: Habitat constraint assessment – rocky habitats and bat roosts

Figure 3b: Habitat constraint assessment – HBTs, stick nests and WBSE habitat

Figure 3c: Habitat constraints assessment – Streams

Figure 4a: Flora results - Candidate flora

Figure 4b: Flora results – Vegetation

Figure 5: Fauna results – Candidate fauna

Figure 6: *Prasophyllum bagoense* impacts at McPhersons Plain

Figure 7: *Solanum armourense* survey effort