Appendix G

Biodiversity Development Assessment Report

prepared by

Capital Ecology Pty Ltd

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Monaro Rock Quarry, Royalla, NSW

Biodiversity Development Assessment Report

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We acknowledge the Traditional Custodians of the land on which we work. We pay our respects to Elders past and present.

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Executive Summary

Monaro Rock Pty Ltd (Monaro Rock) is currently progressing the planning and approval process for a proposed quarry (the 'proposed development') at 1995 Old Cooma Road, Royalla, NSW (the 'subject land'). The proposed development would include an extraction area, processing and stockpiling area, Quarry Access Road, and associated ancillary works including administrative buildings, a weighbridge, parking, fuel storage, a workshop, and track upgrades (collectively referred to throughout this report as the 'development footprint'). The development footprint is the only portion of the subject land that would be subject to physical disturbance. Any description of the wider subject land is included to provide detail on the broader environmental setting.

The project is classified as a State Significant Development (SSD) in accordance with Schedule 1 Part 8 of the *State Environmental Planning Policy (Planning Systems) 2021* and is therefore subject to assessment and determination by the NSW Minister for Planning. The application for approval must be accompanied by an Environmental Impact Statement (EIS) which RW Corkery & Co Pty Ltd (RW Corkery & Co) are preparing in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment on 29 September 2021 and modified on 18 August 2023 (application number SSD-27223807).

Scope

As described in the SEARs, a Biodiversity Development Assessment Report (BDAR) is required to identify and document the biodiversity values of the subject land and assess the impacts of the proposed development upon these values. Accordingly, the BDAR is a key informing document for the EIS. Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by RW Corkery & Co to complete the necessary biodiversity surveys and prepare this BDAR to identify and assess the significance of the impacts that the proposed development would have on the biodiversity values of the subject land.

Although general biodiversity values are identified and considered, the primary purpose of this BDAR is to present the results of Capital Ecology's application of the NSW Biodiversity Assessment Method (BAM) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act). In addition, this BDAR includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Subject Land and Development Footprint

The subject land is located adjacent to the ACT/NSW border, approximately 5 km north of the intersection of Monaro Highway and Old Cooma Road. The 556.71 ha subject land covers the entire Monaro Rock property, while the 78.69 ha development footprint encompasses all of the direct impacts associated with the proposed development. The development footprint does not include the proposed tree screening areas as these areas would be planted out with PCT appropriate canopy and midstorey species.

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Survey Overview

Vegetation and potential flora/fauna habitat were surveyed and mapped in accordance with the BAM. This involved the following ecological surveys performed by Capital Ecology between 27 October 2020 and 5 December 2024.

- Plant Community Type (PCT) and Vegetation Zone assessment and mapping.
- BAM plots.
- Threatened flora surveys via transects, random meander, surveys of rocky areas, and opportunistic observations.
- Threatened bird surveys via areas searches and opportunistic observations.
- Threatened forest owl / nocturnal fauna surveys via call-playback and spotlighting.
- Surveys for the Pink-tailed Legless Lizard *Aprasia parapulchella* via intensive rock turning surveys.
- Surveys for the Golden Sun Moth *Synemon plana* via random meander and transects through potential habitat during the flying season.
- Surveys for Key's Matchstick Grasshopper *Keyacris scurra* via transects, random meander, and opportunistic observations.

Results

Native vegetation

The subject land supports the following two PCTs.

- PCT3375 – Monaro-Queanbeyan Rolling Hills Grassy Forest.
- PCT3376 – Southern Tableland Grassy Box Woodland.

Before European occupation, the whole of the subject land would have been characterised by woody PCTs. These woody PCTs were likely to have included open grassy woodland extending across the flatter, more gently sloping foothills, merging with a grassy / dry sclerophyll forest on the hillslopes and higher elevated land. However, the subject land has been utilised for agriculture (grazing) for an extended period and as a result the current vegetation is modified. The native overstorey and midstorey have been cleared across approximately 37% of the subject land, and some of the areas which retain a woody overstorey still show signs of historic thinning. However, despite the history of disturbance, almost the whole of the subject land is characterised by a native dominant groundstorey with a moderate to high diversity of native forbs. The exceptions to this are two paddocks that were ploughed and sown to Phalaris *Phalaris aquatica* in autumn/spring 2024.

Threatened ecological communities

PCT3376 is identified as the potential BC Act listed Threatened Ecological Community (TEC) *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (BC Act Box-Gum Woodland). The subject land is estimated to support 218.11 ha of high quality BC Act Box-Gum Woodland in the areas mapped as PCT3376 Zone 1 (which supports a canopy representative of the

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climax community and a diverse midstorey, shrubstorey, and groundstorey) and PCT3376 Zone 2 (which supports a diverse groundstorey).

PCT3376 is also identified as the potential EPBC Act listed TEC *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EPBC Act Box-Gum Woodland). As above, the areas mapped as PCT3376 Zone 1 and Zone 2 meet the criteria for the EPBC Act listed TEC. The subject land therefore supports 218.11 ha of EPBC Act Box-Gum Woodland.

Threatened species

Threatened flora

Targeted surveys recorded the following threatened flora species.

- Silky Swainson-pea *Swainsona sericea* (BC Act Vulnerable). The subject land is estimated to support 92.36 ha of Silky Swainson-pea habitat, primarily in PCT3375 / PCT3376 Zones 1 and 2, with smaller areas of habitat in PCT3375 Zone 3 and 4.
- Pale Pomaderris *Pomaderris pallida* (EPBC Act and BC Act Vulnerable). The subject land is estimated to support of 2.52 ha of Pale Pomaderris habitat in PCT3375 Zone 1 and PCT3376 Zone 1.
- Small Purple-pea *Swainsona recta* (EPBC Act and BC Act Endangered). The subject land is estimated to support of 0.42 ha of Small Purple-pea habitat in PCT3375 Zone 1, PCT3376 Zone 1, and PCT3376 Zone 2.
- Hoary Sunray *Leucochrysum albicans subsp. tricolor* (EPBC Act and BC Act Endangered). The subject land is estimated to support a single Hoary Sunray plant in 0.28 ha of habitat in PCT3375 Zone 1 and Zone 2.

Threatened birds

Targeted surveys recorded the following threatened bird species.

- Woodland birds (Dusky Woodswallow *Artamus cyanopterus* [BC Act Vulnerable], Gang-gang Cockatoo *Callocephalon fimbriatum* [BC Act / EPBC Act Endangered], Speckled Warbler *Chthonicola sagittate* [BC Act Vulnerable], Varied Sittella *Daphoenositta chrysoptera* [BC Act Vulnerable], Scarlet Robin *Petroica boodang* [BC Act Vulnerable], Flame Robin *Petroica phoenicea* [BC Act Vulnerable]).
- Latham's Snipe *Gallinago hardwickii* (BC Act / EPBC Act Vulnerable, marine, and migratory).

Dusky Woodswallow, Gang-gang Cockatoo (foraging), Speckled Warbler, Varied Sittella, Scarlet Robin, and Flame Robin are assumed to occur in the subject land as ecosystem credit species. Apart from Gang-gang Cockatoo, these species are only listed under the BC Act and are therefore not considered in greater detail as any impact to them is captured through assessment of ecosystem impacts and associated offsetting through ecosystem credits.

Gang-gang Cockatoo

Gang-gang Cockatoo is identified as both an ecosystem credit species (for foraging) and as a species credit species (for breeding). In addition, Gang-gang Cockatoo is listed as endangered under the EPBC Act.

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Gang-gang Cockatoo were observed on two occasions, both of which were in PCT3375 Zone 1. The south-eastern observation was of a pair of Gang-gang Cockatoos flying through the canopy, while the north-western observation was of a lone male Gang-gang Cockatoo. Based on these observations, the subject land is estimated to support 348.57 ha of Gang-gang Cockatoo foraging habitat, composed of those vegetation zones that support a canopy (i.e. PCT3375 Zones 1, 3, and 5 and PCT3376 Zone 1).

While no signs of breeding activity were recorded in 2020, additional targeted surveys for Gang-gang Cockatoos were conducted in 2024. No further signs of Gang-gang Cockatoos were detected. Given the small number of Gang-gang Cockatoo observations over multiple years and the absence of any sign of breeding activity, the species is considered unlikely to breed in the subject land.

Latham's Snipe

Four Latham's Snipe were observed incidentally during Golden Sun Moth surveys, presumably foraging / roosting in the soak between two dams in the south of the subject land. Latham's Snipe is not identified as either an ecosystem credit species or species credit species pursuant to the Biodiversity Offset Scheme (BOS) and so cannot be added to the BAM Calculator. However, the proposed development would not directly impact the recorded foraging / roosting habitat. In addition, given the substantial distance to ongoing quarry operations, the proposed development is considered unlikely to indirectly impact the recorded foraging / roosting habitat. Accordingly, Latham's Snipe is considered unlikely to be directly or indirectly impacted by the proposed development.

Threatened reptiles

Under current Commonwealth Survey Guidelines and the previous NSW Government Survey Guidelines, the results of targeted Pink-tailed Legless Lizard surveys could be used to determine the presence/absence of the species within a site and help define the extent of habitat. While this is still the case under the Commonwealth Survey Guidelines, since October 2024 the BAM now requires Pink-tailed Legless Lizard to either be: 1) assessed via expert report; or 2) assumed to be present.

Given the differences between the Commonwealth and NSW Government's requirements, the extent of Pink-tailed Worm Lizard habitat in the subject land has been defined in the following two ways.

1. Occupied habitat, which has been determined with reference to the results of the targeted surveys. Occupied habitat is used to determine the impact to the species pursuant to the EPBC Act.

2. Characteristically suitable habitat, which encompasses all portions of the subject land that support appropriate habitat features. Characteristically suitable habitat is used to determine the impact to the species pursuant to the BC Act and BOS.

Occupied habitat

Across the initial four days of survey in 2020/21, six adult Pink-tailed Legless Lizards were recorded. Pink-tailed Legless Lizard were only recorded close to the northern boundary of the subject land. This finding was somewhat surprising given that much of the potential habitat across the remainder of the subject land appeared to be characteristically suitable for the species, being loose surface rock in a native dominant groundstorey that is largely dominated by Kangaroo Grass *Themeda triandra* and a moderate to high diversity of forbs. As a result, an additional rock turning survey was conducted a second time across the development footprint and adjacent areas in 2024. Again, no

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Pink-tailed Legless Lizard were recorded within that portion of the subject land. Sufficient surface rock was turned across the development footprint on multiple occasions to provide reasonable confidence that the species does not occur in these areas.

With respect to the above, occupied Pink-tailed Legless Lizard habitat in the subject land has therefore been determined by:

- calculating a 200 m buffer around the six recorded individuals;
- identifying all patches of surface rock that intersect with the 200 m buffer; and
- calculating a 50 m buffer to the above identified patches of surface rock.

Following the above methodology, the subject land is estimated to support 75.99 ha of occupied habitat in PCT3375 Zone 1, Zone 2, Zone 3, Zone 4, and PCT3376 Zone 1 and Zone 2.

Characteristically suitable habitat

Characteristically suitable Pink-tailed Legless Lizard habitat in the subject land has been determined by:

- mapping all areas that support loose surface rock via analysis of aerial imagery and subsequent refinement during on-ground field surveys;
- excluding areas of surface rock that occur under a dense canopy (i.e. areas with >50% opaque crown cover, which is roughly equal > 25% projected foliage cover);
- calculating a 50 m buffer to all areas of remaining potential habitat; and
- excluding areas that that occur in an exotic dominant groundstorey.

Following the above methodology, the subject land is estimated to support 367.51 ha of characteristically suitable habitat in PCT3375 Zone 1, Zone 2, Zone 3, Zone 4, and PCT3376 Zone 1 and Zone 2.

Threatened insects

Key's Matchstick Grasshopper was recorded in two locations, both of which were adjacent to the Goulburn Bombala Rail Line in PCT3375 Zone 1. These areas were characterised by a moderately open canopy (i.e. a scattered canopy as opposed to a dense canopy) combined with a diverse and native dominate groundstorey to contained areas of bare ground and a substantial component of Kangaroo Grass. The subject land is estimated to support 3.08 ha of Key's Matchstick Grasshopper habitat in PCT3375 Zone 1, PCT3376 Zone 1, and PCT3376 Zone 2.

Avoidance and Minimisation

A range of alternatives for a number of the project components were examined before deciding upon the location, scale, and form of the proposed development as presented in this BDAR. This included consideration of multiple extraction areas, project access routes, location and configuration of processing equipment, and final landform and land use.

Important factors that were considered during this process included the location of the hard rock resource, biodiversity, Aboriginal heritage, proximity to residences, community preferences, access, amenity, road safety, planning approval risks, road authority, configuration of public roads, construction complexity, cost, landowner agreements, and terrain.

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Impacts

Direct impacts

The proposed development would result in the direct clearance of vegetation and species credit species habitat as detailed in below table. In total, the proposed development would result in the clearance of 77.03 ha of BC Act native vegetation, which includes 22.44 ha of EPBC Act / BC Act Box-Gum Woodland, 39.95 ha of characteristically suitable Pink-tailed Legless Lizard habitat (noting that no known occupied habitat would be impacted), 2.35 ha of Key's Matchstick Grasshopper habitat, 0.56 ha of Pale Pomaderris habitat, 0.13 ha of Small Purple-pea habitat, and 2.66 ha of Silky Swainson-pea habitat.

Vegetation zone / species	Area	BC Act Native Vegetation	VI score	Listing status
PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest				
Zone 1	29.57 ha	Yes	81.3	-
Zone 2	15.92 ha	Yes	21.0	
Zone 3	5.49 ha	Yes	52.4	
Zone 4	2.88 ha	Yes	10.9	
Zone 5	0.73 ha	Yes	20.4	
Zone 6	0.80 ha	No	6.7	
PCT3376 Southern Tableland Grassy Box Woodland				
Zone 1	12.29 ha	Yes	59.3	Critically endangered (BC Act & EPBC Act)
Zone 2	10.15 ha	Yes	14.4	
Pink-tailed Legless Lizard *Aprasia parapulchella*				
PCT3375 Zone 1	17.50 ha	-	81.3	Vulnerable (BC Act & EPBC Act)
PCT3375 Zone 2	5.61 ha	-	21.0	
PCT3375 Zone 3	3.39 ha	-	52.4	
PCT3375 Zone 4	2.29 ha	-	10.9	
PCT3376 Zone 1	7.80 ha	-	59.3	
PCT3376 Zone 2	3.36 ha	-	14.4	
Key's Matchstick Grasshopper *Keyacris scurra*				
PCT3375 Zone 1	2.06 ha	-	81.3	Endangered (BC Act & EPBC Act)
PCT3376 Zone 1	0.29 ha	-	59.3	
Pale Pomaderris *Pomaderris pallida*				
PCT3375 Zone 1	0.56 ha	-	81.3	Vulnerable (BC Act & EPBC Act)
Small Purple-pea *Swainsona recta*				
PCT3375 Zone 1	0.06 ha	-	81.3	Endangered (BC Act & EPBC Act)
PCT3376 Zone 1	0.07 ha	-	59.3	
Silky Swainson-pea *Swainsona sericea*				
PCT3375 Zone 1	1.60 ha	-	81.3	Vulnerable (BC Act)
PCT3375 Zone 2	0.42 ha	-	21.0	
PCT3376 Zone 1	0.10 ha	-	59.3	
PCT3376 Zone 2	0.54 ha	-	14.4	

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Indirect impacts

Following minimisation and mitigation measures, noise, edge effects, and dust may have an indirect impact on retained / adjacent areas. The severity of indirect impacts has been determined in the following manner.

1. A 20% reduction in biodiversity value within 50 m of the extraction, processing, and stockpiling areas.
2. A 20% reduction in biodiversity value within 30 m of the unsealed section of the Quarry Access Road.
3. A 10% reduction in biodiversity value within 100 m of the extraction, processing, and stockpiling areas.
4. A 10% reduction in biodiversity value within 30 m of the sealed section of the Quarry Access Road.

The only way in which indirect impacts can be captured by the BAM Calculator is through altering VI scores. As VI scores cannot be directly altered in the BAM Calculator, the estimated reduction in quality has been achieved by reducing the average composition, structure, and function scores by the relevant amount for each indirectly impacted vegetation zone. By altering composition, structure, and function scores, the future VI scores for indirectly impacted vegetation zones are reduced. This reduction in VI in turn generates an ecosystem credit offset obligation for indirectly impacted vegetation. In total, indirect impacts generate a total of 80 ecosystem credits, which represents 4.3% of the total ecosystem credit offset obligation associated with the project.

Serious and Irreversible Impacts (SAII)

The subject land supports the following ecological community and threatened flora species which are listed as SAII entities.

- PCT3376 - Southern Tablelands Grassy Box Woodland (BC Act Box-Gum Woodland).
- Pale Pomaderris *Pomaderris pallida*.

The proposed development would result in the clearance of 22.44 ha of BC Act Box-Gum Woodland, indirect impact to 5.39 ha of BC Act Box-Gum Woodland, and clearance of 0.56 ha of Pale Pomaderris habitat. Additional information is provided in the BDAR to support the decision maker to determine if the proposed impacts constitute a SAII.

Assessment and Approval Requirements

Commonwealth EPBC Act

The proposed development would result in the following impacts to EPBC Act listed MNES in the NSW portion of the subject land[1].

- Clearance of 22.44 ha of EPBC Act Box-Gum Woodland (EPBC Act critically endangered) and indirect impact of 5.39 ha of EPBC Act Box-Gum Woodland.
- Clearance of 2.35 ha of Key's Matchstick Grasshopper habitat (EPBC Act Endangered).

[1] Additional impacts to MNES will occur in the ACT portion of the subject land. Those impacts will be included in the EPBC Act referral.

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- Clearance of 0.56 ha of Pale Pomaderris habitat (EPBC Act Vulnerable).
- Clearance of 0.13 ha of Small Purple-pea habitat (EPBC Act Endangered).
- Clearance of 48.08 ha of Gang-gang Cockatoo foraging habitat (EPBC Act Endangered).

As detailed in the associated Significant Impact Criteria (SIC) assessments, the proposed development is considered: 1) likely to result in a significant impact to EPBC Act Box-Gum Woodland, Gang-gang Cockatoo, Key's Matchstick Grasshopper, and Small Purple-pea; and 2) unlikely to result in a significant impact to Pale Pomaderris. In light of the above, it is anticipated that the proposed development would be a controlled activity and would require assessment and approval under the EPBC Act.

Note: with regard to Pink-tailed Legless Lizard, the extent of habitat as determined by the Commonwealth Survey Guidelines is defined by the extent of occupied habitat (as opposed to characteristically suitable habitat). As the proposed development will not impact any occupied Pink-tailed Legless Lizard habitat, the proposed development is not considered to impact the species pursuant to the EPBC Act.

NSW BC Act – Biodiversity offset credit calculations

The proposed development would involve the clearance of vegetation which generates the following ecosystem credits.

PCT & Vegetation Zone	Impact Type	Area	Credits Required
PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest			
Zone 1	Direct impact	29.57 ha	1052
Zone 2		15.92 ha	146
Zone 3		5.49 ha	126
Zone 4		2.88 ha	0
Zone 5		0.73 ha	7
Zone 6		0.80 ha	0
Zone 1	Indirect impact	28.78 ha	57
Zone 2		7.67 ha	11
Zone 3		0.48 ha	2
Zone 4		0.50 ha	0
Zone 6		0.37 ha	0
		TOTAL	**1401**
PCT3376 Southern Tableland Grassy Box Woodland			
Zone 1	Direct impact	12.29 ha	455
Zone 2		10.15 ha	0
Zone 1	Indirect impact	4.73 ha	10
Zone 2		0.66 ha	0
		TOTAL	**465**

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The proposed development would involve the clearance of vegetation which generates the following species credits.

Species	PCT & Vegetation Zone	Area	Credits Required
Aprasia parapulchella Pink-tailed Legless Lizard	PCT3375 Zone 1	17.50 ha	711
	PCT3375 Zone 2	5.61 ha	59
	PCT3375 Zone 3	3.39 ha	89
	PCT3375 Zone 4	2.29 ha	13
	PCT3376 Zone 1	7.80 ha	231
	PCT3376 Zone 2	3.36 ha	24
		TOTAL	**1127**
Keyacris scurra Key's Matchstick Grasshopper	PCT3375 Zone 1	2.06 ha	84
	PCT3376 Zone 1	0.29 ha	9
		TOTAL	**93**
Pomaderris pallida Pale Pomaderris	PCT3375 Zone 1	0.56 ha	34
		TOTAL	**34**
Swainsona recta Small Purple-pea	PCT3375 Zone 1	0.06 ha	2
	PCT3376 Zone 1	0.07 ha	2
		TOTAL	**4**
Swainsona sericea Silky Swainson-pea	PCT3375 Zone 1	1.60 ha	65
	PCT3375 Zone 2	0.42 ha	4
	PCT3376 Zone 1	0.10 ha	3
	PCT3376 Zone 2	0.54 ha	4
		TOTAL	**76**

Staged retirement of credits

The credit obligation would be met in two stages, as summarised in the below table. Surface disturbance activities in each stage would not commence until the credit obligation relative to that stage have been satisfied.

Credit type	Description	Impact type	Area	Credits
Stage 1 - Site Establishment and Stage 1 Extraction				
Ecosystem	PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest	Direct	27.85 ha	674
		Indirect	37.80 ha	70
	PCT3376 Southern Tableland Grassy Box Woodland	Direct	10.84 ha	208
		Indirect	5.39 ha	10
Species	Pink-tailed Legless Lizard (*Aprasia parapulchella*)	Direct	16.38 ha	456
	Key's Matchstick Grasshopper (*Keyacris scurra*)		2.35 ha	93
	Pale Pomaderris (*Pomaderris pallida*)		0.28 ha	17
	Small Purple-pea (*Swainsona recta*)		0.13 ha	4
	Silky Swainson-pea (*Swainsona sericea*)		2.32 ha	63

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Credit type	Description	Impact type	Area	Credits
Stage 2 - Extraction Area Development				
Ecosystem	PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest	Direct	27.54 ha	657
	PCT3376 Southern Tableland Grassy Box Woodland		11.60 ha	247
Species	Pink-tailed Legless Lizard (*Aprasia parapulchella*)		23.57 ha	671
	Pale Pomaderris (*Pomaderris pallida*)		0.28 ha	17
	Silky Swainson-pea (*Swainsona sericea*)		0.34 ha	13

Credit obligation options

To meet the offset obligation, Monaro Rock is investigating the following three options. All offset obligations would be met via the 'like-for-like' offset rules.

1. Retiring biodiversity credits generated at a Biodiversity Stewardship Site to be established in the subject land. The land in the west of the subject land, between the development footprint and the Goulburn Bombala Railway Line, is being considered for a Biodiversity Stewardship Site. Initial investigations indicate that a such a Biodiversity Stewardship Site would generate enough credits to meet approximately 50% of the total offset obligation.
2. Retiring biodiversity credits that have been purchased on the market. A number of Biodiversity Stewardship Sites have been established in the Monaro / Murrumbateman IBRA Subregions[2]. This includes Beatty Hill, which directly borders the eastern boundary of the subject land, and an additional four Biodiversity Stewardship Sites in Williamsdale / Burra. These established Biodiversity Stewardship Sites, which have entered into active management, generate the same ecosystem credits and species credits as the proposed development. As such, purchasing credits from these Biodiversity Stewardship Site could meet almost 100%[3] of the proposed development's offset obligation, and do so through conservation of land that is located close to the impacted area.
3. Paying into the Biodiversity Conservation Fund. The amount which must be paid into the Biodiversity Conservation Fund is determined at the time the proponent applies for an invoice from the Biodiversity Conservation Trust. A risk premium is included in that calculation to account for fact that the risks and costs involved in securing the offset have effectively been transferred to the Biodiversity Conservation Trust.

The final offset strategy would be determined prior to the clearing of any vegetation for the proposed development and may include only one or a mix of the above options.

[2] Beatty Hill, Williamsdale North, Williamsdale South, Burra North, Burra South, Panorama Biobanking Agreement, Swans Biobanking Agreement, The Poplars North Biobanking Agreement, and The Poplars South Biobanking Agreement.

[3] The only credit type which is not available in sufficient numbers from these biodiversity stewardship sites is Small Purple-pea. However, as detailed in the Biodiversity Credits Catalogue, a small number of Small Purple-pea credits are available for purchase.

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Summary and Conclusion

As summarised below, this BDAR presents the outcomes of comprehensive field survey and assessment of the subject land and development footprint.

- Ecological field surveys were undertaken in accordance with the BAM.
- The subject land contains two PCTs (PCT3375 and PCT3376), one of which is a threatened ecological community listed under the NSW BC Act and the Commonwealth EPBC Act (i.e. Box-Gum Woodland).
- A number of threatened flora and fauna species have been identified on the subject land and within the development footprint.
- Monaro Rock has considered opportunities to avoid impacts to biodiversity in developing the project design. This included avoidance of good condition vegetation as well as making decisions that considered biodiversity risks alongside Aboriginal cultural heritage impacts, road safety, and community amenity risks.
- An assessment of SAII and the significance of impacts to threatened species has identified the following.
    - Both Box-Gum Woodland and Pale Pomaderris are SAII entities. Potential impacts to these entities should be assessed in light of this listing.
    - As per the Commonwealth SIC assessment, there is likely to be a significant impact to critically endangered Box-Gum Woodland on the basis of direct and indirect impacts.
    - As per the Commonwealth SIC assessments, there is likely to be a significant impact to Gang-gang Cockatoo foraging habitat, Key's Matchstick Grasshopper habitat, and Small Purple-pea habitat.
- The assessment of significance does not incorporate the likely benefit of establishing or supporting biodiversity offsets in perpetuity.
- Assessment in accordance with the BAM has established that the residual impacts to biodiversity associated with the development footprint may be offset in accordance with the Biodiversity Offset Scheme.

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1 Introduction

Monaro Rock Pty Ltd (Monaro Rock) is currently progressing the planning and approval process for a proposed quarry (the 'proposed development') at 1995 Old Cooma Road, Royalla, NSW (the 'subject land', Figure 1). As shown in Figure 2, the proposed development would include an extraction area, processing and stockpiling area, Quarry Access Road, and associated ancillary works including administrative buildings, a weighbridge, parking, fuel storage, a workshop, and track upgrades (collectively referred to throughout this report as the 'development footprint', Figure 3). The development footprint is the only portion of the subject land that would be subject to physical disturbance. Any description of the wider subject land is included to provide detail on the broader environmental setting.

The proposed development is classified as a State Significant Development (SSD) in accordance with Schedule 1 Part 8 of the *State Environmental Planning Policy (Planning Systems) 2021* and is therefore subject to assessment and determination by the NSW Minister for Planning. The application for approval must be accompanied by an Environmental Impact Statement (EIS) which RW Corkery & Co Pty Ltd (RW Corkery & Co) are preparing in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment on 29 September 2021 and modified on 18 August 2023 (application number SSD-27223807).

As described in the SEARs, a Biodiversity Development Assessment Report (BDAR) is required to identify and document the biodiversity values of the subject land and assess the impacts of the proposed development upon these values. Accordingly, the BDAR is a key informing document for the EIS. Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by RW Corkery & Co to complete the necessary biodiversity surveys and prepare this BDAR to identify and assess the significance of the impacts that the proposed development would have on the biodiversity values of the subject land.

Although general biodiversity values are identified and considered, the primary purpose of this BDAR is to present the results of Capital Ecology's application of the NSW Biodiversity Assessment Method (BAM) (NSW Government 2020a[4]) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act). In addition, this BDAR includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Note: as shown in Figure 2, a small section of the proposed development occurs in the Australian Capital Territory (ACT). Accordingly, that section of the proposed development is not assessed as part of this BDAR and will instead be assessed and approved pursuant to the relevant ACT legislation. However, see Section 3.2.4 for a summary of cumulative impacts associated with the combined ACT and NSW portions of the proposed development.

[4] NSW Government (2020a). *Biodiversity Assessment Method*. NSW Department of Planning, Industry and Environment. Published October 2020.

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1.1 Version History

This BDAR is the first version that has been formally submitted for review and assessment. Future versions of this BDAR will include a summary of the key changes that have occurred in comparison to earlier versions.

1.2 Subject Land and Development Footprint

The subject land is located adjacent to the ACT/NSW border, approximately 5 km north of the intersection of Monaro Highway and Old Cooma Road (Figure 1 and Figure 3). The 556.71 ha subject land covers the entire Monaro Rock property, while the 78.69 ha development footprint encompasses all of the direct impacts associated with the proposed development, including the extraction area, processing and stockpiling area, Quarry Access Road, and associated ancillary works including administrative buildings, a weighbridge, parking, fuel storage, a workshop, and track upgrades (Figure 2 and Figure 3). The development footprint does not include the proposed tree screening areas as these areas would be planted out with PCT appropriate canopy and midstorey species.

The subject land is bordered by:

- lightly to moderately cleared agricultural and conservation zoned land to the north, east, and south; and
- the Goulburn Bombala Rail Line to the west, beyond which is ACT land consisting of rural lease land, the Rob Roy Range Nature Reserve, and the Monaro Highway.

Table 1 details the lots, DPs, zoning, and minimum lot size associated with the subject land and development footprint. Located in the Queanbeyan-Palerang Regional Council (QPRC) Local Government Area (LGA), pursuant to the *Queanbeyan Local Environment Plan 2022* (Queanbeyan LEP), the subject land is zoned[5] 'RU2 – Rural Landscape', 'C2 – Environmental Conservation', and 'SP2 – Infrastructure' with a minimum lot size[6] of 'AC – 80 ha'. The majority of the subject land is identified on the Queanbeyan LEP Terrestrial Biodiversity Map[7]; these areas correspond to the portions of the subject land that support a remnant canopy.

Much of the subject land, particularly in the western half, is mapped as 'High Environmental Land' and 'South East and Tablelands Corridors' on the South East and Tablelands Regional Plan[8]. Of relevance to the subject land: 1) the criteria for mapping lands with high environmental value includes existing conservation areas, threatened ecological communities and key habitats, and important vegetation areas; and 2) regional biodiversity corridors are native vegetation links within a region, between regions, or between significant biodiversity features. They expand and link different habitats and are critical to long-term ecological connections, particularly in the context of long-term climate change.

[5] Queanbeyan Local Environment Plan (2022). *Land Zoning Map - Sheet LZN_001.*
[6] Queanbeyan Local Environment Plan (2022). *Lot Size Map - Sheet LZN_001.*
[7] Queanbeyan Local Environment Plan (2022). *Terrestrial Biodiversity Map – Sheet BIO_001.*
[8] https://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=Seat_Corridors

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Table 1. Lots and DPs

Area	Lot	DP	Zoning	Minimum lot size
Subject land	6, 255, 256, 257, 258, 259, 282, 283, 301, 302	754912	RU2 – Rural Landscape	AC – 80 ha
	1, 2	555380	C2 – Environmental Conservation	
	152	754912		
	7002	1019607		
	5403	1244966	SP2 – Infrastructure	N/A
	Various unnamed Crown roads			
Development footprint	6, 256, 257, 258, 259, 282, 283	754912	RU2 – Rural Landscape	AC – 80 ha
	2	555380	C2 – Environmental Conservation	
	5403	1244966	SP2 – Infrastructure	N/A
	Various unnamed Crown roads			

The topography varies significantly across the subject land. The highest point, Enchanted Hill, is in the south-west of the subject land and stands at approximately 950 m Australian Height Datum (AHD). The elevation falls sharply in most directions, reaching approximately 760 m AHD on the western boundary and approximately 800 m AHD on the eastern boundary. An undulating ridge runs from Enchanted Hill to the north-east, and relatively flat topography occurs in the south-eastern corner of the subject land.

Before European occupation, the subject land would have been characterised by a grassy / dry sclerophyll forest on the elevated and steeply sloping areas that merged with an open grassy woodland lower in the landscape. However, the subject land has been modified by its current and past land use, which has primarily been agriculture (grazing). This has led to substantial clearing of the native woody overstorey, midstorey, and shrubstorey across approximately 37% of the subject land. Some of the areas which have retained a woody overstorey have also undergone historic thinning. Despite the history of grazing, the groundstorey across the subject land is largely dominated by native grasses and supports a moderate to high diversity of native forbs.

Finally, there are a number of farm sheds, stock holding yards, silos, farm tracks, and farm dams in the subject land, and Enchanted Hill has a telecommunications tower at its summit. The subject land also contains internal and boundary stock fences, which are in a generally good condition.

1.3 Proposed Development

Monaro Rock has identified an important deposit of rhyodacitic ignimbrite in the subject land, a high-quality hard rock valued for concrete production. Estimates indicate a total resource of approximately 31.1 million tonnes with good prospects for continued supply in other areas within the subject land. A term of 30 to 35 years is being sought for the operation of the proposed development. The project would provide aggregates and other concrete batching products to operations associated with Monaro Rock and for local and regional infrastructure and construction projects. The potential demand, quality of the product, and economic benefits, supports consideration of the material within the subject land as a strategically significant resource.

The development and operation of the proposed development is described in detail in Section 3 of the EIS. In summary, the proposed development would consist of a single open cut extraction area.

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Processing would commence within the extraction area using mobile equipment, with adjacent land progressively developed as a standalone processing and stockpiling area. Access arrangements for the proposed development would require the construction of a dedicated Quarry Access Road to the south-west of the extraction area, including a crossing of the Goulburn Bombala Rail Line, and would enter the public road network at a new intersection with the Monaro Highway. The south-western 2.7 km of the Quarry Access Road will be sealed and fenced to reduce noise and dust generation, with the remainder being unsealed and unfenced. A secondary unsealed access road for light vehicle traffic will be established by upgrading the existing farm track in the south-east of the subject land and connecting it to Mates Drive.

Proposed operating hours for the various activities associated with the proposed development are detailed in Table 2.

Table 2. Proposed hours of operation

Activity	Monday to Friday	Saturdays	Sundays or Public Holidays
Construction Activities	7:00am to 6:00pm	8:00am to 1:00pm	Nil
Extraction and Processing Operations including use of Pugmill and concrete recycling	7:00am to 6:00pm	7:00am to 6:00pm	Nil
Blasting Operations	9:00am to 5:00pm	Nil	Nil
Product Despatch and Material Importation	5:00am to 6:00pm	5:00am to 6:00pm	Nil
Concrete / Asphalt Production	7:00am to 6:00pm	8:00am to 1:00pm	Nil
Maintenance	24 hours / day	24 hours / day	Nil

1.3.1 Staging

The intention is to progressively increase production, with activities staged as follows to meet demand and allow the operation to grow as the construction market expands. The triggers for production rates would coincide with the staging of development of the processing and stockpiling area as the space available in this area would need to grow to provide stockpiling space and the management of various product types.

- Project Site Establishment - Processing and despatch of up to 100,000 tonnes per annum (tpa) during site establishment using mobile processing plant which would initially be located within the extraction area.
- Stage 1 - Processing of up to 250,000 tpa using a mobile processing plant which would be located within the Stage P1 processing area. A Pugmill would also be used during this stage.
- Stage 2 - Once a production rate of 250,000 tpa is reached, the Stage P2 processing plant area would be constructed.
- Stage 3 - Production using mobile processing equipment would continue up to a level of 750,000 tpa. At this level, or earlier if needed, a fixed processing plant would be commissioned and built. The fixed processing equipment would then be used for production up to the limit of 1,000,000 tpa.

Timing for each stage would be dependent on demand, but it is anticipated that Stage 2 would be commenced within five years of approval.

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1.3.2 Extraction

Extraction would occur using standard drill and blast, load, and haul methods. Blasting would generate between 25,000 t and 100,000 t of raw material for each blast event. Blasted rock would be loaded to haul trucks by excavator or front-end loader and hauled from the extraction area to the mobile or fixed processing plant. Blasting would be limited to at most weekly blast events. Blasting may need to be repeated in the event of a misfire; however, this would be rare.

1.3.3 Processing

Both mobile and fixed processing plants would be utilised throughout the project life.

The mobile processing plant includes three crushers, a vertical shaft impactor, two screening decks, conveyor belts, stacks, bins, hoppers, and a Pugmill.

The fixed processing plant will be used for all production at levels greater than 750,000 tpa. It includes three crushers, a vertical shaft impactor, five screen decks, conveyor belts, stacks, bins, hoppers, and a Pugmill. All new processing plant equipment would be constructed in accordance with standard practice for the quarrying industry and incorporate suitable enclosures and other mitigation for potential noise and dust impacts.

1.3.4 Ancillary Infrastructure

Additional infrastructure would be developed for activities that are ancillary to the production of hard rock aggregates. These activities, which are described below, would occur alongside extraction and processing operations to produce additional products for use in the construction industry.

- Importation and processing of up to approximately 20,000 tpa of concrete for use as a component of blended products for sale. It would involve concrete importing, stockpiling, loading, crushing, temporary storage of process material, and potential further processing (blending, crushing, screening, and/or stabilisation). The concrete is likely to be transported to the quarry by trucks retuning from concrete plants (i.e. backloading).

- A concrete batching plant, to be developed within the processing and stockpiling area. The plant would have the capacity to produce and despatch up to 50,000 m^3 of concrete per annum and up to 300 m^3 of concrete per day. It is not expected that the concrete batching plant would be constructed during site establishment but would commence later in the quarry life. It would involve receiving and storage of concrete raw materials, loading, conveyance into batching bins, blending of raw materials, despatch of concrete to customers in concrete agitators, and washout of returning concrete agitators.

- An asphalt plant, to be developed within the processing and stockpiling area. The plant would have the capacity to produce and despatch up to 50,000 t of asphalt per annum and up to 1,000 t of asphalt per day. Construction of the asphalt plant would also not occur during site establishment but occur later in the quarry life. Asphalt production principally consists of mixing aggregate materials with bitumen in a heated environment to create a heated mix that is then applied in road construction. It would involve aggregate feed bins, cold feed conveyor, a diesel burner, rotary drum drier / mixer, a west scrubber and water eliminator, an exhaust stack, a wet scrubber / dust collector, an output conveyor, a hot asphalt storage hopper, and a control house.

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1.3.5 Site Access and Transport

A dedicated Quarry Access Road will be constructed between the operational areas of the quarry and the Monaro Highway. The road will be approximately 4.0 km in length and include a crossing of the Goulburn Bombala Railway Line (not currently operating). After the crossing, the road will pass into the ACT with a short road constructed to a new dedicated intersection with the Monaro Highway. The Quarry Access Road has been designed to minimise traffic impact with a deliberate decision made to directly access the quarry via the Monaro Highway to avoid local roads.

As shown in Figure 2 and Figure 3, the Quarry Access Road will be sealed for 2.7 km from the intersection with the Monaro Highway and a 3 m high Colourbond or wooden fence constructed on one side of the sealed section of road. The sealing and fencing aim to mitigate noise propagation and dust dispersion. The remainder of the road will be unsealed and graded. The condition of the entire road will be monitored and maintained to limit noise and dust generation as much as practicable.

The bulk of quarry products would be despatched from the subject land using truck and dog trailers of various configurations (with a capacity of between 32.5 t and 37.5 t). Smaller quantities of products would be despatched by semi-trailers (27.5 t to 30 t capacity) or rigid trucks (12.5 t to 18 t capacity). Larger capacity vehicles may be used depending on customer requirements.

Daily traffic would vary over the life of the proposed development, dependent on demand. For the purpose of assessment and for setting limits, traffic levels are considered in terms of laden loads and movements to the site / movements departing the site (that is, laden loads are a one-way measure, and movements account for both directions). A peak daily traffic level of 200 heavy vehicle laden loads / 400 movements is proposed and a limit of no more than 25 laden loads in any given hour. An additional 50 laden loads of concrete / 100 movements of concrete agitators may also be despatched on a peak day. Various types of service vehicles and light vehicles would enter and leave the site on any given day depending on the activities occurring at the time and for the transport of employees.

1.3.6 Rehabilitation

All areas apart from the Quarry Access Road and Secondary Access Road will be progressively rehabilitated during, and after completion of, extraction operations. Final rehabilitation activities would require a further three to five years to complete beyond the cessation of extraction and processing activities.

1.4 Consultation and Public Exhibition

This version of the BDAR has not been formally submitted for consultation and/or public exhibition. Future versions of this BDAR will include a summary of the key comments arising from the consultation and public exhibition processes.

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1.5 Commonwealth and State Assessment and Approval Processes

1.5.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their potential to impact upon 'Matters of National Environmental Significance' (MNES). MNES currently listed under the EPBC Act are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- threatened species and ecological communities;
- migratory species (protected under international agreements);
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Guidelines for determining whether an impact is significant are provided by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Commonwealth of Australia 2013a[9]). If it is determined that a proposed action will, or is likely to, have a significant impact on a MNES, the action must be referred to the Minister. The Department will then consider the referred action and the Minister (or their Delegate) will make a determination regarding whether the action requires approval under the EPBC Act and associated conditions and controls.

The following website provides further information regarding the EPBC Act referral and approval process: http://www.environment.gov.au/epbc/index.html

1.5.2 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017, the purpose of which is *to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development* (BC Act Part 1, Section 1.3). The BC Act outlines the NSW framework for addressing impacts on biodiversity from development and clearing. Supported by the NSW *Biodiversity Conservation Regulation 2017* (BC Regulation), the BC Act establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS).

[9] Commonwealth of Australia (2013a). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of Climate Change, Energy, the Environment, and Water.

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1.5.2.1 NSW Biodiversity Offset Scheme

The BOS creates a transparent, consistent, and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity. The BOS aims to ensure a no-net-loss outcome for biodiversity by applying a framework which requires that impacts are first avoided and minimised, and where this cannot be fully achieved, residual impacts must be offset. The BOS also establishes Biodiversity Stewardship Agreements (BSAs), which are voluntary in-perpetuity agreements entered into by landholders, to secure and manage offset sites for biodiversity conservation. The two key elements of the BOS are as follows.

1. A developer, landholder etc. who undertakes an activity (i.e. development, clearing, other impact) which generates a credit obligation must retire the necessary credits to offset their activity.

2. A landholder who establishes a biodiversity stewardship site on their land generates credits which may be sold to developers or landholders who require those credits to offset their credit obligation.

Under the BC Act, the BOS is triggered for proposed development or clearing which:

- will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the BC Regulation) on land identified on the Biodiversity Values Map; and/or

- will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the subject land; and/or

- may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).

1.5.2.2 NSW Biodiversity Assessment Method

The NSW Biodiversity Assessment Method (BAM) is the assessment manual that outlines how an accredited person (i.e. a BAM Assessor) assesses impacts on biodiversity at development sites or assesses the biodiversity values of stewardship sites. The BAM is a scientific document that provides:

- a consistent (standard) method for the assessment of the biodiversity values of a proposed development site, major project site, or vegetation clearing site, or stewardship site;

- guidance on how a proponent (i.e. developer, landholder) can avoid and/or minimise potential biodiversity impacts, or assessment of the management requirements at a proposed biodiversity stewardship site and the likely improvement in biodiversity values that are predicted to occur over time; and

- the number and class of biodiversity credits that need to be offset to achieve a standard of ‘no net loss’ of biodiversity values for a development site, or the number and class of biodiversity credits to be generated by a proposed stewardship site.

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The BAM is supported by the online BAM Calculator, into which a BAM Assessor enters the data from desktop and field investigations to determine the number and class of biodiversity credits generated:

- as an obligation for development/clearance, this obligation must be addressed by the proponent to secure approval for the development/clearance; or
- by the establishment and management of a biodiversity stewardship site, these credits being a commodity that may be sold.

The BAM determines the following two types of credits on both development/clearance sites and stewardship sites.

- Ecosystem credits, these are credits generated for impacts on, or conservation of:
  - threatened ecological communities; and
  - threatened species habitat for species that can be reliably predicted to occur within a given plant community type (PCT) (referred to in the BAM as 'ecosystem credit species').
- Species credits, these are credits generated for impacts on, or conservation of, individuals and/or the habitat of threatened species which cannot be reliably predicted to occur in a given PCT (referred to in the BAM as 'species credit species').

The BAM Assessor documents the results of the biodiversity assessment in a Biodiversity Assessment Report (BAR), of which there are the following three types.

- Biodiversity Development Assessment Report (BDAR). A BDAR is developed to assess the likely biodiversity impacts of a development or vegetation clearing proposal.
- Biodiversity Certification Assessment Report (BCAR). A BCAR is developed to assess the likely biodiversity impacts of conferring biodiversity certification over a specific area of land.
- Biodiversity Stewardship Site Assessment Report (BSSAR). A BSSAR is developed to assess the likely biodiversity conservation gain of establishing a specific area of land as a biodiversity stewardship site under a formal Biodiversity Stewardship Agreement.

1.5.3 NSW *State Environmental Planning Policy (Biodiversity and Conservation) 2021*

State Environmental Planning Policies (SEPPs) outline policy objectives relevant to state-wide issues. The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (the '*Biodiversity and Conservation SEPP 2021*') commenced on 1 March 2022 consolidating and replacing eleven former SEPPs, including the *State Environmental Planning Policy (Koala Habitat Protection) 2021*.

As the subject land is zoned RU2 and C2, both the Koala Habitat Protection SEPP 2020 (Chapter 3) and Koala Habitat Protection 2021 (Chapter 4) would normally apply. However, given that the proposed development is an SSD and Council is therefore not the consent authority, Chapter 3 and Chapter 4 of Biodiversity and Conservation SEPP 2021 do not apply. Consideration of impacts to Koala is provided in Section 2.3.5 of this BDAR.

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1.6 Biodiversity Development Assessment Report

As prescribed under Part 6, Division 3, Section 6.12 of the BC Act, a BDAR is –

> *a report prepared by an accredited person in relation to proposed development or activity that would be authorised by a planning approval, or proposed clearing that would be authorised by a vegetation clearing approval, that:*
>
> *(a) assesses in accordance with the biodiversity assessment method the biodiversity values of the land subject to the proposed development, activity or clearing, and*
>
> *(b) assesses in accordance with that method the impact of proposed development, activity or clearing on the biodiversity values of that land, and*
>
> *(c) sets out the measures that the proponent of the proposed development, activity or clearing proposes to take to avoid or minimise the impact of the proposed development, activity or clearing, and*
>
> *(d) specifies in accordance with that method the number and class of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values of the actions to which the biodiversity offsets scheme applies.*

A BDAR prepared applying the BAM by an accredited BAM Assessor must accompany any development application for which the BOS is triggered. As detailed previously, the BOS is triggered for a proposed development which:

- will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the BC Regulation) on land identified on the Biodiversity Values Map; and/or
- will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the subject land; and/or
- may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).

1.6.1 Biodiversity Offsets Scheme entry

As the project is classified as an SSD in accordance with Schedule 1 Part 8 of the *State Environmental Planning Policy (Planning Systems) 2021,* it is subject to assessment and determination by the NSW Minister for Planning. As stated in the SEARs, a BDAR is required to identify and document the biodiversity values of the subject land and assess the impacts of the proposed development upon these values. The resulting BDAR will be a key informing document for the subsequent EIS.

In addition, the minimum lot size designation for the subject land is 'AC – 80 ha'. Therefore, in accordance with Part 7, Clause 7.2 of the BC Regulation, if the BC Act 'native vegetation' (defined in Part 5A of the *Local Land Services Act 2013* as plant species indigenous to NSW) clearance exceeds 10,000 m^2 (1 ha) in total, then the BOS is triggered. Following the incorporation of appropriate measures to avoid, minimise, and mitigate impacts on the ecological values present within the subject land, the proposed development would involve the clearance of 77.03 ha of BC Act 'native vegetation'. Finally, the proposed development has the potential to significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities). As such, the BOS is triggered and a BDAR is required to assess the impacts of the proposed development.

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The BAM provides a standard method for assessing the impacts of a development/clearance proposal. This theme should carry over to the resulting BDAR such that it is as concise as possible whilst still addressing all of the relevant elements of the BAM in order to provide a complete assessment of the proposed development. The size of the BDAR should reflect the complexity of the subject land's biodiversity values and the scale and nature of the proposed development.

1.6.2 Objectives and Format

Developed to reflect the format of the BAM, this BDAR comprises the following two broad parts.

- Part 1 – Biodiversity Assessment (BAM Stage 1), includes assessment of the:
  - landscape context;
  - native vegetation, threatened ecological communities (TECs), vegetation integrity; and
  - habitat suitability for threatened species.
- Part 2 – Impact Assessment (BAM Stage 2), details the:
  - proposed measures to avoid, minimise and mitigate biodiversity impacts;
  - residual impacts (direct and indirect) of the proposed development; and
  - offset requirements relevant to the proposed development.

1.6.3 Technical Resources and Qualifications

This BDAR has been prepared by the following technical personnel:

- Robert Speirs – Director / Principal Ecologist

  BAppSc (Ecology), DipPM, MEIANZ, CEnvP-E, Accredited BAM Assessor (No: BAAS17089)
  Robert was project director for this assessment and completed or closely supervised all field surveys, data entry, GIS mapping, BAM credit calculations, and report preparation.

- Dr Sam Reid – Senior Ecologist

  BSc (Hons), PhD, Accredited BAM Assessor (No: BAAS20006)
  Sam was project manager for this assessment and completed or closely supervised all field surveys, data entry, GIS mapping, BAM credit calculations, and report preparation.

- Dr Catherine Ross – Consultant Ecologist

  BSc (Hons), PhD
  Catherine undertook field surveys and GIS mapping.

- Jarmin Thornberry – Consultant Ecologist

  BEnvSc&Mgt, Accredited BAM Assessor (No: BAAS24044)
  Jarmin undertook field surveys.

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- Lucy Wenger – Consultant Ecologist

  PhB (Science) (Hons)
  Lucy undertook field surveys.

- Shannon Thompson – Field Ecologist

  BSc
  Shannon undertook field surveys, data entry, and GIS mapping.

- Jamie Barney – Spatial Ecologist

  BSc, DipSci, CertIVEnvSci
  Jamie undertook field surveys.

- Lachlan Anderson – Field Ecologist

  Lachlan undertook field surveys.

All surveys for this assessment were undertaken in accordance with the following.

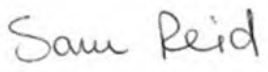
- Capital Ecology's (Robert Speirs – Principal Investigator) Animal Research Authority (ARA) granted under the NSW *Animal Research Act 1985* by the NSW Department of Primary Industries Secretary's Animal Care and Ethics Committee (CSB 15/2046).
- Capital Ecology's NSW Scientific Licence issued by the NSW Department of Climate Change, Energy, the Environment, and Water under Part 2 of the NSW *Biodiversity Conservation Act 2016* (SL101623).

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1.6.4 Certification under clause 6.15 of the Biodiversity Conservation Act 2016

I certify that this report has been prepared based on the requirements of, and information provided under, the NSW Biodiversity Assessment Method 2020 and clause 6.15 of the NSW *Biodiversity Conservation Act 2016*.

Name: Samuel Reid

Signature: 

Date: 8 August 2025

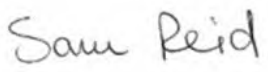
BAM Assessor Accreditation no: BAAS20006

1.6.5 Conflict of interest declaration

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

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

Name: Samuel Reid

Signature: 

Date: 8 August 2025

BAM Assessor Accreditation no: BAAS20006

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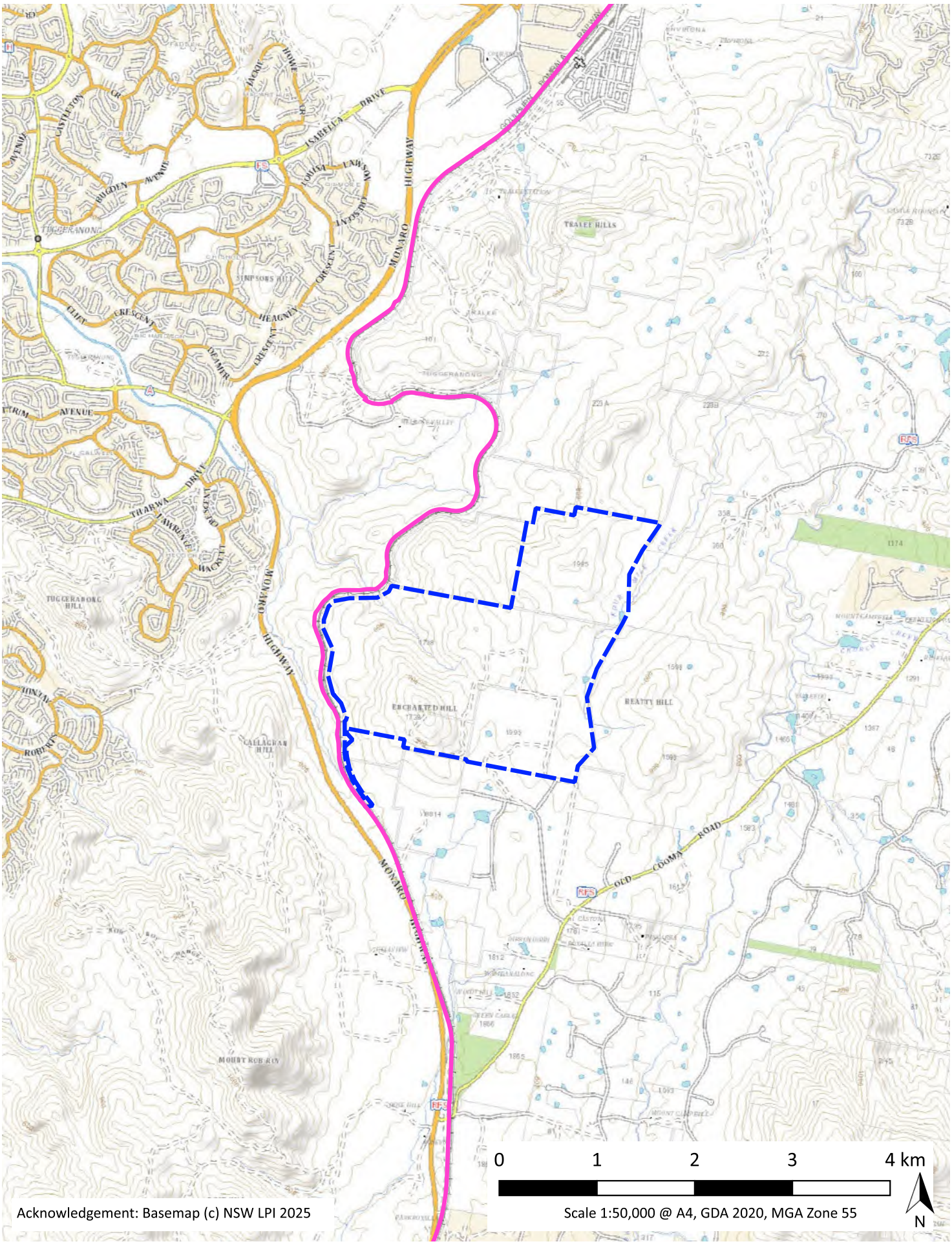


Figure 1. Locality Plan

Legend

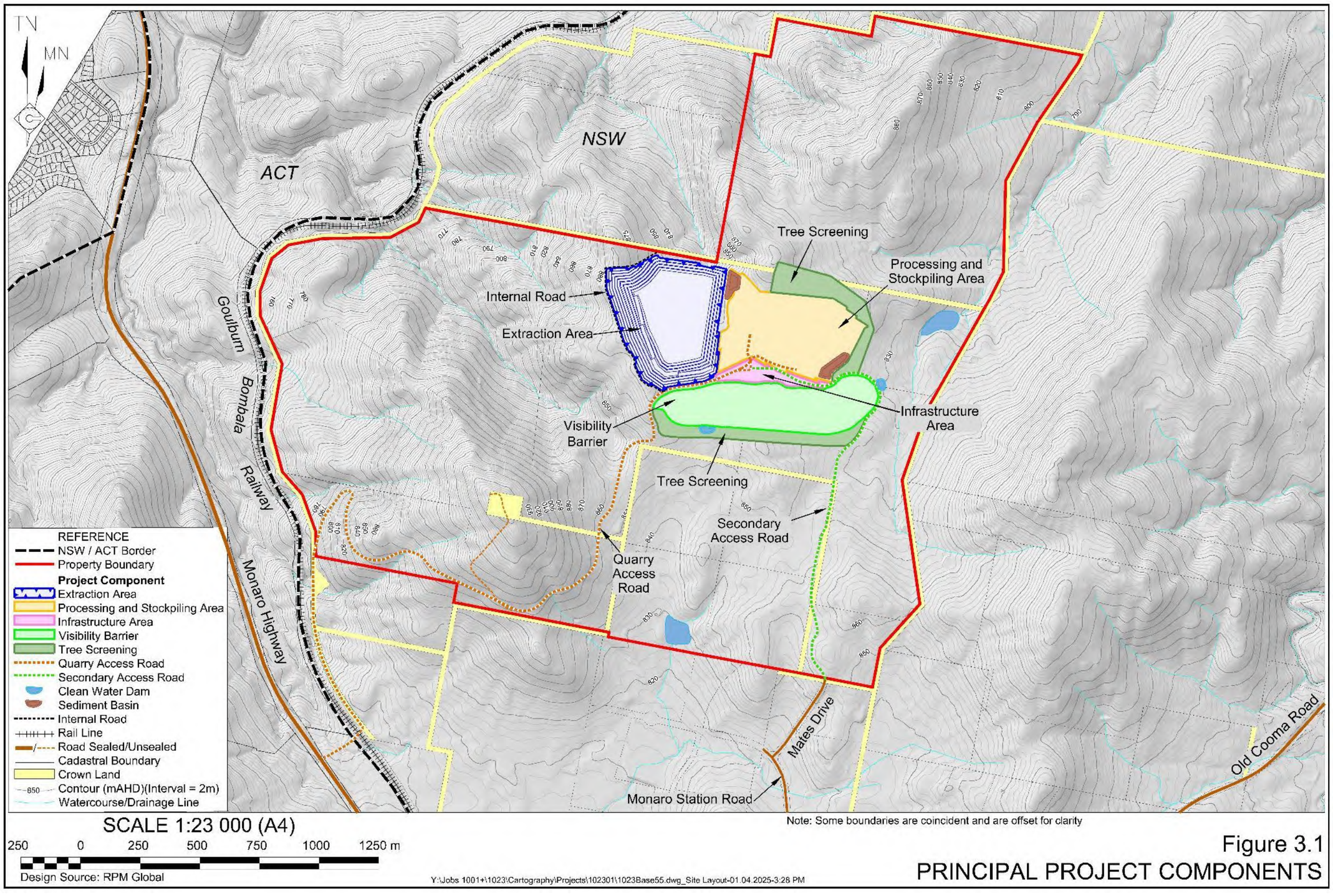
ACT Border

Subject Land

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 19 May 2025

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Figure 2. The Proposed Development



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Legend
ACT Border
Subject Land
Disturbance footprint
ACT Disturbance footprint

0 0.25 0.5 0.75 1 km

Scale 1:14,500 @ A3, GDA 2020, MGA Zone 55

N

Acknowledgement: Image (c) ACT Government CC4.0 2021

Figure 3. The Subject Land and Development Footprint on Aerial Imagery

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 6 June 2025

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2 Part 1 – Biodiversity Assessment (BAM Stage 1)

Part 1 of this BDAR provides an assessment of the biodiversity values of the subject land as set out in Stage 1 of the BAM.

2.1 Landscape Context

As detailed in the BAM, a range of landscape features must be identified where they occur in the subject land or within the assessment area surrounding the subject land. These features may contain/support biodiversity values that are important for the site context of the subject land, or for informing the likely habitat suitability of the subject land. Table 3 outlines the landscape features and overall landscape context of relevance to the subject land.

Table 3. Landscape features.

Landscape Feature	Description	Figure Reference
IBRA bioregion	The subject land occurs in the **South Eastern Highlands** IBRA bioregion.	-
IBRA subregion	The subject land occurs in the **Monaro** and **Murrumbateman** IBRA subregions. The **Monaro** IBRA subregion has been used for all aspects of this assessment as it covers most of the subject land and all of the development footprint.	-
BioNet NSW landscapes (Mitchell landscapes)	The subject land contains one Mitchell Landscape: **Molonglo Ranges**.	-
Rivers, streams, and estuaries (Strahler[10] stream order)	The subject land contains a number of first and second order streams (defined based on the NSW LPI Hydrology Map and as per Appendix 3 of the BAM) that form / join Four Mile Creek (along the eastern boundary), Rock Gully Creek (along the north-western boundary), and Tuggeranong Creek (adjacent to the western boundary). Rock Gully Creek and Four Mile Creek both contain flowing water throughout much of the year and small shallow pools, and Rock Gully Creek supports riparian / fringing native vegetation. Rock Gully Creek and Four Mile Creek are likely to provide habitat for a variety aquatic/riparian flora and fauna. The remainder of the first and second order streams support only small patches of riparian / fringing vegetation and were observed during the surveys to be either dry or to convey a small amount of water depending on the timing of the particular survey. The general lack of permanent water or extensive areas of riparian / fringing vegetation indicates that these streams are unlikely to provide habitat of significance to aquatic/riparian flora or fauna. Finally, there are 24 farm dams of varying size within the subject land. The larger dams support some riparian / fringing vegetation and may therefore provide habitat of value to aquatic/riparian flora and fauna flora.	Figure 4 Figure 6

[10] Strahler, AN (1952). *Hypsometric (area-altitude) analysis of erosional topology*. Geological Society of America Bulletin 63 (11): 1117–1142.

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Landscape Feature	Description	Figure Reference
Wetlands (important wetlands)	The subject land does not contain any important wetlands as listed in the Directory of Important Wetlands in Australia (DIWA) or coastal wetlands protected under *State Environmental Planning Policy No 14*.	-
Connectivity	The subject land is surrounded by lightly to moderately cleared agricultural and conservation managed land. Historically, these areas would have been a mixture of grassy woodlands and dry sclerophyll forests. Currently, the land to the north and south-west supports extensive tracts of woodland / forest, while the land to the east and south has been more heavily cleared. However, as shown in Figure 5, a significant proportion of the cleared areas surrounding the subject land are still dominated by native species. Within the subject land itself, approximately 37% of the previous native/natural overstorey and midstorey has been cleared. In addition, some of the areas which have retained a woody overstorey have also undergone historic thinning. Despite these historical impacts, the groundstorey across the subject land is largely dominated by native grasses and a moderate to high diversity of native forbs. Finally, the subject land contains extensive rocky outcrops and a substantial cover of loose surface rock that are connected to similar features in the surrounding landscape. These areas are likely to provide important habitat for a variety of herpetofauna and invertebrates and be important for habitat connectivity throughout the locality. With consideration of the above, the subject land is therefore well connected to the surrounding landscape and likely forms part of an important connectivity corridor. This is particularly true for highly mobile species, such as large marsupials and birds, but is also true for a wider variety of flora and fauna, including species with a more restricted ability to disperse (e.g. reptiles, amphibians). This is supported by the fact that portions of the subject land are identified as a 'South East and Tablelands Corridors' on the South East and Tablelands Regional Plan and immediately adjacent areas are identified as supporting connected habitat for amphibians, mammals, birds, and grassland reptiles on ACTmapi[11].	Figure 5 Figure 6
Areas of geological significance and soil hazard	The subject land does not contain/support any karst, caves, crevices, cliffs, or other areas/features of geological significance. There are no hazard soil features.	-
Areas of outstanding biodiversity value	The subject land does not support or occur near any declared area of outstanding biodiversity value (AOBV).	-
Percent native vegetation cover (buffer area)	A 1,500 m buffer was applied to the subject land resulting in an overall buffer area of 3,040 ha. This buffer area only contains woody PCTs (i.e. woodland, dry sclerophyll forest). Accordingly, the following two categories of native vegetation were defined to identify the total are of native vegetation in the buffer. 1. Woody vegetation – The areas which have a woody PCT and retain remnant woody vegetation or woody regrowth. 2. Non-woody vegetation – The areas which have a woody PCT from which the woody vegetation has been cleared, yet at least a	Figure 5

[11] https://www.actmapi.act.gov.au/

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Landscape Feature	Description	Figure Reference
	substantial proportionate cover (i.e. > 35%) of native groundstorey species remains (often referred to as derived or secondary grassland). Native vegetation cover was first identified and mapped via interpretation of the available aerial imagery (ACT Government aerial imagery and NSW LPI). The presence of remnant canopy trees, cultivation patterns in paddocks, unnaturally green and/or uniform groundstorey vegetation etc., were important factors considered during aerial interpretation. Field reconnaissance was then undertaken to ground truth and refine the mapping where possible. This field reconnaissance involved driving the publicly accessible roads within the buffer area and making observations across paddocks etc. from the roadside. 1. Woody vegetation cover – 2,091 ha (69%) of the buffer area was determined to support native woody vegetation cover. 2. Non-woody vegetation cover – 540 ha (18%) of the buffer area was determined to support native non-woody vegetation cover. ↓ Total native vegetation cover – the total area of native vegetation cover in the buffer area is 2,632 ha (87%). This falls into the >70% cover class in the BAM Calculator.	

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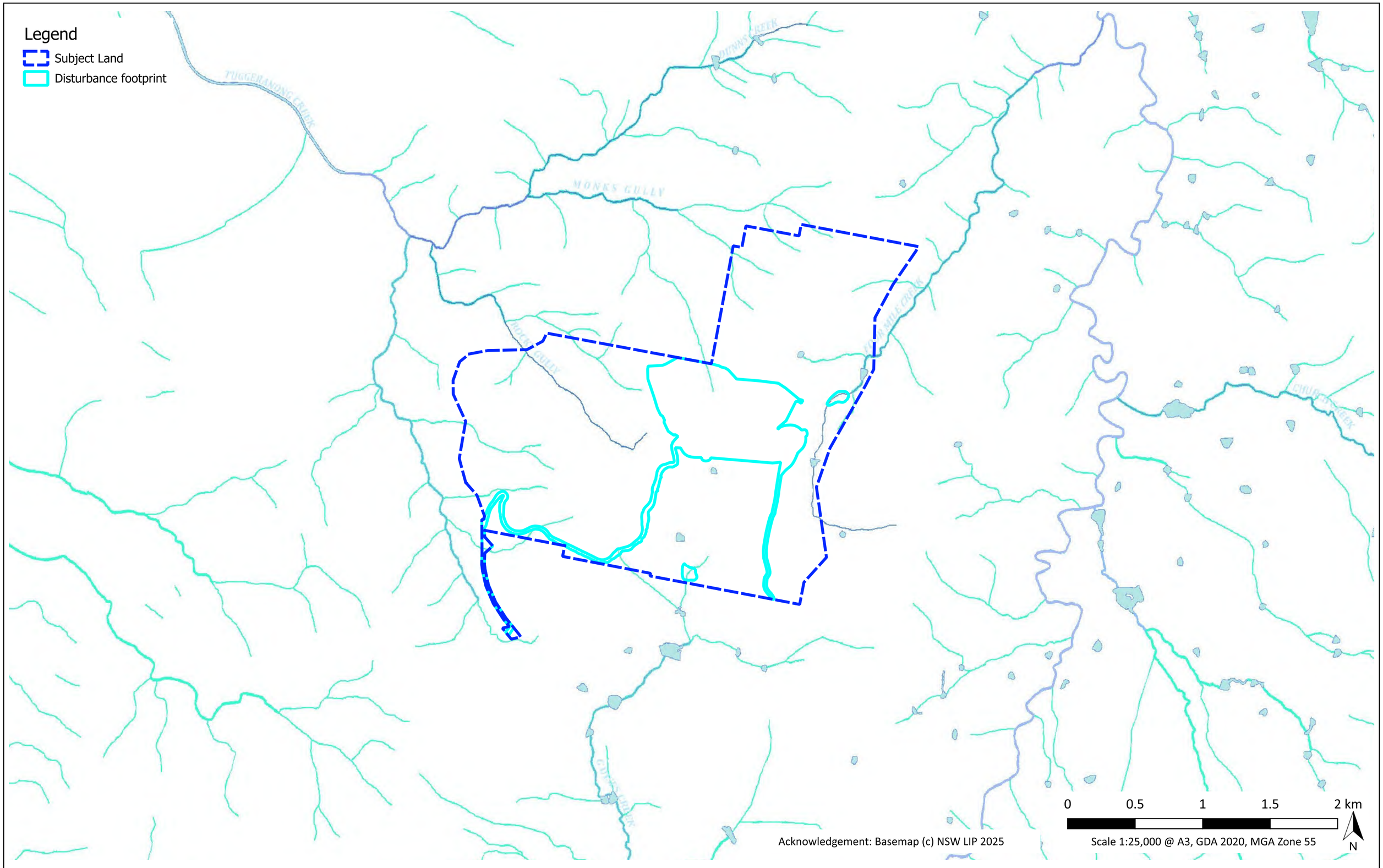


Figure 4. Hydrology

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Date: 19 May 2025

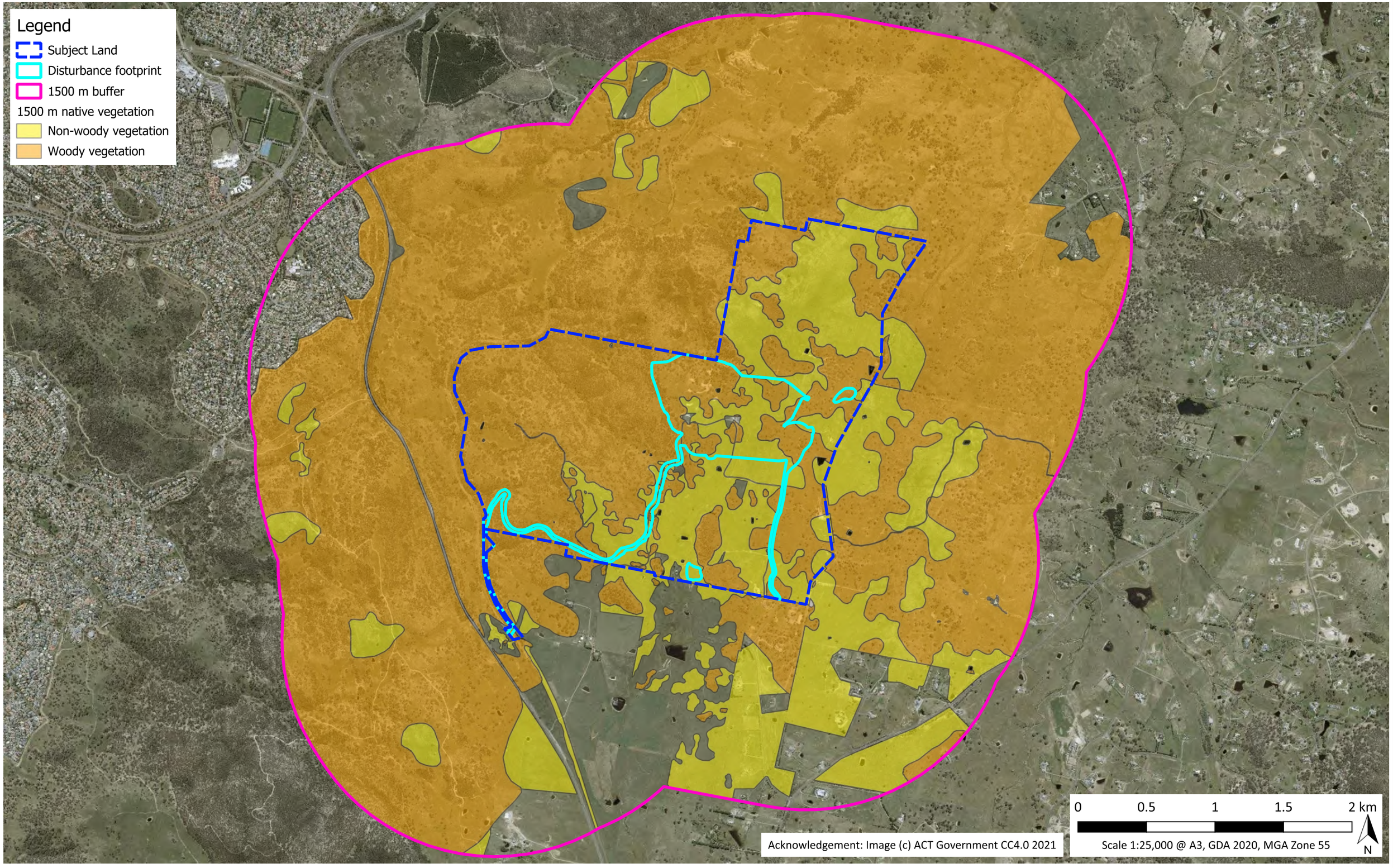


Figure 5. Site Map

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Date: 19 May 2025

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2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

2.2.1 Native vegetation extent

As per the BC Act, native vegetation is defined according to Part 5A of the *Local Land Services Act 2013* (LLS Act), which states:

> *"(1) For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:*
>
> *(a) trees (including any sapling or shrub or any scrub),*
>
> *(b) understorey plants,*
>
> *(c) groundcover (being any type of herbaceous vegetation),*
>
> *(d) plants occurring in a wetland.*
>
> *(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible."*

As per this definition, planted vegetation which comprises plant species native to NSW, regardless of whether or not the species are indigenous to the specific region and/or PCT of the subject land, is classified as native vegetation.

The Commonwealth Government[12,13], ACT Government[14], and previous NSW Government[15] assessment guidelines for the temperate grassland and woodland PCTs of the NSW/ACT Southern Tablelands region each declare vegetation as native dominant if 50% or more of the perennial groundlayer is composed of native species. However, no such threshold is defined by the BAM, and advice from the NSW DCCEEW has been that the criteria for use in determining native vs. exotic dominance must be more stringent than the previously applied 50/50 rule. It is understood that this is due to the potential for seasonal variation and/or assessor disparity to substantially alter the BAM mapping result. For example, a patch of vegetation that is classified as 55% native in one season may be classified as 45% native in another.

With regard to the above, for the purposes of this BDAR (and the supporting BAM assessment):

1. 'Native vegetation' is defined as any plant, naturally occurring or planted, which is native to NSW.

[12] Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.
[13] Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*. Commonwealth Department of the Environment and Energy.
[14] ACT Government (2010). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*. Environment and Sustainable Development Directorate – Conservation Planning and Research.
[15] NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

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2. Exotic vegetation is defined as any plant which is not native to NSW.
3. A polygon of vegetation is 'native vegetation' if:
    a. 35% (i.e. approximately one-third) or more of the perennial groundlayer comprises species native to NSW; and/or
    b. species native to NSW are present in one or more of the other strata.

2.2.2 Vegetation survey and mapping methods

The vegetation throughout the subject land was surveyed and mapped in accordance with the BAM. Vegetation survey dates and survey effort are detailed in Table 4, noting that all vegetation mapping from 2020/21 was reconfirmed in 2024. The methodology involved the following.

- Mapping of the on-ground boundaries of the Plant Community Types (PCTs).
- Stratification of each PCT into vegetation zones reflecting the broad condition state of vegetation.
- The completion of a series of surveys to measure the composition, structure, and function attributes of the vegetation.

These steps are described in more detail below. The full BAM and supplementary resources are available online via the NSW DCCEEW website https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020.

It is important to note that the information and data collected during vegetation survey and mapping (Section 2.2.2.1 to 2.2.2.3) were also used to assess the subject land for the presence/ absence of habitat constraints and/or microhabitats for ecosystem credits species (Section 2.3.4), species credit species (Section 2.3.5), and species which are only listed under the EPBC Act and which are not identified as either an ecosystem credit species or species credit species pursuant to the BOS (Section 2.3.3, Appendix E).

Table 4. Vegetation survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
PCT and Zone mapping	Random meander	03/11/2020 06/11/2020 24/09/2021	1 person 1 person 1 person	8 hours 8 hours 2 hours
Vegetation assessment	BAM plot	07/12/2020 08/12/2020 11/12/2020 30/11/2021 04/12/2024 05/12/2024	2 people 2 people 2 people 2 people 6 people 6 people	16 hours 16 hours 16 hours 10 hours 48 hours 48 hours

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2.2.2.1 Plant Community Type (PCT) mapping

The on-ground boundaries of each of the PCTs present in the subject land were mapped by marking boundaries directly onto high resolution orthorectified aerial photograph field maps. The PCTs and their characteristics are provided in the NSW Vegetation Information System (VIS) https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm.

The PCTs were identified, and their boundaries defined, based on the:

- presence, species, growth form and density of remnant canopy trees and/or stags or stumps of these;
- presence and species of midstorey shrubs and trees;
- floristic composition of the groundstorey; and
- the landscape position and other geographical features (elevation, aspect, soils, apparent hydrology).

2.2.2.2 Vegetation zone definition and mapping

The mapped PCTs were further divided into vegetation zones based on the structure, floristic composition and overall condition ('condition state') of the vegetation. The vegetation zones were mapped in the field and then digitised using GIS which provided accurate calculations of the total area of each vegetation zone in the subject land.

2.2.2.3 Survey Plots/Transects

A series of a BAM plots (i.e. vegetation assessment survey plot/transect sets) were completed to adequately sample each vegetation zone that occurs in the development footprint. As a result, the assessment of BAM plots occurred over multiple years as the design and extent of the proposed development changed over time (refer to Table 4), noting that all BAM plots within the development footprint were assessed in 2024. A small number of additional plots outside the development footprint, which were assessed in 2020 and 2021, have been included in order to provide detail on the condition of the vegetation across the wider subject land.

As illustrated in Figure 9 from NSW Government (2020b[16]), each BAM Plot involved:

a. one 20 x 20 m (400 m^2) plot, used to assess the composition and structure attributes;
b. one 20 x 50 m plot (1,000 m^2) plot, used to assess the function attributes; and
c. five 1 m^2 sub-plots, used to assess average litter cover (and other optional groundcover components) for the plot.

All BAM plot locations were selected randomly within the vegetation zone, by marking on a map and walking to the location. BAM plot locations were spread evenly throughout representative vegetation (refer to Figure 6).

[16] NSW Government (2020b). *Biodiversity Assessment Method 2020 Operational Manual – Stage 1*. NSW Department of Planning, Industry and Environment. Published December 2020.

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The minimum number of BAM plots completed in each vegetation zone of the development footprint was determined as per the minimum required plot numbers specified in the BAM. As shown in Figure 6, a total of 40 plots were completed across eight vegetation zones.

As stated in Section 4.1.2 of the BAM:

> *Any part of the subject land that does not contain native vegetation does not need to be assessed under this chapter, **unless** the land is:*
>
> *a. proposed for restoration as part of a biodiversity stewardship site (see Stage 3), or*
>
> *b. assessed as habitat for threatened species according to Chapter 5.*
>
> *All parts of the subject land that do not contain native vegetation must be clearly shown on the Site Map. Justification as to why these areas do not support **any** native vegetation must be provided in the BAR.*

While PCT3375 Zone 6 is not classified as BC Act 'native vegetation' (refer to Section 2.2.1 and Figure 7), it still supports a very small native component (Appendix A and Appendix B). As such, as per the BAM, all vegetation zones in the development footprint were assessed in this BDAR. In addition, surveying all zones ensured that the vegetation composition (including an accurate determination of BC Act native vegetation presence/absence) and potential threatened species habitat were accurately assessed across all of the vegetation condition types.

2.2.3 BAM targeted survey methods

A number of threatened flora and fauna species were identified by the BAM as potentially occurring in the subject land (referred to as 'species credit species', see Section 2.3.5). Some of these species were excluded from further consideration based on factors such as habitat constraints, degraded habitat, geographical limitations, and/or the absence of required microhabitat features (refer to Table 26). Survey dates and survey effort for the remaining species credit species considered to have the potential to occur in the subject land are detailed in Table 5. Weather conditions for survey dates are detailed in Table 6. In total, the survey effort for this assessment totalled 357.5 person-hours.

Opportunistic observations of fauna and flora species in the subject land were taken during the field surveys completed for this BDAR. An inventory of all species identified in the subject land are presented in Appendix B (flora) and Appendix C (fauna). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged.

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Table 5. Flora and fauna survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
Threatened flora survey	Transects and random meanders through likely habitat	27/10/2020 28/10/2020 03/11/2020 06/11/2020 24/09/2021 09/10/2021 19/10/2021 28/10/2021 29/10/2021 30/11/2021 11/10/2024 22/10/2024	6 people 6 people 5 people 1 person 3 people 2 people 2 people 2 people 4 people 2 people 7 people 3 people	16 hours 16 hours 13.5 hours 4 hours 4 hours 4 hours 8 hours 8 hours 32 hours 4 hours 49 hours 24 hours
	Opportunistic observations[17]	-	1-6 people	255.5 hours
Threatened bird survey	Area search	27/10/2020 28/10/2020 03/11/2020 06/11/2020 24/09/2021 09/10/2021 03/10/2024 11/10/2024	6 people 6 people 5 people 1 person 3 people 2 people 2 people 2 people	16 hours 16 hours 13.5 hours 4 hours 4 hours 4 hours 4 hours 4 hours
	Opportunistic observations[18]	-	1-6 people	452 hours
Threatened nocturnal fauna survey	Call playback and spotlighting in potential habitat	13/08/2024 15/08/2024 20/08/2024 22/08/2024 27/08/2024 29/08/2024	2 people 2 people 2 people 2 people 2 people 2 people	6 hours 6 hours 6 hours 6 hours 6 hours 6 hours
Pink-tailed Legless Lizard survey	Rock turning survey	27/10/2020 28/10/2020 03/11/2020 24/09/2021 03/10/2024	6 people 6 people 4 people 3 people 4 people	16 hours 16 hours 13.5 hours 4 hours 28 hours
Golden Sun Moth survey	Belt transect survey	20/11/2020 27/11/2020 04/12/2020 15/12/2020	2 people 2 people 2 people 2 people	9 hours 6.5 hours 4.5 hours 4 hours
Key's Matchstick Grasshopper survey	Transects and random meanders through likely habitat	03/10/2024 11/10/2024 22/10/2024	4 people 7 people 3 people	28 hours 49 hours 24 hours

[17] During BAM plots, Pink-tailed Legless Lizard survey, and Golden Sun Moth surveys.
[18] During PCT and Zone mapping, BAM plots, Pink-tailed Legless Lizard survey, threatened flora surveys, and Golden Sun Moth surveys.

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Table 6. Survey weather conditions (Tuggeranong, ACT).

Date	Temperature Min-Max	Wind @ 9am	Rain
27/10/2020	8.0 – 16.2°C	22 km/h SSW	2.6 mm
28/10/2020	8.3 – 19.5°C	6 km/h SSE	3.6 mm
03/11/2020	9.7 – 25.1°C	7 km/h SSW	0 mm
06/11/2020	4.5 – 20.8°C	6 km/h WNW	0.8 mm
20/11/2020	12.0 – 34.0°C	7 km/h NNE	0 mm
27/11/2020	14.0 – 31.5°C	9 km/h ENE	0 mm
04/12/2020	5.6 – 29.0°C	6 km/h W	0 mm
07/12/2020	12.5 – 20.1°C	28 km/h WNW	0 mm
08/12/2020	4.8 – 21.5°C	6 km/h NNW	1.2 mm
11/12/2020	9.0 – 19.6 °C	-	5.6 mm
15/12/2020	10.2 – 25.7°C	7 km/h NE	0 mm
24/09/2021	5.5 – 20.0°C	-	0 mm
09/10/2021	1.2 – 23.0°C	-	0 mm
19/10/2021	7.4 – 15.5°C	-	0 mm
28/10/2021	4.7 – 26.8°C	-	0 mm
29/10/2021	12.3 – 20.0°C	-	0 mm
30/11/2021	10.1 – 26.9°C	-	0 mm
13/08/2024	5.3 – 12.4°C	17 km/h NE	0.2 mm
15/08/2024	2.1 – 14.2°C	19 km/h S	0.4 mm
20/08/2024	-0.9 – 18.2°C	26 km/h NNE	0 mm
22/08/2024	1.9 – 18.2°C	39 km/h W	0 mm
27/08/2024	7.2 – 18.3°C	19 km/h WNW	0 mm
29/08/2024	-0.1 – 18.7°C	28 km/h N	0.6 mm
03/10/2024	6.2 – 21.1°C	7 km/h SSW	0 mm
11/10/2024	5.0 – 25.1°C	13 km/h NNW	0 mm
22/10/2024	5.6 – 26.8°C	6 km/h WSW	0 mm
04/12/2024	16.4 – 30.9°C	Calm	9.8 mm
05/12/2024	15.8 – 30.3°C	7 km/h NE	3.0 mm

2.2.3.1 Threatened flora survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened flora species. All threatened flora species are identified by the BAM as a species credit species (refer to Section 2.3.5). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species.

Targeted threatened flora surveys were therefore conducted across the development footprint and wider subject land (Figure 9). The surveys involved one to seven ecologists walking through potential habitat, targeting threatened flora species (totalling 178.5 hours of effective survey effort). In addition, in farmland which has been pasture improved, cultivated, and/or grazed for a prolonged

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period, threatened flora may only persist in those areas which are difficult to pasture improve/cultivate, or which are subject to a low level of grazing pressure. Often, these areas are characterised by the presence of imbedded and/or loose surface rock. As such, targeted threatened flora surveys were also conducted concurrently with Pink-tailed Legless Lizard *Aprasia parapulchella* surveys. These targeted searches totalled an additional 77.5 hours of effective survey effort.

If detected, significant species identified were recorded via a GPS waypoint and, if a population, the population boundary was delineated via GPS.

2.2.3.2 Threatened bird survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened bird species. Some threatened bird species are identified by the BAM as a species credit species (refer to Section 2.3.5). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species.

Targeted threatened bird surveys were therefore conducted across the portions of the development footprint and wider subject land identified as potentially supporting threatened bird habitat, these being those supporting remnant trees (Figure 10). As described in Section 5 of DEC (2004[19]), these surveys involved 'area searches' (Loyn 1986[20]) to identify and record the terrestrial birds occurring in the subject land (totalling 65.5 hours of effective survey effort). An additional 452 hours of opportunistic observations of threatened birds occurred during PCT and Zone mapping, BAM plots, Pink-tailed Legless Lizard survey, threatened flora surveys, and Golden Sun Moth surveys.

Based on detections of Gang-gang Cockatoo *Callocephalon fimbriatum* in 2020, the targeted bird surveys and opportunistic observations in 2024 were primarily focused on that species.

Surveys were timed to coincide with the nesting period for the significant bird species with the potential to occur in the subject land. If detected, significant species identified were recorded via a GPS waypoint and notes were taken on any nesting/breeding activity.

2.2.3.3 Threatened nocturnal fauna survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support BC Act listed forest owl species (Powerful Owl *Ninox strenua* and Barking Owl *Ninox connivens*). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species.

Targeted surveys were therefore undertaken in accordance with the survey guidelines for forest owls identified as 'species credit' species recently published via the NSW Threatened Biodiversity Data Collection (TBDC).

[19] DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.
[20] Loyn, R.H. (1986). '*Birds in fragmented forests in Gippsland, Victoria'.* In Keast, A., Recher, H.F., Ford, H. and Saunders, D. (eds.). In Birds of Eucalypt Forests and Woodlands; Ecology, Conservation Management, RAOU; and Surrey Beatty and Sons.

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Call-playback survey

As per the survey guidelines published in the TBDC, call-playback surveys for forest owls were undertaken in August over six nights (running for approximately three hours per night) during calm and dry weather.

Fixed-point call-playback stations were established within the development footprint plus a 400 m buffer, where possible, using a 1,000 m x 1,000 m grid to establish one call-playback station per 100 ha of suitable habitat (being areas supporting patches of large remnant trees), with call-playback stations spaced approximately 1,000 m apart where practicable (Figure 11).

The following methodology was followed each survey night at each established call-playback station.

1. The surveyor allowed 10 minutes listening and observation time prior to broadcasting. If the target species was observed or heard during this period, call-playback was not undertaken at the station.
2. Pre-recorded calls of various types (i.e. single male, single female, duet) were broadcast for each species as an escalating sequence for no more than 15 seconds per call, followed by at least 30 seconds of listening time, during which the surveyor waited for a responding call or arrival of the target species. This sequence continued for 15 minutes for each target species, with the volume of the noise emitting device incrementally increased with each repeated broadcast.
3. Following the call-playback survey, the surveyor searched for owls drawn in by the broadcast within a 1 ha circular plot around each broadcast station using a spotlight.

If detected, the location of detection, notable behaviour (i.e. entering/exiting hollows), the direction of flight (if applicable), and time taken to respond to playback were recorded, to reduce repeated counts of the same individual at different stations. Additionally, if the target species was recorded at a station, no further survey effort will be required at that station.

Spotlighting survey

While not strictly required by the TBDC for forest owls, spotlighting surveys were also undertaken over six nights in conjunction with call-playback surveys (running for approximately three hours per night). This survey involved one ecologist undertaking random meander surveys with a suitably powerful spotlight through potential habitat (being areas supporting patches of large remnant trees), occasionally stopping and observing for fauna activity at likely habitat trees.

All observed fauna were recorded and added to the species inventory (Appendix C). The locations of any threatened species were recorded via a GPS waypoint, together with notes regarding the observed activity, and the area of the record was inspected during the day in order to determine whether the recorded individual was present at the location for breeding purposes.

2.2.3.4 Pink-tailed Legless Lizard survey

Targeted Pink-tailed Legless Lizard surveys were completed in appropriate weather conditions over five days (Table 5 and Table 6). Prior to the on-ground surveys, Capital Ecology analysed recent aerial

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imagery in order to identify areas of potential habitat (i.e. areas containing surface rock) across the subject land. These areas are included in Figure 12.

As shown in Figure 12, patches of potential Pink-tailed Legless Lizard habitat in the subject land were surveyed for Pink-tailed Legless Lizard individuals. Approximately 77.5 person-hours were spent during the survey, which involved the following.

- Searches for Pink-tailed Legless Lizard individuals or sloughed skins by carefully turning rocks over and then placing them back into position.
- Turning a minimum of 500 rocks per patch (considered adequate for confirming occurrence at large sites based on averages for detection presented in Jones 1999[21]), or until a Pink-tailed Legless Lizard was found and thus presence in the patch confirmed. Where it was not possible to turn 500 rocks because of a shortage of surface rock, all possible rocks were turned.

If discovered, each Pink-tailed Legless Lizard is classified as either an adult (≥12 cm total length), juvenile (≤12 cm total length), or sloughed skin, and the position recorded via a handheld GPS. The above survey methodology is consistent with the Commonwealth Survey Guidelines[22].

2.2.3.5 Golden Sun Moth survey

The NSW Government has not developed survey guidelines for the Golden Sun Moth. As such, a program of four targeted Golden Sun Moth surveys was undertaken in accordance with the Commonwealth Government survey guidelines (Commonwealth of Australia 2009a[23]) and the ACT Government survey guidelines (ACT Government 2014[24]). The survey guidelines suggest a minimum of four survey days to complete the targeted survey.

Each survey involved one ecologist walking random meander surveys across the maximum estimated extent of potential habitat (i.e. derived grassland areas of PCT3375 and PCT3376). Any observed male Golden Sun Moth flights (usually up to 20 m ahead or to either side of the ecologist) were to be marked via a hand-held GPS.

On each survey day, moths were confirmed to be flying in the ACT region via pre-survey checks of known habitat and/or email and phone communication with other ecologists conducting Golden Sun Moth surveys in the region.

The details of the four survey days and relevant survey conditions are provided in Appendix D. In summary, the targeted surveys were undertaken during good to optimal survey conditions on days when moderate to high numbers of Golden Sun Moth were confirmed to be flying.

A GPS track was recorded for each survey; these are illustrated in Figure 14. The alignment of the transects was varied between surveys in order to achieve the best possible coverage of the subject

[21] Jones, S.R. (1999). *Conservation biology of the pink-tailed worm lizard (Aprasia parapulchella)*. PhD thesis Applied Ecology research group, University of Canberra.
[22] Department of Sustainability Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's threatened reptiles.* Commonwealth of Australia, Canberra.
[23] Commonwealth of Australia (2009a). *Background Paper to EPBC Act Policy Statement 3.12 - Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana)*. Department of Climate Change, Energy, the Environment, and Water.
[24] ACT Government (2014). *Survey Guidelines for Golden Sun Moth*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

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land. Whilst the surveys are primarily focused on recording male Golden Sun Moth flights, the ecologists also examined the ground for female moths and pupal cases, particularly in the areas considered to have the highest potential for Golden Sun Moth occurrence.

2.2.3.6 Key's Matchstick Grasshopper survey

Portions of the subject land may provide suitable habitat for Key's Matchstick Grasshopper *Keyacris scurra,* particularly in partially open areas with a moderate to high diversity groundstorey. Accordingly, targeted surveys are required to determine the species credit value of the subject land for Key's Matchstick Grasshopper.

As NSW does not have specific survey guidelines for this species, Capital Ecology consulted with appropriate experts and published research (Rowell and Crawford 1995[25]) to develop the following survey methodology.

Key's Matchstick Grasshopper surveys were conducted within the development footprint plus a 200 m buffer (where possible based on land ownership).

1. Key's Matchstick Grasshopper surveys occurred concurrently with threatened flora surveys. This was considered appropriate as both surveys require a focus on the groundstorey, floristic diversity, and indications of disturbance.
2. Particular attention was given to partially open areas that support a native dominant groundstorey (especially areas dominated by Kangaroo Grass *Themeda triandra*) and known food plants (i.e. *Chrysocephalum apiculatum, C. semipapposum, Acaena ovina*, and *Leptorhynchos squamatus*).
3. Surveys occurred between August and December, on sunny days with temperatures greater than 10 degrees.
4. Surveys were conducted on foot and tracked via hand-held GPS. As Key's Matchstick Grasshopper are known to hop short distances (i.e. < 40 cm) when disturbed[26], all such grasshoppers detected during surveys were captured and inspected.
5. If required, potential Key's Matchstick Grasshopper sightings were photographed for identification and uploaded to the NatureMapr platform for expert identification. The locations of all potential Key's Matchstick Grasshopper sightings were marked via a smartphone-based GIS application.

Capital Ecology have successfully detected Key's Matchstick Grasshopper using the above methodology at multiple sites in the ACT and NSW.

[25] Rowell and Crawford (1995). *Survey of the Morabine Grasshopper Keyacris scurra (RHEN) in the A.C.T.* Report for the Wildlife Research Unit, ACT Parks and Conservation Service.
[26] **Note**: the species does not fly.

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2.2.4 Vegetation survey and mapping results

2.2.4.1 Plant Community Type (PCT) mapping

Before European occupation, the whole of the subject land would have been characterised by woody PCTs. These woody PCTs were likely to have included open grassy woodland extending across the flatter, more gently sloping foothills, merging with a grassy / dry sclerophyll forest on the hillslopes and higher elevated land. However, the subject land has been utilised for agriculture (grazing) for an extended period and as a result the current vegetation is modified. The native overstorey and midstorey have been cleared across approximately 37% of the subject land, and some of the areas which retain a woody overstorey still show signs of historic thinning. However, despite the history of disturbance, almost the whole of the subject land is characterised by a native dominant groundstorey with a moderate to high diversity of native forbs. The exceptions to this are two paddocks that were ploughed and sown to Phalaris *Phalaris aquatica* in autumn/spring 2024 (Figure 6).

The potential PCTs that occur in the subject land were initially determined via the NSW Vegetation Information System (VIS) using the following filters:

- IBRA Bioregion – contains 'South Eastern Highlands';
- IBRA Subregion – contains 'Monaro'; and
- Vegetation Formation – contains 'Grassy Woodlands' or 'Dry Sclerophyll Forests (Shrubby sub-formation)'.

This process resulted in 13 candidate Grassy Woodland PCTs[27] and 13 Dry Sclerophyll Forests (Shrubby sub-formation) PCTs[28].

The grassy / dry sclerophyll forest occurs on the hillslopes and higher elevated land in the subject land. The dominant species across each stratum were as follows.

- Overstorey: Broad-leaved Peppermint *Eucalyptus dives*, Bundy *E. goniocalyx*, Bundy *E. nortonii*, Scribbly Gum *E. rossii*.
- Midstorey: Long-leaf Cassinia *Cassinia longifolia*, Native Blackthorn *Bursaria spinosa subsp. lasiophylla*, Wattles *Acacia* spp..
- Groundstorey: Foxtail Speargrass *Austrostipa densiflora*, Rough Speargrass *Austrostipa scabra*, Red-Anther Wallaby Grass *Rytidosperma pallida*, Wallaby Grasses *Rhytidosperma* spp., Kangaroo Grass *Themeda triandra*, Weeping Grass *Microlaena stipoides*, Common Everlasting *Chrysocephalum apiculatum*, *Lomandra* spp., *Vittadinia* spp..

Of the potential PCTs, PCT3375 best reflects the dominant species, community structure, and landscape position description, and is identified on the NSW State Vegetation Type Map (STVM) as occurring across the majority of the subject land.

[27] 3338, 3341, 3347, 3348, 3370, 3373, 3374, 3375, 3376, 3381, 3382, 3383, 3385.
[28] 3330, 3643, 3650, 3651, 3666, 3671, 3738, 3739, 3741, 3742, 3743, 3744, 3747.

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The grassy woodland occurs across the flatter, more gently sloping foothills in the subject land. The dominant species across each stratum were as follows.

- Overstorey: Yellow Box *E. melliodora*, Blakley's Red Gum *E. blakelyi*, Apple Box *E. bridgesiana*.
- Midstorey: Native Blackthorn, Hopbush *Dodonea viscosa*.
- Groundstorey: Kangaroo Grass, Wallaby Grasses, Rough Speargrass, Snow Grass *Poa sieberiana*, River Tussock *Poa labillardierei,* Weeping Grass, Red-leg Grass *Bothriochloa macra*, Common Love Grass *Eragrostis brownii,* Common Everlasting, Varible Raspwort *Haloragis heterophylla*, Stinking Pennywort *Hydrocotyle laxiflora, Lomandra* spp..

Of the potential PCTs, PCT3376 best reflects the dominant species, community structure, and landscape position description, and is identified on the STVM as occurring in the subject land.

The two identified PCTs occurring in the subject land are shown in Figure 6 and detailed in Table 7.

Table 7. PCTs recorded in the subject land.

PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
3375	Monaro-Queanbeyan Rolling Hills Grassy Forest	A tall grassy sclerophyll open forest of quartz-rich hilly country in the Monaro rain-shadow corridor of the upper Murrumbidgee and Snowy River catchments. Occurs at elevations of 550-1000 m. Composition of the tree canopy is variable, including occasional *Eucalyptus bridgesiana* and rarely *E. viminalis*, *E. dives* or *E. nortonii*. Scattered shrubs commonly include *Bursaria spinosa* and occasionally *Acacia dealbata*, *Ozothamnus conditus*, *Cassinia longifolia* or *A. mearnsii*, over a grassy ground layer of *Elymus scaber*, *Poa sieberiana, Austrostipa scabra, Themeda triandra* and occasionally *Bothriochloa macra*.	This PCT was mapped on the hillslopes and higher elevated aspects of the subject land.	Not listed.	61%
3376	Southern Tableland Grassy Box Woodland	A tall sclerophyll woodland with a dry shrub layer and a mid dense, grassy groundcover. The canopy almost always includes *Eucalyptus melliodora* or *E. bridgesiana*, occasionally associated with *E. blakelyi* which may be locally	This PCT was mapped across the flatter, more gently sloping foothills of the subject land.	Critically Endangered (Commonwealth and NSW) when occurring in a condition consistent with the listing	93%

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PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
		prominent in lower parts of the landscape. The shrub layer is sparse to absent with occasional, scattered *Melichrus urceolatus, Lassanthe strigosa* or various *Acacia* species.		criteria of the TEC.	

2.2.4.2 Vegetation zones

As described below, summarised in Table 8 and Table 9, detailed in Table 10 to Table 18, and shown in Figure 6, these PCTs were classified into six zones and three zones respectively.

PCT3375 – *Monaro-Queanbeyan Rolling Hills Grassy Forest*

- Zone 1 – Canopy – Native Dominant – Mod-High Diversity.
- Zone 2 – No Canopy – Native Dominant – Mod-High Diversity.
- Zone 3 – Canopy – Native Dominant – Low Diversity.
- Zone 4 – No Canopy – Native Dominant – Low Diversity.
- Zone 5 – Canopy – Exotic Dominant – Low Diversity.
- Zone 6 – No Canopy – Exotic Dominant – Low Diversity.

PCT3376 – *Southern Tableland Grassy Box Woodland*

- Zone 1 – Canopy – Native Dominant – Mod-High Diversity (EPBC Act / BC Act Box-Gum Woodland).
- Zone 2 – No Canopy – Native Dominant – Mod-High Diversity (EPBC Act / BC Act Box-Gum Woodland).
- Zone 6 – No Canopy – Exotic Dominant – Low Diversity.

All of the above vegetation zones meet the definition of BC Act 'native vegetation' apart from Zone 6, which does not support a native overstorey or midstorey has a groundstorey dominated by exotic grasses and forbs. In addition, PCT3376 Zone 6 does not occur within the development footprint and so would not be directly impacted by the proposed development.

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Table 8. PCT3375 vegetation zone summary

	PCT3375					
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**
Native Canopy	Yes	No	Yes	No	Yes	No
Groundstorey	Native	Native	Native	Native	Exotic	Exotic
Native Diversity	Mod-High	Mod-High	Low	Low	Low	Low
Area – subject land	192.41 ha	106.88 ha	14.49 ha	16.54 ha	1.64 ha	2.11 ha
Area – development footprint	29.57 ha	15.92 ha	5.49 ha	2.88 ha	0.73 ha	0.80 ha
BAM plots	9	8	3	3	1	1
BC Act Native Vegetation	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No
BC Act TEC	No	No	No	No	No	No
EPBC Act TEC	No	No	No	No	No	No

Table 9. PCT3376 vegetation zone summary

	PCT3376		
	Zone 1	**Zone 2**	**Zone 6**
Native Canopy	Yes	No	No
Groundstorey	Native	Native	Exotic
Native Diversity	Mod-High	Mod-High	Low
Area – subject land	140.03 ha	78.08 ha	1.38 ha
Area – development footprint	12.29 ha	10.15 ha	0.00 ha
BAM plots	8	7	0
BC Act Native Vegetation	**Yes**	**Yes**	No
BC Act TEC	**Yes**	**Yes**	No
EPBC Act TEC	**Yes**	**Yes**	No

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Table 10. PCT3375 Zone 1 results summary

	PCT3375 Zone 1
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest – Canopy – Native Dominant – Moderate to High Diversity** PCT3375 Zone 1 occurs on hilltops and slopes, primarily in the western half of the subject land with scattered patches in the east and north. The areas in the west show very little evidence of historic disturbance from agricultural activities, while the areas in the east and north have been thinned and support a higher cover of exotic grasses and broadleaf weeds. Zone 1 contains a canopy representative of the climax community and a diverse midstorey and shrubstorey. The groundstorey is dominated by a moderate to high diversity of native species. There is a low cover of significant weed species, and the vegetation is grazed primarily by Eastern Grey Kangaroos *Macropus giganteus*.
Area – subject land	192.41 ha.
Area – development footprint	29.57 ha.
BAM plots assessed	9.
Overstorey Species	Co-dominant: *E. dives, E. goniocalyx, E. nortonii, E. rossii*. Associate: *E. melliodora, E. rubida*.
Overstorey Cover	6% - 30% (average of 22%).
Overstorey Regeneration	Yes.
Perennial Groundlayer	68% - 99% native (average of 90%), with 20 – 37 (average of 27) native non-grass species.
Significant Weeds	Saffron Thistle *Carthamus lanatus*, St John's Wort *Hypericum perforatum*, Briar Rose *Rosa rubiginosa*, Blackberry *Rubus fruticosus,* Sheep's Sorrel *Rumex acetosella*.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.



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Table 11. PCT3375 Zone 2 results summary

	PCT3375 Zone 2
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest – No Canopy – Native Dominant – Moderate to High Diversity** PCT3375 Zone 2 occurs on the lower slopes adjacent to PCT3376, primarily in the eastern half of the subject land. The canopy and midstorey have been cleared across Zone 2, presumably to open up the area and improve conditions for stock grazing. Despite these historic impacts, the groundstorey is still dominated by a moderate to high diversity of native species. There is a low cover of significant weed species, and the vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	106.88 ha.
Area – development footprint	15.92 ha.
BAM plots assessed	8.
Overstorey Species	None.
Overstorey Cover	0%
Overstorey Regeneration	No.
Perennial Groundlayer	69% - 98% native (average of 89%), with 8 – 25 (average of 14) native non-grass species.
Significant Weeds	Saffron Thistle, African Lovegrass *Eragrostis curvula,* St John's Wort, Serrated Tussock *Nassella trichotoma*, Briar Rose, Sheep's Sorrel.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.



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Table 12. PCT3375 Zone 3 results summary

	PCT3375 Zone 3
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest –Canopy – Native Dominant – Low Diversity** PCT3375 Zone 3 occurs as small patches of vegetation in three general locations in the subject land. The canopy has been thinned and the midstorey cleared, presumably to open up the area and improve conditions for stock grazing. In comparison to Zones 1 and 2, the groundstorey only supports a low diversity of native species. While the cause of this is unknown, it is likely due to more intensive stock grazing (e.g. these areas were stock holding areas or sheep camps). As a result of these historic impacts and activities, Zone 3 supports a higher diversity and cover of exotic grasses, forbs, and significant weed species. The vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	14.49 ha.
Area – development footprint	5.49 ha.
BAM plots assessed	3.
Overstorey Species	Dominant: *E. goniocalyx*. Sub-dominant: *E. bridgesiana*. Associate: *E. rossii*
Overstorey Cover	5% - 50% (average of 28%).
Overstorey Regeneration	Yes.
Perennial Groundlayer	75% - 92% native (average of 86%), with 6 – 9 (average of 7) native non-grass species.
Significant Weeds	Common Hawthorn *Cratageus monogyna,* St John's Wort.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.



Table 13. PCT3375 Zone 4 results summary

	PCT3375 Zone 4
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest – No Canopy – Native Dominant – Low Diversity** PCT3375 Zone 4 occurs as small patches of vegetation in three general locations in the subject land, connecting to patches of PCT3375 Zone 3. The canopy and midstorey have been cleared, presumably to open up the area and improve conditions for stock grazing. In comparison to Zones 1 and 2, the groundstorey only supports a low diversity of native species. While the cause of this is unknown, it is likely due to more intensive stock grazing (e.g. these areas were stock holding areas or sheep camps). As a result of these historic impacts and activities, Zone 4 supports a higher diversity and cover of exotic grasses, forbs, and significant weed species. The vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	16.54 ha.
Area – development footprint	2.88 ha.
BAM plots assessed	3.
Overstorey Species	None.
Overstorey Cover	0%
Overstorey Regeneration	No.
Perennial Groundlayer	46% - 88% native (average of 74%), with 5 – 9 (average of 7) native non-grass species.
Significant Weeds	African Lovegrass, St John's Wort, Briar Rose, Blackberry.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.



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Table 14. PCT3375 Zone 5 results summary

	PCT3375 Zone 5
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest – Canopy – Exotic Dominant – Low Diversity** PCT3375 Zone 5 occurs as very small patches of vegetation associated with sheep camps. The canopy has been thinned and the midstorey cleared, presumably to open up the area and improve conditions for stock grazing. The groundstorey is dominated by exotic grasses and forbs. While highly disturbed, Zone 5 still supports a low to moderate cover of disturbance tolerant native grasses and forbs. The vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	1.64 ha.
Area – development footprint	0.73 ha.
BAM plots assessed	1.
Overstorey Species	Dominant: *E. goniocalyx*.
Overstorey Cover	5%.
Overstorey Regeneration	Scattered.
Perennial Groundlayer	60% native, with 3 native non-grass species. The apparently high perennial native groundcover is due to a high cover of exotic annual grasses.
Significant Weeds	Saffron Thistle, Umbrella Sedge *Cyperus Eragrostis*.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.



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Table 15. PCT3375 Zone 6 results summary

	PCT3375 Zone 6
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest – No Canopy – Exotic Dominant – Low Diversity** PCT3375 Zone 6 occurs as very small patches of vegetation associated with sheep camps. The canopy and midstorey have been cleared, presumably to open up the area and improve conditions for stock grazing. The groundstorey is dominated by exotic grasses and forbs. While highly disturbed, Zone 6 still supports a low to moderate cover of disturbance tolerant native grasses and forbs. The vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	2.11 ha.
Area – development footprint	0.80 ha.
BAM plots assessed	1.
Overstorey Species	None.
Overstorey Cover	0%
Overstorey Regeneration	No.
Perennial Groundlayer	89% native, with 2 native non-grass species. Previous plots in Zone 6 from 2020 recorded a much lower average perennial native groundlayer of 28%. The single plot in this instance captured a small patch of Weeping Grass, which has raised the perennial native groundcover. In general, Zone 6 is clearly dominated by exotic species.
Significant Weeds	African Lovegrass.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	No.



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Table 16. PCT3376 Zone 1 results summary

	PCT3376 Zone 1
Description	**Southern Tableland Grassy Box Woodland – Canopy – Native Dominant – Moderate to High Diversity (EPBC Act and BC Act Box-Gum Woodland)** PCT3376 Zone 1 occurs across flatter, more gently sloping foothills in the subject land. The areas in the west show very little evidence of historic disturbance from agricultural activities, while the areas in the east and north have been thinned and support a higher cover of exotic grasses and broadleaf weeds. Zone 1 contains a canopy representative of the climax community and a diverse midstorey and shrubstorey. The groundstorey is dominated by a moderate to high diversity of native species. There is a low cover of significant weed species, and the vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	140.03 ha.
Area – development footprint	12.29 ha.
BAM plots assessed	8.
Overstorey Species	Dominant: *E. melliodora, E. blakelyi.* Sub-dominant: *E. bridgesiana*.
Overstorey Cover	5% - 30% (average of 16%).
Overstorey Regeneration	Yes.
Perennial Groundlayer	77% - 99% native (average of 91%), with 10 – 41 (average of 21) native non-grass species.
Significant Weeds	Saffron Thistle, St John's Wort, African Lovegrass, Serrated Tussock, Briar Rose, Sheep's Sorrel.
EPBC Act and/or BC Act listed TEC	Yes (EPBC Act and BC Act Box-Gum Woodland).
BC Act Native Vegetation	Yes.
	

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Table 17. PCT3376 Zone 2 results summary

	PCT3376 Zone 2
Description	**Southern Tableland Grassy Box Woodland – No Canopy – Native Dominant – Moderate to High Diversity (EPBC Act and BC Act Box-Gum Woodland)** PCT3376 Zone 2 occurs on the lower slopes adjacent to PCT3375, primarily in the eastern half of the subject land. The canopy and midstorey have been cleared across Zone 2, presumably to open up the area and improve conditions for stock grazing. Despite these historic impacts, the groundstorey is still dominated by a moderate to high diversity of native species. There is a low cover of significant weed species, and the vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	78.08 ha.
Area – development footprint	10.15 ha.
BAM plots assessed	7.
Overstorey Species	None.
Overstorey Cover	0%
Overstorey Regeneration	No.
Perennial Groundlayer	88% - 99% native (average of 96%), with 9 – 34 (average of 16) native non-grass species.
Significant Weeds	Saffron Thistle, African Lovegrass, St John's Wort, Serrated Tussock, Sheep's Sorrel.
EPBC Act and/or BC Act listed TEC	Yes (EPBC Act and BC Act Box-Gum Woodland).
BC Act Native Vegetation	Yes.
	

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Table 18. PCT3376 Zone 6 results summary

	PCT3376 Zone 6
Description	**Monaro-Queanbeyan Rolling Hills Grassy Forest – No Canopy – Exotic Dominant – Low Diversity (BC Act Box-Gum Woodland)** PCT3376 Zone 6 occurs as small patches of vegetation associated with sheep camps and historically pasture improved / cultivated areas. The canopy and midstorey have been cleared, presumably to open up the area and improve conditions for stock grazing. The groundstorey is dominated by exotic grasses and forbs. While highly disturbed, Zone 6 still supports a low cover of disturbance tolerant native grasses and forbs. The vegetation is grazed primarily by stock and Eastern Grey Kangaroos.
Area – subject land	1.38 ha.
Area – development footprint	0.00 ha.
BAM plots assessed	0.
Overstorey Species*	None.
Overstorey Cover*	0%
Overstorey Regeneration*	No.
Perennial Groundlayer*	15% native, with 2 – 6 (average of 4) native non-grass species.
Significant Weeds*	Saffron Thistle, Briar Rose, Sheep's Sorrel.
EPBC Act and/or BC Act listed TEC*	No.
BC Act Native Vegetation*	No.



***** Data comes from BAM plots that were conducted in 2020. These plots are not included in the remainder of the BDAR as PCT3376 Zone 6 is not directly or indirectly impacted by the proposed development.

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2.2.4.3 Patch size

As defined in the BAM, patch size is -

> *an area of native vegetation that:*
>
> > *a) occurs on the development site or biodiversity stewardship site, and*
> >
> > *b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30m for non-woody ecosystems).*
>
> *Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.*

With respect to the above, all the vegetation in the subject land meets the definition of BC Act native vegetation apart from PCT3375 Zone 6 and PCT3376 Zone 6. As PCT3375 Zone 6 and PCT3376 Zone 6 do not meet the definition of 'native vegetation', their patch size is recorded as 0 ha. For the remaining vegetation zones, the native vegetation outside of the subject land extends to the north, east, and west for other 100 ha. The patch size for all zones apart from Zone 6 is therefore within the >100 ha class as defined by the BAM.

2.2.4.4 Vegetation integrity scores

Zones that occur in the development footprint and which support any amount of BC Act 'native vegetation' are used to determine vegetation integrity scores and the impacts associated with the proposed development (refer to Figure 7). Zones which do not support any BC Act native vegetation do not require further assessment in the BAM except where:

(a) they are proposed for restoration as part of an offset; or

(b) they are assessed as habitat for threatened species.

PCT3376 Zone 6 does not occur within the development footprint and so would not be directly impacted by the proposed development. As such, impacts to this vegetation zone are not assessed as part of this BDAR and therefore a vegetation integrity score is not required.

As shown in Table 10 to Table 18, all other vegetation zones apart from PCT3375 Zone 6 meet the definition of BC Act 'native vegetation'. However, PCT3375 Zone 6 does support a native component (Appendix A and Appendix B). As such, as per the BAM, all impacted vegetation zones are assessed to determine a vegetation integrity score.

Table 19 and Table 20 presents the results of the BAM plot assessments and details the composition, structure, function, and resulting vegetation integrity score for each relevant vegetation zone.

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Table 19. Vegetation integrity scores for PCT3375.

	PCT3375					
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**
Patch size	> 100 ha	> 100 ha	> 100 ha	> 100 ha	> 100 ha	0 ha
Area – development footprint	29.57 ha	15.92 ha	5.49 ha	2.88 ha	0.73 ha	0.80 ha
BAM plots	9	8	3	3	1	1
Composition condition score	96.6	59.5	33.8	27.9	71	6.6
Structure condition score	94.2	47.2	81.4	46.7	18.9	46.7
Function condition score	59.0	3.3	52.3	0.2	64.0	0
Current vegetation integrity score	**81.3**	**21.0**	**52.4**	**10.9**	**20.4**	**6.7**

Table 20. Vegetation integrity scores for PCT3376.

	PCT3376	
	Zone 1	**Zone 2**
Patch size	> 100 ha	> 100 ha
Area – development footprint	12.29 ha	10.15 ha
BAM plots	8	7
Composition condition score	74.0	62.0
Structure condition score	85.7	48.0
Function condition score	32.8	0.1
Current vegetation integrity score	**59.3**	**14.4**

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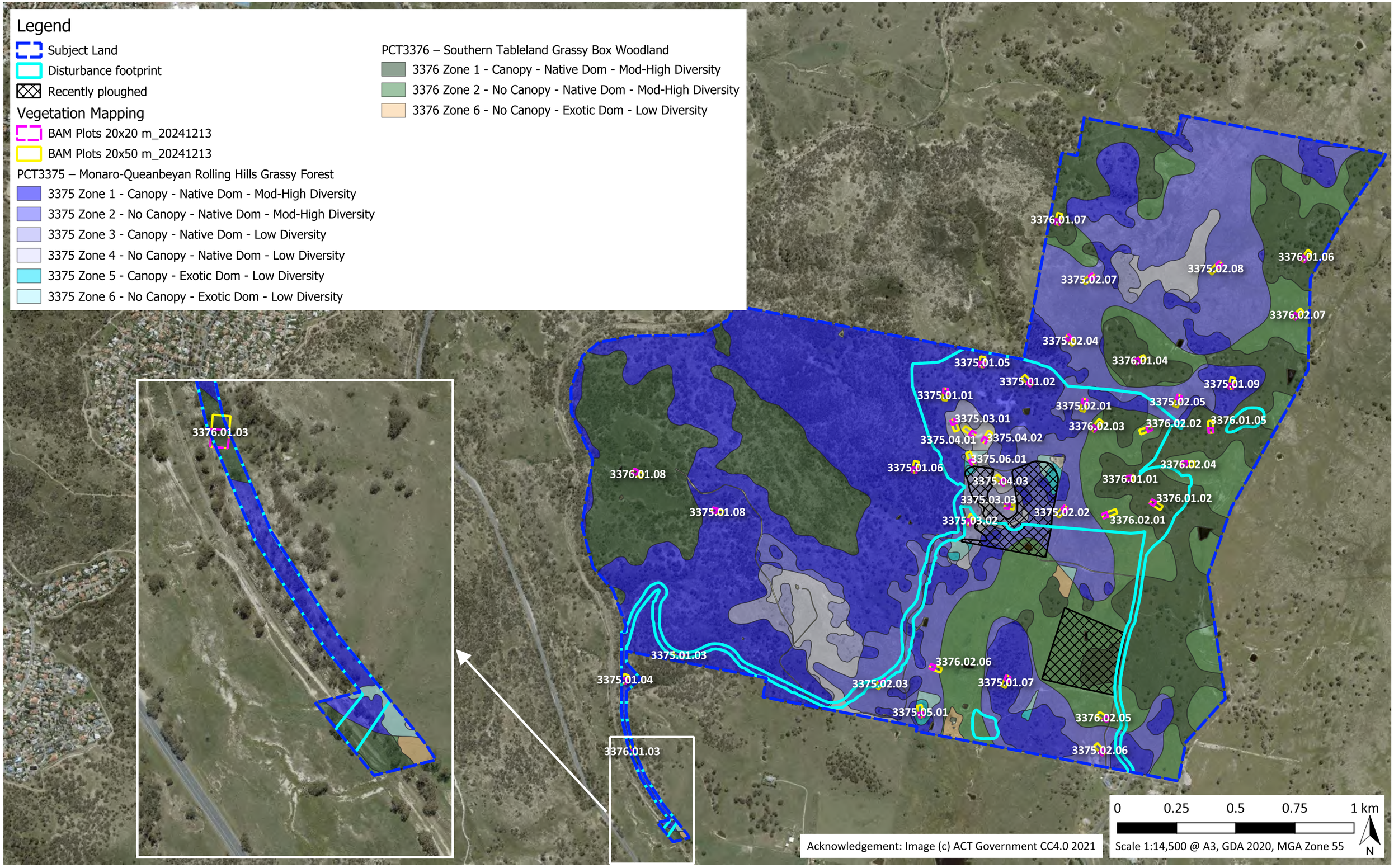


Figure 6. BAM Vegetation Mapping and Survey

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 19 May 2025

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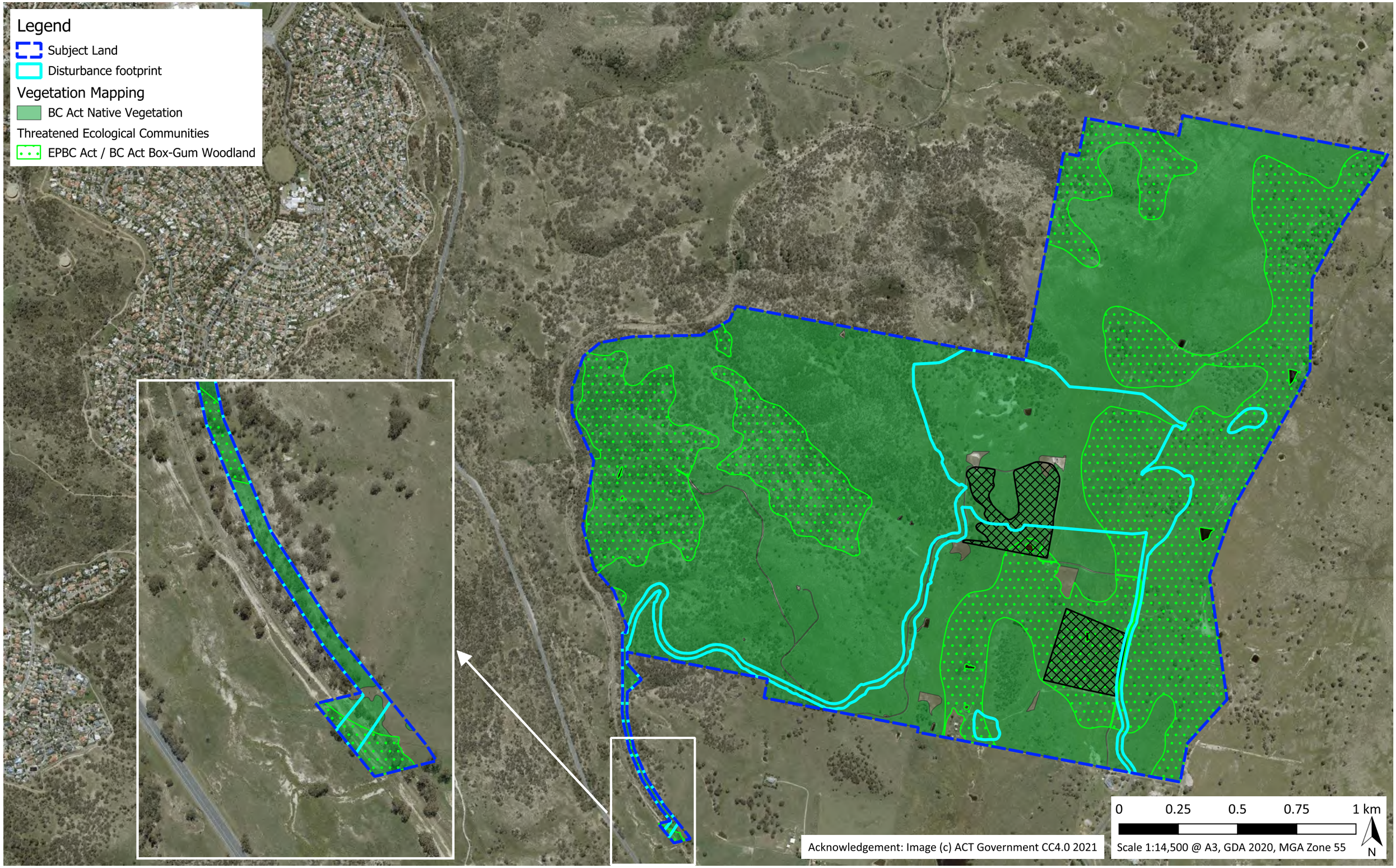


Figure 7. BC Act Native Vegetation and Threatened Ecological Communities

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Drawn by: S. Reid
Date: 19 May 2025

2.2.5 Threatened Ecological Communities

2.2.5.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Two EPBC Act critically endangered listed threatened ecological communities have the potential to occur in the subject land: Natural Temperate Grassland of the South Eastern Highlands (Natural Temperate Grassland) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act Box-Gum Woodland). Based on the recorded vegetation types, plant species, landscape position, and the vegetation on adjoining and nearby properties, only EPBC Act Box-Gum Woodland is considered to have the potential to occur in the subject land.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – listed as critically endangered pursuant to the EPBC Act

Description – The White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box and/or Yellow Box and/or Blakely's Red Gum trees. This TEC occurs along the western slopes and tablelands of the Great Dividing Range from southern Queensland through New South Wales and the Australian Capital Territory to Victoria.

Presence in the subject land – Confirmed – The subject land occurs in one of the associated bioregions (i.e. the South Eastern Highlands bioregion) and the entire portion of the subject land mapped as PCT3376 would have once supported the climax community of this TEC.

To determine whether a patch meets the criteria for the community, the vegetation must be assessed according to the *Approved Conservation Advice for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DCCEEW 2023a[29]).* The Conservation Advice provides 'key diagnostic characteristics' for determining if the ecological community is present at a site, as well as criteria for determining the condition categories for a patch, known as the 'minimum condition thresholds'.

In order to be protected as a Matter of National Environmental Significance, areas of the ecological community must meet both:

- the key diagnostic characteristics; and
- at least the minimum condition thresholds.

An assessment of the vegetation within the subject land against these key diagnostics and condition thresholds is provided below.

Key Diagnostic Characteristics

1. *The ecological community occurs in one of the listed bioregions.*

   Yes – the subject land is in the South Eastern Highlands bioregion.

[29] Department of Climate Change, Energy, the Environment and Water (2023a). *Conservation advice for White Box-Yellow Box -Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Canberra.

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2. *The patch has, or previously had, an overstorey dominated or co-dominated by Eucalyptus albens (White Box), E. melliodora (Yellow Box) and/or E. blakelyi (Blakely's Red Gum).*

   Yes – Blakley's Red Gum and Yellow Box are the dominant overstorey species in the areas mapped as PCT3376 Zone 1 and are likely to have historically been the dominant overstorey species in PCT3376 Zone 2 and Zone 6.

3. *The patch has a predominantly native understorey (i.e. at least 50% of the perennial vegetation cover in the ground layer is made up of native species)?*

   Yes – PCT3376 Zone 1 and Zone 2 support a groundstorey dominated by perennial native grasses and forbs.

   The patches mapped as PCT3376 Zone 6 supports a groundstorey clearly dominated by exotic species and therefore do not meet this criterion.

4. *Tussock grasses are conspicuous in the ground layer (except in some situations, such as under dense groves of shrubs or regenerating trees), usually with several native species from some of the following genera: Austrostipa, Bothriochloa, Chloris, Cymbopogon, Dicanthium, Microlaena, Poa, Themeda, Rytidosperma or Sorghum.*

   Yes – PCT3376 Zone 1 and Zone 2 are dominated by native tussock grasses including *Themeda, Rytidosperma, Austrostipa, Poa, Microlaena, and Bothriochloa.*

5. *Amongst the grass tussocks and sometimes in swathes, a range of broad-leaved forbs and petaloid monocots (e.g. lilies sens. lat.) may be a major component of the plant diversity.*

   Yes – a substantial variety of broad-leaved forbs and other native non-grass species have been recorded in PCT3376 Zone 1 and Zone 2 (refer to Appendix B).

6. *While shrubs may be dominant locally within areas of the ecological community, areas of native vegetation with a more continuous shrub layer, in which the average shrub cover of the whole patch is greater than 30%, is considered to be a shrubby woodland and so in not part of the listed community.*

   Yes – shrub cover is not greater than 30% in any patch.

In addition, Section 2.2 of the Approved Conservation Advice provides some additional information to assist in identifying occurrences of the ecological community.

1. A 'patch' is a continuous area containing the ecological community. The patch is the larger of:

   - an area that contains five or more trees in which the gap between the outer canopy of any tree and the outer canopy of the nearest tree is no greater than 75 m, or
   - the area over which the ground layer is predominantly native (at least 50% of the perennial vegetation cover in the ground layer is made up of native species).

2. Allowances are made for 'breaks' up to the larger of 30 metres between areas of the understorey, or 75 metres between areas of the canopy, that meet the diagnostics. These breaks may the result of tracks or roads, exposed areas of soil, or areas of localised variation in vegetation that do not meet the key diagnostics. Tracks or roads should not be included in patch size calculations. Breaks larger than the distances above indicate that separate patches are present.

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3. Characteristics may vary within the patch. These should be measured on a scale of 0.1 ha or greater and the average used to determine whether the TEC is present. Once it is determined that a patch meets the minimum condition threshold overall, it is recognised that different areas within this patch may be consistent with different condition classes.

4. Revegetated, restored, or replanted sites or areas of regrowth are not excluded from the TEC, so long as the patch meets the description, key diagnostics, and minimum condition thresholds.

Condition Classes and thresholds

The minimum condition thresholds are designed to identify those patches that retain sufficient conservation values to be considered a matter of national environmental significance, to which the referral, assessment, approval and compliance provisions of the EPBC Act apply. The three condition classes for EPBC Act Box-Gum Woodland are as follows:

- Condition Class A – Good quality understorey and mature overstorey both present.

  Patch size greater than 0.1 ha, with 12 or more native non-grass understorey species and at least one important species[30]. In addition, there must be at least 10 mature trees[31] per hectare.

- Condition Class B – Good quality understorey present. Characteristic trees may be absent.

  As for Condition Class A, but there may be less than 10 mature trees per hectare.

- Condition Class C – Allows for a lower diversity in the understorey in areas where there is regeneration and/or tree density may be relatively dense.

  Patches greater than 2 ha, with at least 20 mature trees per hectare and/or natural regeneration[32] of the dominant overstorey eucalypts.

Table 21 provides an assessment of each vegetation zone against the listing criteria and minimum condition thresholds (refer to Appendix A, Appendix B, and Table 16 to Table 18 for details on vegetation composition and structure).

Conclusion – As detailed in Table 21, only the areas mapped as PCT3376 Zone 1 and Zone 2 meet the criteria for the EPBC Act listed TEC. The subject land therefore supports 218.11 ha of EPBC Act Box-Gum Woodland, consisting of 140.03 ha in Condition Class A (i.e. PCT33746 Zone 1) and 78.08 ha in Condition Class B (i.e. PCT3376 Zone 2). Of that, the proposed development would directly impact 22.44 ha, consisting of 12.29 ha in Condition Class A (i.e. PCT33746 Zone 1) and 10.15 ha in Condition Class B (i.e. PCT3376 Zone 2).

[30] Listed in 'Appendix A – Species Lists' in the Conservation Advice (DCCEEW 2023a).
[31] Mature trees are those with a circumference of at least 125 cm measured at a height of 130 cm above the ground (equivalent to diameter of 40 cm).
[32] Regeneration of dominant overstorey species: the patch contains eucalyptus saplings of the dominant species that are 5 cm diameter or greater at breast height.

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Table 21. Assessment against the listing criteria for the EPBC listed TEC – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Criterion		Assessment results		
		PCT3376 Zone 1	**PCT3376 Zone 2**	**PCT3376 Zone 6**
1.	*Is the patch 0.1 ha or larger?*	Yes	Yes	Yes
2.	*Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?*	Yes Yellow Box and Blakley's Red Gum are dominant throughout this zone.	Yes Yellow Box and/or Blakley's Red Gum are expected to have been historically dominant or co-dominant throughout this zone.	Yes Yellow Box and/or Blakley's Red Gum are expected to have been historically dominant or co-dominant throughout this zone.
3.	*Does the patch have a predominantly native understorey?*	Yes On average, the understorey cover was 91% native (range of 77% to 99%).	Yes On average, the understorey cover was 96% native (range of 88% to 99%).	No On average, the understorey cover was 15% native.
4.	*Does the patch have 12 or more native understorey species present (excluding grasses)? There must be at least one important species.*	Yes Patches are greater than 0.1 ha in size and support an average of 21 native non-grass understorey species (range of 10 to 41)	Yes Patches are greater than 0.1 ha in size and support an average of 16 native non-grass understorey species (range of 9 to 34)	N/A Refer to Criterion 3.
5.	*Does the patch contain 10 or more mature trees per hectare?*	Yes On average, this zone is estimated to support 10 or more mature trees per hectare	No This zone lacks mature trees and regeneration of the overstorey.	N/A Refer to Criterion32.
	Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration[33] of the dominant overstorey eucalypts?	Yes Patches are greater than 2 ha in size and there is natural regeneration of the overstorey.	No This zone lacks mature trees and regeneration of the overstorey.	N/A Refer to Criterion 3.
	Does the patch meet the criteria for the listed TEC?	**Yes – Condition Class A**	**Yes – Condition Class B**	**No**

[33] Defined in Commonwealth of Australia (2006) as '*natural regeneration of the dominant overstorey eucalypts when there are mature trees* [circumference of at least 125 cm at 130 cm above the ground] *plus regenerating trees of at least 15 cm circumference at 130 cm above the ground*.'

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2.2.5.2 Biodiversity Conservation Act 2016 (NSW)

Two BC Act listed ecological communities have the potential to occur in the subject land: *White Box – Yellow Box – Blakely's Red Gum Woodland* (BC Act Box-Gum Woodland) and *Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion*.

BC Act Box-Gum Woodland

This community, listed as critically endangered in NSW, is described below, together with an assessment of its presence and condition in the subject land.

The below description is extracted from the NSW *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020a, gazetted 17 July 2020[34]).

> *4.2. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characterised by widely-spaced trees with canopies not touching and projected foliage cover generally less than 30% (Prober et al. 2017) ...Understorey shrubs are typically sparse or absent (Prober et al. 2017). The groundcover is dominated by perennial tussock grasses interspersed with a diverse range of forb species with the families Asteraceae and Fabaceae, and the orders Liliales and Asparagales well represented (Prober et al. 2017).*
>
> *4.3. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characteristically dominated by one or more of the species Eucalyptus albens (White Box), E. melliodora (Yellow Box) and E. blakelyi (Blakely's Red Gum) …A number of understorey species are typically found throughout almost the entire range of the community, with the exception of the extreme north of its distribution and areas where they have been excluded by grazing.*
>
> *4.10. The distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland spans a range in elevation from approximately 170 m ASL on the western slopes of the Great Dividing Range to approximately 1200 m on the Northern Tablelands of NSW (Beadle 1981), although occurrences on the ranges are typically at lower elevations (Prober et al. 2017). The topography on which the community occurs ranges from flat in the west of its range to hilly and undulating in the east (Prober and Thiele 2004).*
>
> *4.12. …For the purpose of establishing the risk of ecosystem/community collapse due to ongoing decline in distribution, it is not possible on the basis of available data, to specify thresholds in either tree cover or species diversity which are indicative of loss of function because: i) no single threshold is appropriate for the range of circumstances and pathways leading to different states of degradation (and hence the potential for recovery); ii) the point at which an ecological community has ceased to function in its original form is inherently uncertain, and the scientific basis upon which symptoms such as loss of tree cover and diversity can be related to ecological function is not established in this case; and iii) recovery may be dependent on active remediation, therefore thresholds can not be determined in absolute terms because they depend on social (collective will) and economic (cost of remediation) factors.*
>
> *3.1.4. The condition of remnants ranges from relatively good to highly degraded, such as paddock remnants with weedy understories and only a few hardy natives left. Some remnants of*

[34] NSW Threatened Species Scientific Committee (2020a). *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Gazetted 17 July 2020.

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the community may consist of only an intact overstorey or an intact understorey but may still have high conservation value due to the flora and fauna they support.

The final determination does not provide specific listing criteria against which to assess a patch of vegetation. However, as described in the final determination, the definition for the BC Act Box-Gum Woodland TEC is extremely broad. In effect, any land for which the climax community is Box-Gum Woodland that has not been cultivated, become a stock camp, or otherwise been entirely modified, is likely to meet the minimum definition of the BC Act listed TEC.

Presence in the subject land – Confirmed – The entire portion of the subject land mapped as PCT3376 would have once supported the climax community of this TEC.

The condition of the BC Act listed TEC in the subject land varies as follows.

1. **High Quality**. Occurring in a condition sufficient to be listed as EPBC Act Box-Gum Woodland. PCT3376 Zone 1 supports a canopy representative of the climax community and a diverse midstorey, shrubstorey, and groundstorey. PCT3376 Zone 2 supports a diverse groundstorey.

2. **Not BC Act Box-Gum Woodland**. PCT3376 Zone 6 supports a low diversity exotic groundstorey and has therefore been disturbed to the extent that it no longer meets the listing criteria for the BC Act TEC.

As such, the subject land supports 218.11 ha of high quality BC Act Box-Gum Woodland. Of that, the proposed development would directly impact 22.44 ha.

BC Act Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion

The Monaro Tableland Cool Temperate Grassy Woodland (CTGW) in the South East Highlands Bioregion community, listed as critically endangered in NSW, is described below, together with an assessment of its presence and condition within the subject land.

The below description is extracted from the NSW *Final Determination for the TSC Act critically endangered listed ecological community Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion* (NSW Threatened Species Scientific Committee 2019[35]).

Monaro Tableland Cool Temperate Grassy Woodland ranges in structure from woodland to low open woodland. It is characterised by a sparse to very sparse tree stratum dominated by Eucalyptus pauciflora either in monospecific stands or with any of Acacia melanoxylon, E. rubida subsp. rubida, E. stellulata or E. viminalis as codominants. A number of other tree species have been recorded within the community, although very infrequently and always as canopy subdominants. These include E. bridgesiana, E.dives, E. blakelyi and E. melliodora. Tree height and cover vary as a function of moisture availability, drainage and past land management. The tree stratum becomes shorter and sparser with declining moisture availability or increasing levels of soil waterlogging… Trees may be absent as a consequence of tree removal under pastoral management and grazing by domestic stock. A continuous herbaceous ground stratum is usually present, although this is highly variable in composition and cover as a function of grazing pressure from wild herbivores (native and exotic) and domestic stock. Ground cover species include Themeda triandra, Poa sieberiana, Elymus scaber, Hydrocotyle laxiflora, Scleranthus biflorus, Oxalis perennans, Plantago varia, Euchiton japonicus, Poa labillardieri,

[35] NSW Threatened Species Scientific Committee (2019). *Final Determination: Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion.* Department of Planning, Industry and Environment, Sydney. Gazetted 28 June 2019.

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Hypericum gramineum, Desmodium varians, Geranium solanderi, Acaena echinata, Gonocarpus tetragynus, Microlaena stipoides, Dichondra repens, Solenogyne gunnii, Asperula conferta, Asperula scoparia, Rumex brownii, Rytidosperma laeve, Rytidosperma pilosum, Chrysocephalum apiculatum and Chrysocephalum semipapposum. The Community may develop a shrub or bracken layer as a consequence of the opening up of the ground stratum following excessive grazing by rabbits and sheep. This may include species such as Pimelea pauciflora, Acacia dealbata, Acacia melanoxylon, Acacia rubida subsp. rubida, Cassinia longifolia and Pteridium esculentum (Costin 1954).

As stated in Part 4 of the Final Determination, the occurrence or historical occurrence of Snow Gum *Eucalyptus pauciflora* is the primary characteristic for determining the presence of the community. The final determination provides a Monaro & Werriwa CTGW Assessment Spreadsheet Tool to be used in conjunction with an Advisory Layer indicating potential extent. Presence of Snow Gum, characteristic species, non-characteristic species, stumps, and the proximity to nearest Snow Gum, are entered into the assessment tool to determine the likelihood of occurrence of the community. Part 1 of the Final Determination provides a list of an assemblage of species characteristic of the Monaro Tableland CTGW.

Presence in the subject land – Absent – The dominant tree species in the development footprint and wider subject land are not characteristic of the dominant or co-dominant species of the BC Act Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion TEC. As such, the subject land and wider subject land do not support vegetation which meets the criteria for this community under the BC Act.

Conclusion

The subject land supports the BC Act listed ecological community *White Box Yellow Box Blakely's Red Gum Woodland* in the areas mapped as PCT3376 Zone 1, Zone 2, Zone 4, and Zone 5. No part of the subject land or subject land supports the BC Act listed ecological community *Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion.*

2.2.6 High threat weeds

Table 22 lists the 10 high threat weeds that occur in the subject land. None of these weeds are currently widespread or occur at high density.

Table 22. High threat weeds.

Species Name	Common Name	Status
Tree		
Pinus sp.	Pine tree	-
Shrubs		
Crataegus monogyna	Common Hawthorn	-
Rosa rubiginosa	Briar Rose	-
Rubus fruticosus aggregate	Blackberry	WoNS, LM/AP
Forb		
Carthamus lanatus	Saffron Thistle	-
Hypericum perforatum	St John's Wort	LM
Rumex acetosella	Sheep's Sorrel	-

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Species Name	Common Name	Status
Grass		
Eragrostis curvula	African Lovegrass	AP
Nassella trichotoma	Serrated Tussock	WoNS, C
Paspalum dilatatum	Paspalum Grass	-

Table key. Commonwealth Weed of National Significance = **WoNS**. Regional Priority Weed in the South East Local Land Services region under the NSW *Biosecurity Act 2015*: **P** = Prevention; **E** = Eradication; **C** = Containment; **AP** = Asset Protection; **LM** = Species subject to Local Management programs.

2.3 Habitat Suitability for Threatened Species

2.3.1 Fauna habitat

The habitat features in the subject land were identified during the field surveys and assessed regarding their potential value to native fauna species, both threatened and common. The fauna habitat features of the subject land are described in Table 23. It is important to note that the information presented in Table 23 is also used to assess the presence/absence of habitat constraints and/or microhabitats for ecosystem credits species (Section 2.3.4), species credit species (Section 2.3.5), and species which are only listed under the EPBC Act and which are not identified as either an ecosystem credit species or species credit species pursuant to the BOS (Section 2.3.3, Appendix E).

Table 23. Fauna habitat features.

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Remnant eucalypts	Despite historic clearing across 37% of the subject land, the subject land contains a large number of remnant trees, many of which support important habitat features (e.g. hollows, mistletoe).	All remnant trees, young and mature, are likely to provide foraging resources for a variety of birds and marsupials when in flower, including threatened species. The mature hollow bearing remnant trees are likely to provide a nesting resource for birds, bats, and marsupials, including threatened species. Mistletoe is likely to provide a foraging resource for a variety of birds and marsupials when in flower, including threatened species.
Drooping Sheoak	Drooping Sheoak *Allocasuarina verticillata* occur as scattered individuals across the western half of the subject land.	Drooping Sheoak are likely to provide a foraging resource to a variety native birds, potentially including threatened species such as the Glossy Black-cockatoo *Calyptorhynchus lathami.*
Other native vegetation (i.e. native shrubs, grasses, and forbs)	The midstorey and shrubstorey are present throughout a large proportion of the subject land. Almost the entire subject land supports a high diversity native dominant grassy groundlayer.	The native midstorey and shrubstorey are likely to provide habitat value for many of the region's threatened and rare woodland birds, which generally prefer to inhabit woodland where such features are present. The grasses and forbs are likely to provide a foraging resource to a variety of native birds, reptiles, and herbivorous mammals, such as the Eastern Grey Kangaroo. Open areas are likely to provide a hunting resource for raptors and other predatory birds.

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Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Fallen timber	Fallen timber is scattered across the wooded portions of the subject land.	The fallen timber is likely to provide foraging habitat and/or refugia for a variety of native mammals, birds, herpetofauna, and invertebrates.
Surface rocks and rocky outcrops	Loose surface rock and embedded rocky outcrops are scattered across a substantial portion of the subject land.	The loose surface rock is likely to provide refuge and foraging habitat for herpetofauna and invertebrates, including for the threatened Pink-tailed Legless Lizard.
Termite mounds	Termite mounds are scattered across the wooded portions of the subject land.	Termite mounds are likely to provide a foraging resource for the Short-beaked Echidna *Tachyglossus aculeatus*, and potentially a foraging and nesting resource for Rosenberg's Monitor *Varanus rosenbergi*.
Creeks, streams, dams	Rock Gully Creek and Four Mile Creek both contain flowing water throughout much of the year and small shallow pools, and Rock Gully Creek supports riparian / fringing native vegetation. Rock Gully Creek and Four Mile Creek are likely to provide habitat for a variety aquatic/riparian flora and fauna. The remainder of the first and second order streams support only small patches of riparian / fringing vegetation and were observed during the surveys to be either dry or to convey a small amount of water depending on the timing of the particular survey. Finally, there are 24 farm dams of varying size within the subject land. The larger dams support some riparian / fringing vegetation.	Rock Gully Creek and Four Mile Creek are likely to provide habitat for a variety of aquatic/riparian flora and fauna but are considered unlikely to support significant habitat for any threatened species. The remainder of the first and second order streams are unlikely to provide habitat of significance to aquatic/riparian flora or fauna due to the lack of permanent water and extensive areas of riparian / fringing vegetation. The farm dams are likely to provide habitat of some value to aquatic/riparian flora and fauna including native water birds (e.g. Australian Wood Duck *Chenonetta jubata*) and reptiles (e.g. Eastern Long-necked Turtle *Chelodina longicollis*). They are considered unlikely to support significant habitat for any threatened species.

2.3.2 Threatened Biodiversity Data

2.3.2.1 Definitions of conservation significance

The conservation significance of a species, population, or community is determined by its current listing pursuant to Commonwealth and/or State legislation and associated policy, more specifically:

- National – Listed as threatened (critically endangered, endangered, vulnerable or, conservation dependent) pursuant to the EPBC Act; and
- State (NSW) – Listed as threatened (critically endangered, endangered, or vulnerable) pursuant to the BC Act.

Species listed as 'migratory' under the EPBC Act are also considered where relevant.

2.3.2.2 Database and literature review

Information regarding the suitability of the habitat in the subject land for threatened species was obtained from the TBDC, BioNet (e.g. the profile of a threatened species), the BAM Calculator, listing determinations, and/or recovery plans prepared for the species by the Commonwealth Government

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and NSW Government. This information is used to assess the presence/absence of habitat constraints and/or microhabitats for species flagged by the BAM as ecosystem credits species (Section 2.3.4), species credit species (Section 2.3.5), or species which are only listed under the EPBC Act and which are not identified as either an ecosystem credit species or species credit species pursuant to the BOS (Section 2.3.3, Appendix E).

A database search and literature review were completed to inform likelihood of occurrence assessments and provide useful background information for this assessment. This review included obtaining:

- a list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the subject land obtained using the Department of the Environment's online EPBC Act PMST on 9 May 2025 (see Appendix E);
- ecological point data from the NSW Wildlife Atlas (BioNet), downloaded on 29 April 2025, providing a list of threatened species which have previously been recorded in the broad locality of the subject land (i.e. within 10 km) (refer to Figure 8); and
- ecological point data from NatureMapr (formally Canberra Nature Map), accessed on 29 August 2024, providing a list of threatened species which have previously been recorded in the immediate locality of the subject land (i.e. within approx. 1.5 km) (data is not displayed in any figure due to licencing agreements).

Literature referred to during the conduct of the surveys for this study and/or during the preparation of this BDAR is listed under References.

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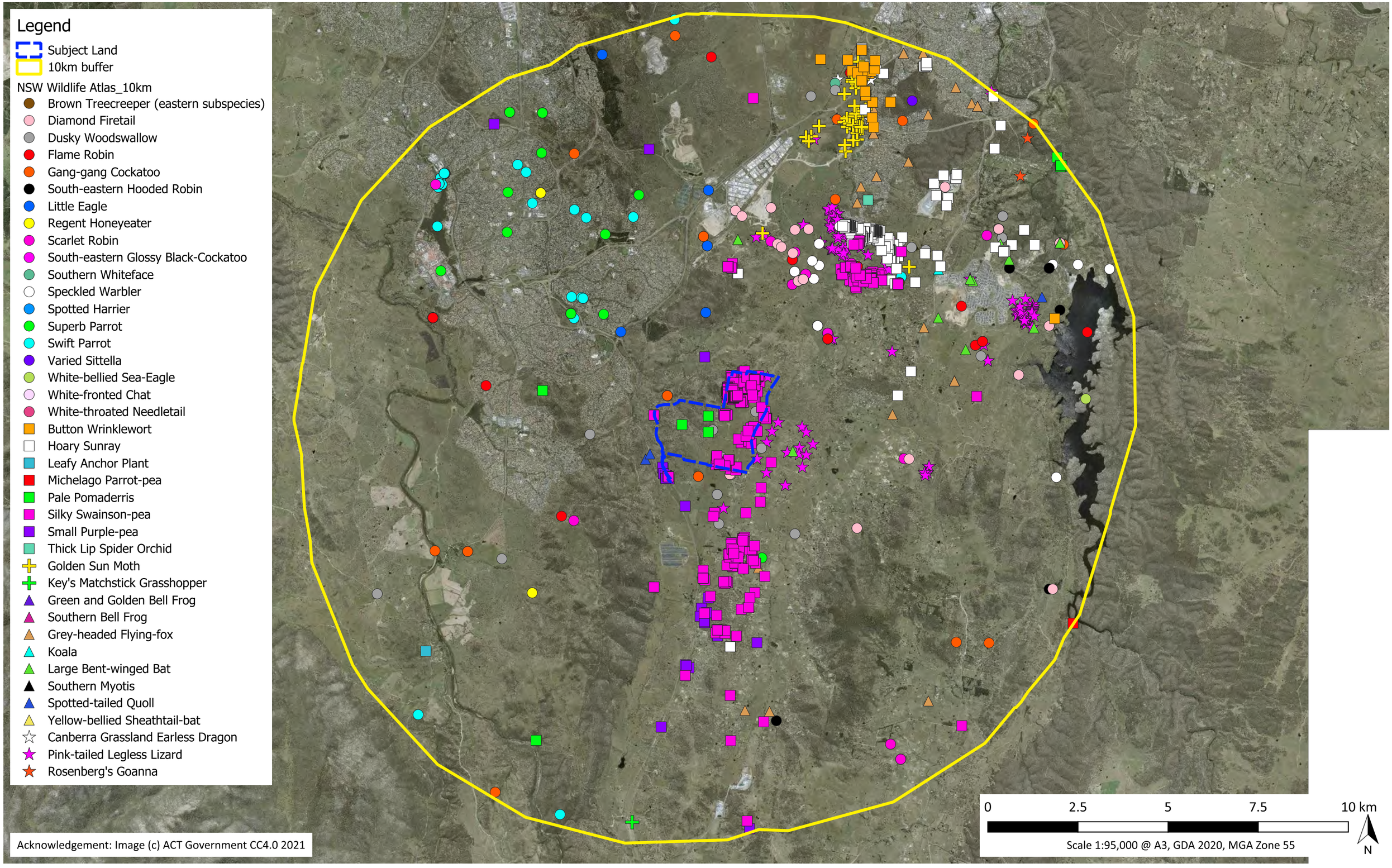


Figure 8. NSW Wildlife Atlas Threatened Species Search

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 19 May 2025

2.3.3 Habitat suitability for EPBC Act listed species that are not ecosystem credit species or species credit species

A large number of EPBC Act listed species that occur in NSW are included in the TBDC and are therefore captured by the BAM Calculator (refer to Appendix E). The assessment of the likelihood of these species occurring in the subject land can therefore be determined as per the BAM; this assessment is presented in Section 2.3.4 to Section 2.3.6.

However, there are a number of EPBC Act listed species that are not included in the TBDC; these species therefore cannot be captured by the BAM Calculator (refer to Appendix E). As such, the assessment of the likelihood of these species occurring in the subject land must be determined independently of the BAM Calculator. Accordingly, Table 24 assesses the likelihood of EPBC Act listed species, that are neither ecosystem credit species nor species credit species, occurring in the subject land. The likelihood of these species occurring in the subject land is determined based upon the presence/absence of specific habitat constraints, microhabitat requirements, geographic limitations, vagrancy, species records (BioNet and ecological reports), and/or the results of targeted surveys. A summary of the findings from any associated targeted surveys is given in Section 2.3.6.

Table 24. Habitat suitability EPBC Act listed species that are not ecosystem credit species or species credit species

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Calidris acuminata Sharp-tailed Sandpiper	-	Vulnerable, Migratory	During the non-breeding season, approximately 91 percent of the East Asian – Australasian population of Sharp-tailed Sandpiper occurs in Australia and New Zealand. Sharp-tailed Sandpipers occur within all states of Australia. They are found mostly in the south-east and are widespread in both inland and coastal locations. The species is widespread in most regions of New South Wales and Victoria, especially in coastal areas. The species utilises fresh and hypersaline environments, feeding along the edge of water on mudflats, coastal and inland wetlands, and sewage ponds. After rainfall events, the species may also feed on areas of agricultural pasture.	No – microhabitat features	The subject land does not support appropriate habitat for the species as it lacks mudflats, coastal and inland wetlands, and sewerage ponds. In addition, the species has not been recorded within 10 km of the subject land, with the closest record 66 km to the north-east. Conclusion – the species is considered unlikely to occur in the subject land.
Euastacus armatus Murray Crayfish	-	Vulnerable	The Murray River Crayfish is found in the southern Murray-Darling Basin to approximately 700 metres above sea level. In the ACT it is known from the Murrumbidgee River, lower Cotter River below the Cotter Dam, Tumut River, Goobragandra River and the lower Goodradigbee River. The species inhabit a wide variety of permanent rivers and large streams and are also known to occur in some lake environments. In lowland areas, clay banks appear to be important for constructing burrows, but in the ACT region boulder/cobble substrate along with other structure such as snags may provide important cover. The species has a preference for intermediate flow velocities, deeper pools and glides with overhanging vegetation for shading.	No – habitat constraint	The subject land does not contain habitat for this species. Conclusion – the species is considered unlikely to occur in the subject land.
Gallinago hardwickii Latham's Snipe	Vulnerable	Vulnerable, Migratory	Latham's Snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. Most birds spend the non-breeding period at sites located south of the Richmond River in New South Wales. In Australia, Latham's Snipe occurs in a wide variety of permanent and ephemeral wetlands. They usually occur in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby. They generally occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains.	Yes – confirmed	As detailed in Section 2.3.6, Latham's Snipe were recorded foraging / roosting in the subject land. Conclusion – the subject land supports foraging / roosting habitat for this species.
Lepidium ginninderrense Ginninderra Peppercress	-	Critically Endangered	The species is known from a small number of grassland sites in the ACT, where it grows in alluvial soil made from sand and earth left by rivers and floods. The species generally occurs in shallow, bare spots that collect water after rain. It is often found with other native grassland plants.	No – microhabitat features	The subject land does not support appropriate habitat for the species as it lacks grassland PCTs and notable areas of alluvial soil that contain shallow, bare spots that collect water after rain. Conclusion – the species is considered unlikely to occur in the subject land.
Macquaria australasica Macquarie Perch	Endangered	Endangered	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their substantial tributaries.	No – habitat constraint	The subject land does not contain habitat for this species. Conclusion – the species is considered unlikely to occur in the subject land.

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2.3.4 Habitat suitability for ecosystem credit species

Threatened species classified as ecosystem credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 25. The value of the habitat in the subject land for ecosystem credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based the presence/absence of specific habitat constraints, geographic limitations, and vagrancy. Information regarding habitat constraints, geographic limitations, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator.

Table 25. Predicted ecosystem credit species identified by the BAM as potentially occurring in the subject land

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered	Critically Endangered	Yes – assumed	-
Aphelocephala leucopsis Southern Whiteface	Vulnerable	Vulnerable	Yes – assumed	-
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	-	Yes – confirmed	-
Botaurus poiciloptilus Australasian Bittern	Endangered	Endangered	No – habitat constraint	No suitable wetlands in the subject land.
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Endangered	Endangered	Yes – confirmed	-
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Chthonicola sagittata Speckled Warbler	Vulnerable	-	Yes – confirmed	-
Circus assimilis Spotted Harrier	Vulnerable	-	Yes – assumed	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	Vulnerable	Vulnerable	Yes – assumed	-
Daphoenositta chrysoptera Varied Sittella	Vulnerable	-	Yes – confirmed	-
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	Endangered	Yes – assumed	-
Ephippiorhynchus asiaticus Black-necked Stork	Endangered	-	No – habitat constraint	No suitable wetlands in the subject land.
Falco subniger Black Falcon	Vulnerable	-	Yes - assumed	
Falsistrellus tasmaniensis Eastern False Pipistrelle	Vulnerable	-	Yes – assumed	-
Glossopsitta pusilla Little Lorikeet	Vulnerable	-	Yes – assumed	-
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Vulnerable	-	Yes – assumed	
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable	-	Yes – assumed	-

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Hirundapus caudacutus White-throated Needletail	Vulnerable	Vulnerable	Yes – assumed	-
Lathamus discolor Swift Parrot (Foraging)	Endangered	Critically Endangered	Yes – assumed	-
Lophoictinia isura Square-tailed Kite (Foraging)	Vulnerable	-	Yes – assumed	-
Melanodryas cucullata cucullata South-eastern Hooded Robin	Endangered	Endangered	Yes – assumed	-
Miniopterus orianae oceanensis Large Bent-winged Bat (Foraging)	Vulnerable	-	Yes – assumed	-
Neophema pulchella Turquoise Parrot	Vulnerable	-	Yes – assumed	-
Pachycephala olivacea Olive Whistler	Vulnerable	-	Yes – assumed	-
Petroica boodang Scarlet Robin	Vulnerable	-	Yes – confirmed	-
Petroica phoenicea Flame Robin	Vulnerable	-	Yes – confirmed	-
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	Vulnerable	-	Yes – assumed	-

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Stagonopleura guttata Diamond Firetail	Vulnerable	Vulnerable	Yes – assumed	-
Suta flagellum Little Whip Snake	Vulnerable	-	Yes – assumed	-
Varanus rosenbergi Rosenberg's Goanna	Vulnerable	-	Yes – assumed	-

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2.3.5 Habitat suitability for species credit species

2.3.5.1 Candidate species credit species

Threatened species classified as species credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 26. The value of the habitat in the subject land for species credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based upon the presence/absence of specific habitat constraints, microhabitat requirements, geographic limitations, vagrancy, species records (BioNet and ecological reports), and/or the results of targeted surveys. Information regarding habitat constraints, microhabitat requirements, geographic limitations, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator. A summary of the findings from each targeted survey is given in Section 2.3.6.

Table 26. Candidate species credit species identified by the BAM as potentially occurring in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Anthochaera phrygia Regent Honeyeater (Breeding)	Critically Endangered	Critically Endangered	This species inhabits dry open forest and woodland (particularly Box-Ironbark woodland and riparian forests of River Sheoak) that have significantly large numbers of mature trees, high canopy cover, and abundance of mistletoes. The species breeds in Box-Ironbark and other temperate woodlands, and in riparian gallery forest dominated by River Sheoak. The species usually nests in tall mature eucalypts, Sheoaks, or mistletoe haustoria. There are only three known key breeding regions: north-east Victoria (Chiltern-Albury) and NSW (Capertee Valley and the Bundarra-Barraba region). The TBDC lists *'as per important habitat map'* as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified on the 'BAM – Important Areas viewer' map[36]. Conclusion – the subject land lacks the breeding habitat constraints required for this species.
Aprasia parapulchella Pink-tailed Legless Lizard	Vulnerable	Vulnerable	This species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. The TBDC lists *'rocky areas or within 50 m of rocky areas'* as a habitat constraint for this species. Some of the main threats to this species listed in the TBDC are habitat loss through bush-rock removal and vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), overgrazing by domestic stock, and invasion of habitat by weeds.	Yes – surveyed	As detailed in Section 2.3.6, Pink-tailed Legless Lizard were recorded in the subject land. Conclusion – the subject land supports habitat for this species.
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	Endangered	Endangered	In spring and summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Gang-Gang Cockatoos favour old growth forest and woodland for nesting and roosting. The TBDC lists '*Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger*' as a breeding habitat constraint for this species.	No – surveyed	As detailed in Section 2.3.6, Gang-gang Cockatoo were recorded in the subject land. However, despite specific targeted surveys for the species, no sign of breeding activity was detected. Conclusion – it is unlikely that the subject land supports breeding habitat for this species.
Calotis glandulosa Mauve Burr-daisy	Vulnerable	Vulnerable	This species is found in montane and subalpine grasslands in the Australian Alps and is found in subalpine grassland (dominated by *Poa* spp.), and montane or natural temperate grassland dominated by Kangaroo Grass and Snow Gum Woodlands on the Monaro and Shoalhaven area. It appears to be a coloniser of bare patches, which explains why it often occurs on roadsides. The species does not persist in heavily grazed pastures of the Monaro or the Shoalhaven area. The BAM Calculator lists '*South of Michelago*' as a geographic constraint for this species.	No – geographic constraint	The subject land is not south of Michelago. Conclusion – geographic limitations remove this species from further consideration.

[36] https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo (Breeding)	Vulnerable	Vulnerable	This species inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak *Allocasuarina littoralis* and Forest Sheoak *Allocasuarina torulosa* are important foods. Inland populations feed on a wide range of Sheoaks, including Drooping Sheoak, *Allocasuaraina diminuta* and *A. gymnathera*. Belah (*Casuarina cristata*) is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah. The species is dependent on large hollow-bearing eucalypts for nest sites and a single egg is laid between March and May. The TBDC lists '*Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground*' as a breeding habitat constraint for this species and notes that '*the species may need larger patches and more intact landscapes for breeding.*'	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.
Cercartetus nanus Eastern Pygmy-possum	Vulnerable	-	This species is found in a broad range of habitats, but in most areas woodlands and heath appear to be preferred. It feeds primarily on nectar and pollen collected from banksias, eucalypts, and bottlebrushes, but also feeds on insects throughout the year. The species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys, or thickets of vegetation, (e.g. grass-tree skirts). Tree hollows are favoured for breeding. The TBDC lists '*declining shrub diversity in forests and woodlands due to overgrazing by stock and rabbits*', '*predation from cats, dogs and* foxes', and '*loss of nest sites due to removal of firewood'* as some of the key threats to the species.	No	Field surveys of the vegetation in the subject land did not record any Banksias or Bottlebrushes (Appendix B) and the species was not encountered during nocturnal spotlighting surveys. In addition, the species has not been recorded within 10 km of the subject land and is not known to occur in the locality, with the closest record approximately 25 km away in the Yanununbeyan National Park and Tinderry Nature Reserve (Figure 8). Conclusion – the species is considered unlikely to occur in the subject land.
Delma impar Striped Legless Lizard	Vulnerable	Vulnerable	Striped Legless Lizard is mainly found in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. It is also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is characterised by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda triandra*, Speargrasses *Austrostipa* spp., Poa Tussocks *Poa* spp., and occasionally Wallaby Grasses *Rytidosperma* spp.. The species can sometimes be found in modified grasslands with a significant content of exotic grasses, and in grasslands with significant amounts of surface rocks (used for shelter). Some of the main threats to this species listed in the TBDC are habitat loss through vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), habitat degradation through invasion by weeds or escaped pasture species, and overgrazing by domestic stock.	No	The subject land is not within 2 km of any potential areas of Natural Temperate Grassland and the closest record is approximately 7 km away in the Jerrabomberra East Nature Reserve (BioNet and NatureMapr). Conclusion – the species is considered unlikely to occur in the subject land.
Dillwynia glaucula Michelago Parrot-pea	Endangered	-	Occurs on exposed patches of clay or on rocky outcrops in eucalypt woodland often dominated by Scribbly Gum (*Eucalyptus rossii*), Snow Gum (*E. pauciflora*), Broad-leafed Peppermint (*E. dives*) and Red Stringybark (*E. macrorhyncha*). The understorey may be either grassy or shrubby. Grows adjacent to Natural Temperate Grassland in the Michelago area.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Diuris aequalis Buttercup Doubletail	Endangered	Endangered	This species has been recorded in forest, low open woodland with a grassy understorey, and secondary grassland on the higher parts of the Southern and Central Tablelands (especially on the Great Dividing Range). Populations tend to contain few, scattered individuals; despite extensive surveys, only about 200 plants from 20 populations are known. The species has been recorded in Kanangra-Boyd National Park, Gurnang State Forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago and Bungendore. The BAM Calculator lists '*North of Hoskintown*' as a geographic limitation for this species and the TBDC lists vegetation clearing for agricultural purposes, overabundant native herbivores, feral pigs, overgrazing by domestic stock, rabbits, and invasive grasses as some of the key threats to the species.	No – geographic constraint	The subject land is not north of Hoskintown. Conclusion – geographic limitations remove this species from further consideration.
Dodonaea procumbens Creeping Hop-bush	Vulnerable	Vulnerable	Creeping Hop-bush is found in the dry areas of the Monaro, between Michelago and Dalgety. It grows in Natural Temperate Grassland or fringing eucalypt woodland of Snow Gum. It is found in open bare patches where there is little competition from other species, on sandy-clay soils, usually on or near vertically-tilted shale outcrops. The species does not persist in heavily grazed pastures of the Monaro. The BAM Calculator lists '*Cooma-Monaro Shire south of Michelago*' as a Geographic limitation for this species.	No – geographic limitation	The subject land is north of Michelago. Conclusion – geographic limitations remove this species from further consideration.
Eucalyptus aggregata Black Gum	Vulnerable	Vulnerable	Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler, and higher parts of the tablelands (e.g. in the Blayney, Crookwell, Goulburn, Braidwood, and Bungendore districts). The species grows on alluvial soils in the lowest parts of the landscape (i.e. on cold and poorly drained flats and hollows adjacent to creeks and small rivers). It often grows with other cold-adapted eucalypts (e.g. Snow Gum *E. pauciflora*, RIbbon Gum *E. viminalis*, Candlebark *E. rubida*, Black Sallee *E. stellulata*, and Swamp Gum *E. ovata*). Black Gum usually occurs in an open woodland formation with few shrubs and a grassy groundlayer dominated by either River Tussock *Poa labillardierei* or Kangaroo Grass *Themeda triandra*. Black Gum can occur as isolated paddock trees in modified native or exotic pastures. The BAM Calculator lists '*East of a line that runs north to south about 5 km west of Bungendore*' as a Geographic limitation for this species.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.
Eucalyptus pulverulenta Silver-leafed Gum	Vulnerable	Vulnerable	This species grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum E. *mannifera*, Red Stringybark *E. macrorhynca*, Broad-leafed Peppermint *E. dives*, Silvertop Ash *E. sieberi* and Apple Box E. *bridgesiana*. The BAM Calculator lists '*South of Tinderry Range'* as a geographic limitation for this species.	No – geographic limitation	The subject land does not occur south of the Tinderry Range. Conclusion – geographic limitations remove this species from further consideration.
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Vulnerable	-	Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. The TBDC lists '*living or dead mature trees in suitable vegetation within 1km of a river, lake, large dam, creek, wetland, or coastline*' as a breeding habitat constraint.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Heleioporus australiacus Giant Burrowing Frog	Vulnerable	Vulnerable	This species appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. The species if found in heath, woodland, and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. When breeding, frogs will call from open spaces, under vegetation or rocks or from within burrows in the creek bank. The species spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. The TBDC lists '*Habitat loss through clearing for residential, agricultural and urban infrastructure development*', '*Disease (chytrid fungus)*', and '*Reduction of water quality generally in the vicinity of urban development*' as some of the key threats to the species.	No – microhabitat features	The development footprint does not contain potential habitat for the species as it lacks appropriate streams, rivers, other suitable waterbodies, and riparian habitat. In addition, the species is no longer considered likely to occur in the immediate locality, with the closest record 12 km south of the subject land being from 1995 (BioNet and NatureMapr). Conclusion – the species is considered unlikely to occur in the development footprint.
Hieraaetus morphnoides Little Eagle (Breeding)	Vulnerable	-	This species occupies open eucalypts forest, woodland, or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. The species nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. The TBDC lists *'Nest trees - live (occasionally dead) large old trees within vegetation'* as a breeding habitat constraint for this species.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.
Keyacris scurra Key's Matchstick Grasshopper	Endangered	Endangered	Key's Matchstick Grasshopper is usually found in native grasslands, but it has also been recorded in other vegetation associations containing a native grass understory (especially Kangaroo Grass *Themeda triandra*) and known food plants (particularly Asteraceae, indicator species include the daisy *Chrysocephalum apiculatum*). Although it does not appear to feed on Kangaroo Grass, it may be important for providing protection from predators. More recently, however, opportunistic sightings of Key's Matchstick Grasshopper have been reported in a wide range of vegetation types in south-east NSW including wet sclerophyll forest, montane low forest, dry woodlands, heathland and montane grasslands. In some reported locations there is an absence of Kangaroo Grass and very few or no Asteraceae. Where the understory is favourable for the species, habitat under scattered trees could be suitable. Being flightless, this species does not disperse large distances (< 10 m).	Yes – surveyed	As detailed in Section 2.3.6, Key's Matchstick was recorded in the subject land, including within the section of the development footprint that is adjacent to the Goulburn Bombala Rail Line. Conclusion – the subject land supports habitat for this species.
Lathamus discolor Swift Parrot (Breeding)	Endangered	Critically Endangered	This species breeds in Tasmania from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *Eucalyptus globulus.* The species migrates between February and October to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. On the mainland, they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. In NSW, the species mostly occurs on the coast and south west slopes. The TBDC lists *'as per Important Habitat Map'* as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified on the 'BAM – Important Areas viewer' map[37]. Conclusion – the subject land lacks the breeding habitat constraints required for this species.

[37] https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Leucochrysum albicans subsp. tricolor Hoary Sunray	Endangered	Endangered	This species occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. It can occur in modified habitats such as semi-urban areas and roadsides. It is highly dependent on the presence of bare ground for germination, and in some areas disturbance is required for successful establishment.	Yes – surveyed	As detailed in Section 2.3.6, Hoary Sunray were recorded in the subject land. However, the proposed development would not impact the species as the recorded habitat occurs outside the development footprint. Conclusion – the subject land supports habitat for this species.
Litoria aurea Green and Golden Bell Frog	Endangered	Vulnerable	The species inhabits marshes, dams, and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby, and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region, occur in highly disturbed areas. The TBDC lists '*Within 1km of wet areas [Semi-permanent/ephemeral wet areas]*', '*Within 1km of swamp*', and '*Within 1km of waterbody'* as habitat constraints for this species.	No – microhabitat features	The development footprint does not contain potential habitat for the species as it lacks appropriate streams, rivers, other suitable waterbodies, and riparian habitat. In addition, the species is no longer considered likely to occur in the immediate locality, with the closest record 8.5 km north-east of the subject land being from 1984 (Figure 8). Conclusion – the species is considered unlikely to occur in the development footprint.
Litoria castanea Yellow-spotted Tree Frog	Critically Endangered	Critically Endangered	Historically, this species occurred in two separate highland ranges: on the New England Tableland, and on the southern and central tablelands from Bathurst to Bombala. Following the chytrid virus pandemic in the 1970s, this species went unrecorded for 30 years and was believed to be extinct, until it was rediscovered in 2009 on the Southern Tablelands. This population - near Yass - remains the only known extant site of the species.	No – microhabitat features	The development footprint does not contain potential habitat for the species as it lacks appropriate streams, rivers, other suitable waterbodies, and riparian habitat. In addition, the species is no longer considered likely to occur in the immediate locality, with the closest record 11 km north-west of the subject land being from 1975 (BioNet and NatureMapr). Conclusion – the species is considered unlikely to occur in the development footprint.
Litoria raniformis Southern Bell Frog	Endangered	Vulnerable	The species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. During the breeding season, animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams, and rice crops. Tadpoles require standing water for at least 4 months for development and metamorphosis to occur but can take up to 12 months to develop. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.	No – microhabitat features	The development footprint does not contain potential habitat for the species as it lacks appropriate streams, rivers, other suitable waterbodies, and riparian habitat. In addition, the species is no longer considered likely to occur in the immediate locality, with the closest record 8.5 km north-east of the subject land being from 1984 (Figure 8). Conclusion – the species is considered unlikely to occur in the development footprint.
Lophoictinia isura Square-tailed Kite (Breeding)	Vulnerable	-	This species is found in a variety of timbered habitats including dry woodlands and open forests. It shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The TBDC lists *'nest trees'* as a breeding habitat constraint. The TBDC general notes state '*it will be difficult to identify a Kite nest (there are lots of comparable sized stick nests built by other species), especially given Kites have large territories and other stick nesters will undoubtedly also be nesting where Kites might be recorded. Kites will need be in attendance to confirm breeding sites*.'	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Vulnerable	-	Caves are the primary roosting habitat, but the species also use derelict mines, storm-water tunnels, buildings, and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. Breeding or roosting colonies can number from 100 to 150,000 individuals. The TBDC list the following breeding habitat constraint, *'Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave", observation type code "E nest-roost", with numbers of individuals >500.'*	No – habitat constraint	The subject land does not contain potential breeding habitat (caves, tunnels, mines, culverts, etc.). Conclusion – the subject land lacks the breeding habitat constraints required for this species.
Myotis macropus Southern Myotis	Vulnerable	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end, and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. The species roosts close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges, and in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. The species is dependent on waterways (i.e. medium to large permanent creeks, rivers, lakes, or other waterways with pools/stretches 3 m wide or greater[38]), where it catches aquatic insects and small fish with their large hind claws, and also catches flying insects. The TBDC lists *'Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other, on or within 200m of the site'* as habitat constrains for this species.	No	The subject land is located more than 100 km inland from the coast and does not support, nor is adjacent to, a major river. As such, the species is unlikely to occur in the subject land or immediate locality. This is supported by the fact that the species has only been recorded twice within 30 km of the subject land (ref BioNet and NatureMapr). Conclusion – the species is considered unlikely to occur in the subject land.
Ninox connivens Barking Owl	Vulnerable	-	This species inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly over years by a pair. Nesting occurs during mid-winter and spring, being variable between pairs and among years. As a rule of thumb, laying occurs during August and fledging in November. The female incubates for 5 weeks, roosts outside the hollow when chicks are 4 weeks old, then fledging occurs 2-3 weeks later. The TBDC lists *'living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground'* as a habitat constraint for this species.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.
Ninox strenua Powerful Owl	Vulnerable	-	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The species requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. The TBDC lists *'living or dead trees with hollow greater than 20 cm diameter'* as a habitat constraint.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.

[38] Anderson. J., Law. B., and Tidemann (2005). *Stream use by the Large-footed Myotis Myotis Macropus in relation to environmental variables in Northern New South Wales*. Australian Mammalogy 28:15-26.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Petauroides volans Southern Greater Glider	Endangered	Endangered	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	No	The subject land does not support tall, montane, or moist eucalypt forest and the species was not encountered during nocturnal spotlighting surveys. In addition, the species has not been recorded within 10 km of the subject land and is not known to occur in the locality, with the closest records approximately 23-32 km away in the Tallangandra National Park and Tidbinbilla Nature Reserve (BioNet and NatureMapr). Conclusion – the species is considered unlikely to occur in the subject land.
Petaurus norfolcensis Squirrel Glider	Vulnerable	-	West of the Great Diving Range, this species inhabits mature or old growth Box, Box-Ironbark woodlands, and River Red Gum forest. It prefers mixed species stands with a shrub or Acacia midstorey. The species requires abundant tree hollows for refuge and nest sites and generally relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely connected (i.e. no more than 50 m apart). The TBDC lists *'Loss of hollow-bearing trees'* and '*Loss of understorey food resources'* as some of the key threats to this species.	No	The species has not been recorded within 10 km of the subject land and is not known to occur in the locality, with the closest records approximately 32 km away near the Tallangandra State Conservation Area (BioNet and NatureMapr). In addition, the species was not encountered during nocturnal spotlighting surveys. Conclusion – the species is considered unlikely to occur in the subject land.
Petrogale penicillata Brush-tailed Rock-wallaby	Endangered	Vulnerable	The species occupies rocky escarpments, outcrops, and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Brush-tailed Rock-wallaby browse on vegetation in and adjacent to rocky areas, eating grasses and forbs as well as the foliage and fruits of shrubs and trees. They are highly territorial and have strong site fidelity with an average home range size of about 15 ha; males tend to have larger home ranges than females. The home range consists of a refuge area and a foraging range linked by habitually used commuting routes. The TBDC lists *'Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines'* as a habitat constraint for this species.	No – habitat constraint	The subject land is not within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines Conclusion – the subject land lacks the habitat constraints required for this species.
Phascogale tapoatafa Brush-tailed Phascogale	Vulnerable	-	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. This species prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. It also inhabits heath, swamps, rainforest, and wet sclerophyll forest. It is an agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. The species nests and shelters in tree hollows with entrances 2.5 – 4 cm wide and uses many different hollows over a short time span. The TBDC lists 'Loss of hollow-bearing trees' and 'Predation by foxes and cats' as some of the key threats to this species.	No	The species has not been recorded within 10 km of the subject land and is not known to occur in the immediate locality, with the closest records approximately 25 km away in Namadgi Nation Park (BioNet and NatureMapr). In addition, the species was not encountered during nocturnal spotlighting surveys. Conclusion – the species is considered unlikely to occur in the subject land.
Phascolarctos cinereus Koala	Endangered	Endangered	This species inhabits eucalypt woodlands and forests, feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species. Home range size varies with quality of habitat, ranging from less than 2 hectares to several hundred hectares in size. The TBDC lists *'Presence of koala use trees - refer to the Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide for information on targeted survey requirements and mapping species polygons'* as a habitat constraint for breeding for this species.	No	Low density Koala populations are known to occur in the dense and relatively intact vegetation that extends from Cuumbeun / Googong to Tinderry Nature Reserve and further south. However, the species has not been recorded to the east of this line for a long period of time despite multiple surveys by NSW Government ecologists, ACT Government ecologists, and ecological consultants. As a result, the nearest record of Koala to the subject land is approx. 8.5 km to the north-east and was recorded in 1984 (Figure 8). No signs of the species were observed during surveys associated with this BDAR and multiple other BDARs/BCARs/BSSARs that have been conducted by Capital Ecology and others over the past 5 years within 10 km of the subject land. Conclusion – the species is considered unlikely to occur in the subject land.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Pomaderris pallida Pale Pomaderris	Vulnerable	Vulnerable	Pale Pomaderris has been recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It is also found along the Murrumbidgee River in the ACT and has been recently recorded in eastern Victoria. This species usually grows in shrub communities surrounded by Brittle Gum (*Eucalyptus mannifera*) and Red Stringybark (*E. macrorhyncha*) or *Callitris spp.* woodland. The BAM Calculator lists '*South of Queanbeyan'* as a geographic limitation for this species.	Yes – surveyed	As detailed in Section 2.3.6, Pale Pomaderris was recorded in the subject land, including two plants in the development footprint. Conclusion – the subject land supports habitat for this species.
Prasophyllum petilum Tarengo Leek Orchid	Endangered	Endangered	The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and Travelling Stock Routes, land from which grazing has been restricted.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.
Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	Vulnerable	Vulnerable	Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Site fidelity to camps is high; some camps have been used for over a century. The TBDC lists *'breeding camps'* as a breeding habitat constraint for this species.	No – habitat constraint	While the species is likely to visit the subject land occasionally to forage, field surveys confirmed that the subject land does not support breeding camps. Conclusion – the subject land lacks the breeding habitat constraints required for this species.
Rutidosis leptorrhynchoides Button Wrinklewort	Endangered	Endangered	This species occurs in Box-Gum Woodland, secondary grassland derived from Box-Gum Woodland, or in Natural Temperate Grassland. It often occurs in the ecotone between Box-Gum Woodland and Natural Temperate Grassland. The species grows on soils that are usually shallow, stony red-brown clay loams and tends to occupy areas where there is relatively less competition from herbaceous species (either due to the shallow nature of the soils, or at some sites due to the competitive effect of woodland trees). It exhibits an ability to colonise disturbed areas (e.g. vehicle tracks, bulldozer scrapings and areas of soil erosion). The species is apparently susceptible to grazing, being retained in only a small number of populations on roadsides, rail reserves, and other un-grazed or very lightly grazed sites. Some of the main threats to this species listed in the TBDC are: 1) loss and degradation of habitat and/or populations by intensification of grazing regimes; 2) loss and degradation of habitat and/or populations by invasion of weeds; and 3) increased competition from other native grassland species within the habitat because of adverse increases of biomass due to absence of fire or grazing and the resultant closing up of the inter-tussock spaces that this species requires.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.
Swainsona recta Small Purple-pea	Endangered	Endangered	Before European settlement, Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum *E. blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida*, and Long-leaf Box *E. goniocalyx*. It grows in association with understorey dominants that include Kangaroo Grass *Themeda australis*, Poa tussocks *Poa* spp. and Speargrasses *Austrostipa* spp.. Some of the main threats to this species listed in the TBDC are: 1) grazing and trampling by cattle, sheep, and goats; and 2) loss, degradation, and fragmentation of habitat and/or populations for residential developments, agricultural developments, and by weed invasion (including exotic grasses mostly, as well as bridal creeper and St John's wort).	Yes – surveyed	As detailed in Section 2.3.6, Small Purple-pea was recorded in the subject land, including a small number of plants in the section of the development footprint that crosses the Goulburn Bombala Rail Line. Conclusion – the subject land supports habitat for this species.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Swainsona sericea Silky Swainson-pea	Vulnerable	-	This species is found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes. It is sometimes found in association with Cypress-pines *Callitris* spp.. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat and/or populations for: 1) residential developments; 2) invasion of weeds; 3) intensification of grazing regimes; and 4) agricultural developments.	Yes – surveyed	As detailed in Section 2.3.6, a large number of Silky Swainson-pea were recorded in the subject land, including in the development footprint. Conclusion – the subject land supports habitat for this species.
Synemon plana Golden Sun Moth	Vulnerable	Vulnerable	The species occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which the groundlayer is dominated by Wallaby grasses *Rhytidosperma* spp.. Grasslands dominated by Wallaby grasses are typically low and open and the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several Wallaby grass species, which are typically associated with other grasses particularly Speargrasses *Austrostipa* spp. or Kangaroo Grass *Themeda australis*. The TBDC lists '*Wallaby grass (Rytidosperma sp), Speargrass (Austrostipa sp) or Chilean needlegrass (Nassella neesiana)*' as a habitat constraint. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat by urban, residential, infrastructure, and agricultural development, modifications to agricultural practices (e.g. fertiliser application, ploughing, and inappropriate grazing), overgrazing by domestic stock, and invasive grasses.	No – surveyed	The species was not recorded during targeted surveys. Conclusion – this species does not occur in the subject land.

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2.3.6 BAM targeted survey results

As described in Table 26, targeted surveys were completed to confirm the occurrence and/or habitat potential for the species credit species flagged by the BAM as having the potential to occur in the relevant PCT of the subject land.

2.3.6.1 Threatened flora

Targeted threatened flora surveys were conducted across the subject land (Figure 9). A total of 314 flora species were recorded during field surveys, comprising 231 native species and 83 exotic species (Appendix B). These targeted surveys recorded the following threatened flora species.

- Silky Swainson-pea *Swainsona sericea* (BC Act Vulnerable).
- Pale Pomaderris *Pomaderris pallida* (EPBC Act and BC Act Vulnerable).
- Small Purple-pea *Swainsona recta* (EPBC Act and BC Act Endangered).
- Hoary Sunray *Leucochrysum albicans subsp. tricolor* (EPBC Act and BC Act Endangered).

The above species are discussed in more detail in the following sections. None of the other threatened flora species identified in Table 24 or Table 26 were recorded in the subject land; these species are therefore considered unlikely to occur.

Silky Swainson-pea

As shown in Figure 9, Silky Swainson-pea was recorded in a large number of locations along the eastern half of the subject land and in two locations on the western edge of the subject land. The size of the sub-populations varied dramatically, from a few individual plants to over 5,000 plants in the largest patches (Plate 1). In total, the subject land is estimated to support well over 30,000 individual plants, which were all recorded in vegetation zones that support a diverse native groundstorey (i.e. PCT3375 Zone 1 and 2, PCT3376 Zone 1 and 2).

The following methodology for determining the species polygon for Silky Swainson-pea is in accordance with the recently updated TBDC. Clustered records were defined as those with at least three individuals with a separation of less than approximately 100 m[39]; all other records were treated as isolated records. Based on this definition, all records in the subject land meet the definition of clustered records. The species polygon was therefore calculated by defining a minimum convex polygon around all clustered records and applying a 30 m buffer to the convex polygon. Non-credit generating areas (e.g. tracks and dams) and vegetation zones with an exotic dominant groundstorey were excluded from the species polygon.

Following this method, the subject land is estimated to support 92.36 ha of Silky Swainson-pea habitat, primarily in in PCT3375 / PCT3376 Zones 1 and 2, with smaller areas of habitat in PCT3375 Zone 3 and 4.

The development footprint would directly impact 2.66 ha (2.9%) of the identified habitat, which is estimated to support approximately 1,000 plants.

[39] The separation distance was increased from that in the TBDC due to the very large number of plants that were recorded (i.e. > 5,000 in some instances) and represented by a small number of GPS points. The increased separation distance resulted in larger, more appropriate species polygons (i.e. the species polygons captured the extent of the localised populations).

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Plate 1. Silky Swainson-pea *Swainsona sericea*

Pale Pomaderris

Pale Pomaderris was recorded at six locations in the western half of the subject land in the areas of more intact vegetation, being PCT3375 Zone 1 and PCT3376 Zone 1 (Figure 9, Plate 2). Most of the recorded Pale Pomaderris occurred as a single plant, with only two patches supporting multiple plants, the largest of which contained approximately 250 plants.

Given that Pale Pomaderris is a moderately large shrub and conspicuous from a distance, the species polygon was determined by applying a 30 m buffer to each record (where the species occurs as single plants) or to the population boundary (where there are multiple plants within a discrete location). Following this method, the subject land is estimated to support of 2.52 ha of Pale Pomaderris habitat in PCT3375 Zone 1 and PCT3376 Zone 1.

The development footprint would directly impact 0.56 ha (22.2%) of the identified habitat, which supports a total of two plants.



Plate 2. Pale Pomaderris *Pomaderris pallida*

Small Purple-pea

Across 2.98 ha, at least 150 Small Purple-pea plants were recorded in multiple locations along the south-western boundary of the subject land (Figure 9, Plate 3). All plants were located within the fenced area of the Goulburn Bombala Rail Line, which is known as an important area for the

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species[40,41]. It is likely that Small Purple-pea has persisted in the fenced area due to the absence of agricultural activities, especially grazing. This is supported by the observation that no plants were recorded outside of the fenced area during targeted surveys, and none have been recorded outside of the fenced area adjacent to the subject land on either BioNet or NatureMapr during the past 35 years. As such, the species polygon for Small Purple-pea has been defined by the intersection of the fenced area and all vegetation zones with a native dominant groundstorey. Following this method, the subject land is estimated to support of 0.42 ha of Small Purple-pea habitat in PCT3375 Zone 1, PCT3376 Zone 1, and PCT3376 Zone 2.

The development footprint would directly impact 0.13 ha of the identified habitat, which supports approximately seven plants. This impact represents 31% of the 0.42 ha of habitat that occurs within the subject land and 4% of the 2.98 ha of habitat that occurs within the immediately adjacent fenced area of the Goulburn Bombala Rail Line.



Plate 3. Small Purple-pea *Swainsona recta*

Hoary Sunray

A single Hoary Sunray plant was recorded in the north-east of the subject land in PCT3375 Zone 1 (Figure 9). Given that Hoary Sunray is identified as a 'count' species as per the BAM, a species polygon has been determined by applying a 30 m buffer to this record. Following this method, the subject land is estimated to support a single Hoary Sunray plant in 0.28 ha of habitat in PCT3375 Zone 1 and Zone 2. The proposed development would not directly impact the species.

2.3.6.2 Threatened fauna

A total of 103 native fauna species were recorded during field surveys, comprising 75 bird species, 10 reptile species, 13 mammal species, four amphibian species, and one insect species (noting that

[40] DCCEEW (2023b). *Conservation Advice for Swainsona recta (small purple pea).* In effect under the Environment Protection and Biodiversity Conservation Act 1999 from 31 August 2023.
[41] ACT Government (2019a). *ACT native woodland conservation strategy and action plans*. Environment, Planning and Sustainable Development.

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only EPBC Act and/or BC Act listed invertebrate species were recorded) (Appendix C). Targeted surveys recorded the following threatened fauna species.

- Woodland birds (Dusky Woodswallow *Artamus cyanopterus* [BC Act Vulnerable], Gang-gang Cockatoo *Callocephalon fimbriatum* [BC Act / EPBC Act Endangered], Speckled Warbler *Chthonicola sagittate* [BC Act Vulnerable], Varied Sittella *Daphoenositta chrysoptera* [BC Act Vulnerable], Scarlet Robin *Petroica boodang* [BC Act Vulnerable], Flame Robin *Petroica phoenicea* [BC Act Vulnerable]).
- Latham's Snipe *Gallinago hardwickii* (BC Act / EPBC Act Vulnerable, marine, and migratory).
- Pink-tailed Legless Lizard *Aprasia parapulchella* (BC Act / EPBC Act Vulnerable).
- Key's Matchstick Grasshopper *Keyacris scurra* (BC Act / EPBC Act Endangered).

The above species are discussed in more detail in the following sections. None of the other threatened fauna species identified in Table 24 or Table 26 were recorded in the subject land; these species are therefore considered unlikely to occur.

Threatened birds

A total of 75 bird species were recorded in the subject land across all surveys, comprising 71 native species and four exotic species (Appendix C). As shown in Figure 10, seven threatened bird species were identified: Dusky Woodswallow, Gang-gang Cockatoo, Speckled Warbler, Varied Sittella, Scarlet Robin, Flame Robin, and Latham's Snipe.

Woodland birds

Dusky Woodswallow, Gang-gang Cockatoo (foraging), Speckled Warbler, Varied Sittella, Scarlet Robin, and Flame Robin are assumed to occur in the subject land as ecosystem credit species. Apart from Gang-gang Cockatoo, these species are therefore not considered in greater detail as any impact to them is captured through the assessment of ecosystem impacts and associated offsetting through ecosystem credits.

Gang-gang Cockatoo

Gang-gang Cockatoo is identified as both an ecosystem credit species (for foraging) and as a species credit species (for breeding). In addition, Gang-gang Cockatoo is listed as endangered under the EPBC Act.

Gang-gang Cockatoo were observed on two occasions, both of which were in PCT3375 Zone 1 (Figure 10). The south-eastern observation was of a pair of Gang-gang Cockatoos flying through the canopy on 28 October 2020, while the north-western observation was of a lone male Gang-gang Cockatoo on 27 October 2020. Based on these observations, the subject land is estimated to support 348.57 ha of Gang-gang Cockatoo foraging habitat, composed of those vegetation zones that support a canopy (i.e. PCT3375 Zones 1, 3, and 5 and PCT3376 Zone 1).

While no signs of breeding activity were recorded in 2020, additional targeted surveys for Gang-gang Cockatoos were conducted on 3 October 2024 and 11 October 2024 (Figure 10). In addition, during all other surveys in 2024 a direction was given for any detection of Gang-gang Cockatoos to take precedence and be immediately investigated. In total, this equals an additional 8 hours of targeted survey for the species and 197 hours of notable opportunistic observations. No further signs of Gang-gang Cockatoos were detected. Given the small number of Gang-gang Cockatoo observations

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over multiple years and the absence of any sign of breeding activity, the species is considered unlikely to breed in the subject land.

The proposed development would therefore not directly impact any known breeding habitat for the species. However, the development footprint would directly impact 48.08 ha (14%) of the identified Gang-gang Cockatoo foraging habitat.

Latham's Snipe

Four Latham's Snipe were observed incidentally during Golden Sun Moth surveys on 27 November 2020, presumably foraging / roosting in the soak between two dams in the south of the subject land (Figure 10). Latham's Snipe is not identified as either an ecosystem credit species or species credit species pursuant to the BOS and so cannot be added to the BAM Calculator. As per the EPBC Act Conservation Advice[42], Latham's Snipe, which is a non-breeding visitor to Australia,

> *"…feed in soft mudflats or shallow water typically at night, early morning, or evening… They shelter during the day in small wetlands including urban water bodies, saltmarshes, as well as creek edges, where there is adequate shallow flooded or inundated substrate. They also use crops and pasture. They mostly are found among dense cover comprising sedges, grasses, lignum, reeds, and rushes. The bird tends to disperse after dusk to forage over larger areas…*
>
> *Latham's snipe is dispersive during its stay in Australia. The species probably moves in response to rainfall and the availability of food (Frith et al. 1977). For example, the species abandons seasonally drying wetlands and moves to wetter or more permanent habitats elsewhere (Naarding 1982, 1983). Data from regular counts in southern Australia indicate that the species is highly mobile during the non-breeding season (Naarding 1983, 1984)."*

It is therefore likely that the Latham's Snipe were foraging and roosting in the subject land for a short period of time before moving to another location in response to rainfall patterns and the availability of food.

As shown in Figure 10, the identified foraging / roosting habitat would not be directly impacted by the proposed development. In addition, the proposed development is considered unlikely to indirectly impact the identified foraging / roosting habitat given that:

- the Quarry Access Road is over 200 m from the identified foraging / roosting habitat;
- the extraction, processing, and stockpiling areas are over 600 m from the identified foraging / roosting habitat; and
- *Guidelines for restoring and managing wetland habitat for Latham's Snipe*[43] recommend a minimum 75 m – 110 m buffer to Latham's Snipe habitat in order to reduce disturbance from human activities.

[42] Commonwealth of Australia (2024). *Conservation advice for Gallinago hardwickii (Latham's Snipe).* In effect from 5 January 2024. Department of Climate Change, Energy, the Environment and Water.
[43] Hansen B, Walters J, Akers R. (2024). *Guidelines for restoring and managing wetland habitat for Latham's Snipe*. Unpublished report produced by the Latham's Snipe Project. DOI: 10.25955/28139495.

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Forest owls and threatened nocturnal fauna

Call-playbacks for threatened forest owls and spotlight surveys for threatened nocturnal fauna were conducted over six nights in August 2024 (Figure 11). No threatened forest owls or other threatened nocturnal fauna were recorded.

The full list of recorded fauna is presented in Appendix C. Observations of note from the call-playback and spotlight surveys include Tawny Frogmouth *Podargus strigoides*, Australian Owlet-nightjar *Aegotheles cristatus*, Sugar Glider *Petaurus breviceps*, Common Ringtail Possum *Trichosurus vulpecula*, and Common Brushtail Possum *Trichosurus vulpecula*.

Pink-tailed Legless Lizard

Under current Commonwealth Survey Guidelines[44] and the previous NSW Government Survey Guidelines[45], the results of targeted Pink-tailed Legless Lizard surveys could be used to determine the presence/absence of the species within a site and help define the extent of habitat. While this is still the case under the Commonwealth Survey Guidelines, since October 2024 the BAM now requires Pink-tailed Legless Lizard to either be: 1) assessed via expert report; or 2) assumed to be present.

Given the differences between the Commonwealth and NSW Government's requirements, the extent of Pink-tailed Worm Lizard habitat in the subject land has been defined in the following two ways.

1. Occupied habitat, which has been determined with reference to the results of the targeted surveys. Occupied habitat is used to determine the impact to the species pursuant to the EPBC Act.

2. Characteristically suitable habitat, which encompasses all portions of the subject land that support appropriate habitat features. Characteristically suitable habitat is used to determine the impact to the species pursuant to the BC Act and BOS.

The methodology for establishing species polygons for the above habitat definitions are described below.

Occupied habitat

Across the initial four days of survey in 2020/21, six adult Pink-tailed Legless Lizards were recorded (Figure 12, Plate 4). In addition to many scorpions, spiders, centipedes and other common invertebrates, a number of non-target herpetofauna species were also recorded during the survey; these are listed in Appendix C.

Pink-tailed Legless Lizard were only recorded close to the northern boundary of the subject land. This finding was somewhat surprising given that much of the potential habitat across the remainder of the subject land appeared to be characteristically suitable for the species, being loose surface rock in a native dominant groundstorey that is largely dominated by Kangaroo Grass and a moderate to high diversity of forbs. As a result, an additional rock turning survey was conducted a second time across the development footprint and adjacent areas (Figure 12). Again, no Pink-tailed Legless Lizard were recorded within that portion of the subject land. As per the methodology described in Section

[44] Department of Sustainability Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's threatened reptiles.* Commonwealth of Australia, Canberra.
[45] NSW Government (2022). *Threatened reptiles Biodiversity Assessment Method survey guide*. Department of Planning and Environment.

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2.2.3.4, sufficient surface rock was turned across the development footprint on multiple occasions to provide reasonable confidence that the species does not occur in those areas.

With respect to the above, occupied Pink-tailed Legless Lizard habitat in the subject land has therefore been determined by (refer to Figure 12):

- calculating a 200 m buffer around the six recorded individuals;
- identifying all patches of surface rock that intersect with the 200 m buffer; and
- calculating a 50 m buffer to the above identified patches of surface rock.

Following the above methodology, the subject land is estimated to support 75.99 ha of occupied habitat in PCT3375 Zone 1, Zone 2, Zone 3, Zone 4, and PCT3376 Zone 1 and Zone 2. The proposed development would not directly impact any of the occupied habitat.



Plate 4. Adult Pink-tailed Legless Lizard *Aprasia parapulchella*

Characteristically suitable habitat

Characteristically suitable habitat in the subject land has been determined by (refer to Figure 12):

- mapping all areas that support loose surface rock via analysis of aerial imagery and subsequent refinement during on-ground field surveys;
- excluding areas of surface rock that occur under a dense canopy (i.e. areas with > 50% opaque crown cover, which is roughly equal > 25% projected foliage cover);
- calculating a 50 m buffer to all areas of remaining potential habitat; and
- excluding areas that that occur in an exotic dominant groundstorey.

Following the above methodology, the subject land is estimated to support 367.51 ha of characteristically suitable habitat in PCT3375 Zone 1, Zone 2, Zone 3, Zone 4, and PCT3376 Zone 1 and Zone 2. The development footprint would directly impact 39.95 ha (10.9%) of the characteristically suitable habitat.

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Key's Matchstick Grasshopper

Key's Matchstick Grasshopper was recorded in two locations, both of which were adjacent to the Goulburn Bombala Rail Line in PCT3375 Zone 1 (Figure 13, Plate 5). These areas were characterised by a partially open canopy (i.e. a scattered canopy as opposed to a dense canopy) combined with a diverse and native dominate groundstorey that contained areas of bare ground and a substantial component of Kangaroo Grass.

The species polygon for Key's Matchstick Grasshopper habitat was defined by including all areas contiguous with the species records that lack a dense canopy and have a moderate to high diversity native groundstorey (i.e. portions of PCT3375 Zone 1 and PCT3376 Zone 1, and all areas of PCT3376 Zone 2, Figure 13). The subject land is therefore estimated to support 3.08 ha of Key's Matchstick Grasshopper habitat in PCT3375 Zone 1, PCT3376 Zone 1, and PCT3376 Zone 2.

Based on the condition of the surrounding vegetation, it is likely that the identified Key's Matchstick Grasshopper habitat extends to both the east and west of the Quarry Access Road. Indeed, as noted in NSW Threatened Species Scientific Committee (2020d)[46], the species is known to occur frequently "along the railway easement between Tralee and Williamsdale". Taking into account the characteristically suitable habitat that adjoins the recorded habitat in the subject land, the 'local population' is estimated to have access to 15.07 ha of characteristically suitable habitat.

The development footprint would directly impact 2.35 ha of the identified habitat. This represents 76% of the habitat in the subject land and 16% of the characteristically suitable habitat that is available to the local population.



Plate 5. Key's Matchstick Grasshopper *Keyacris scurra*

Golden Sun Moth *Synemon plana*

Across the four days of survey, no Golden Sun Moths were recorded (Figure 14). Surveys were carried out during the flying season on days with appropriate weather conditions when Golden Sun Moths were confirmed to be flying at other nearby sites in NSW and the ACT (Appendix D). As such, the species is considered unlikely to occur in the subject land.

[46] NSW Threatened Species Scientific Committee (2020d). *Conservation Assessment of Keyacris scurra (Rehn 1952) Key's Matchstick Grasshopper (Morabidae)*. Ben Hope and Brad Law, Version 2, June 2020.

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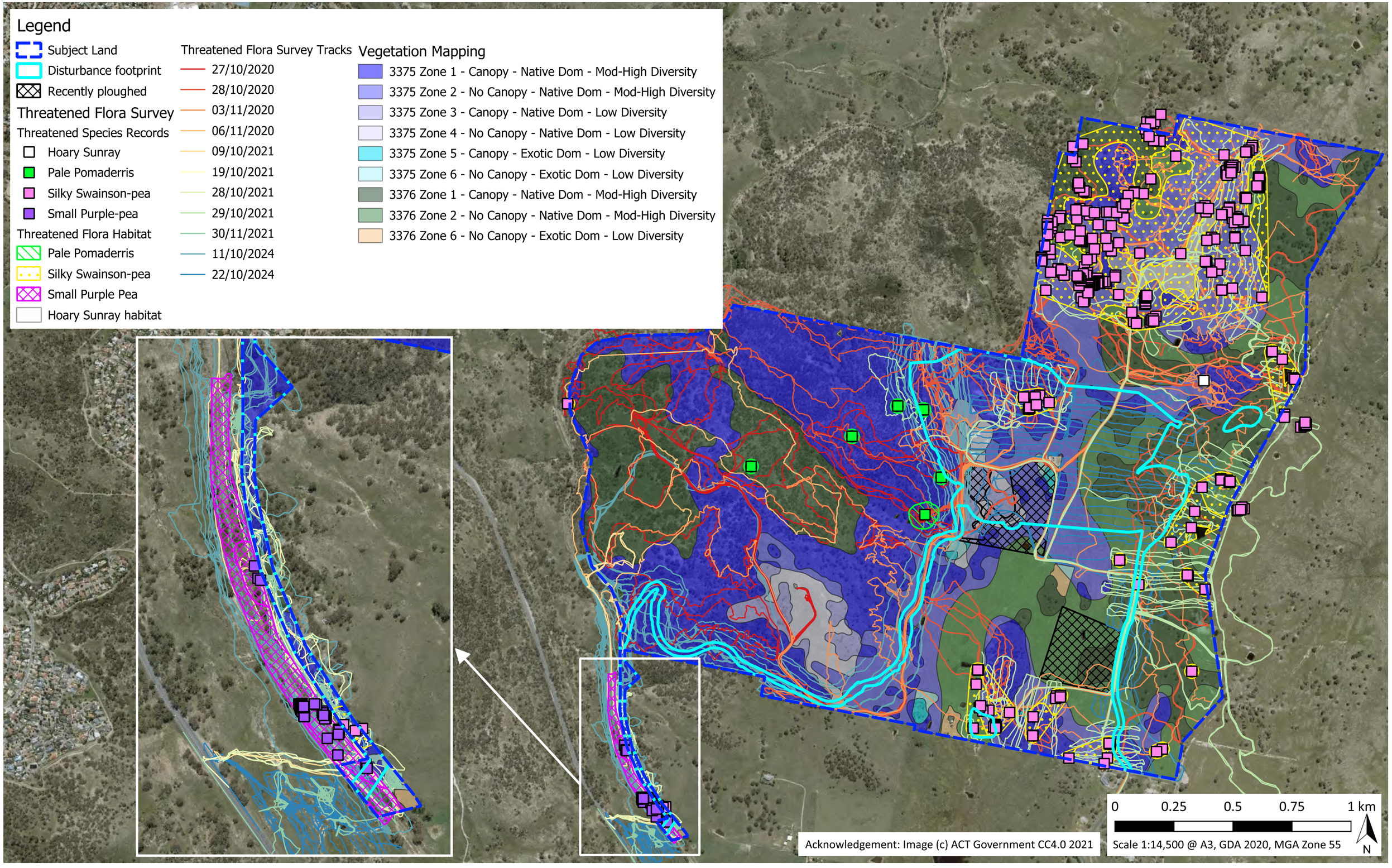


Figure 9. Threatened Flora Survey Results

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 19 May 2025

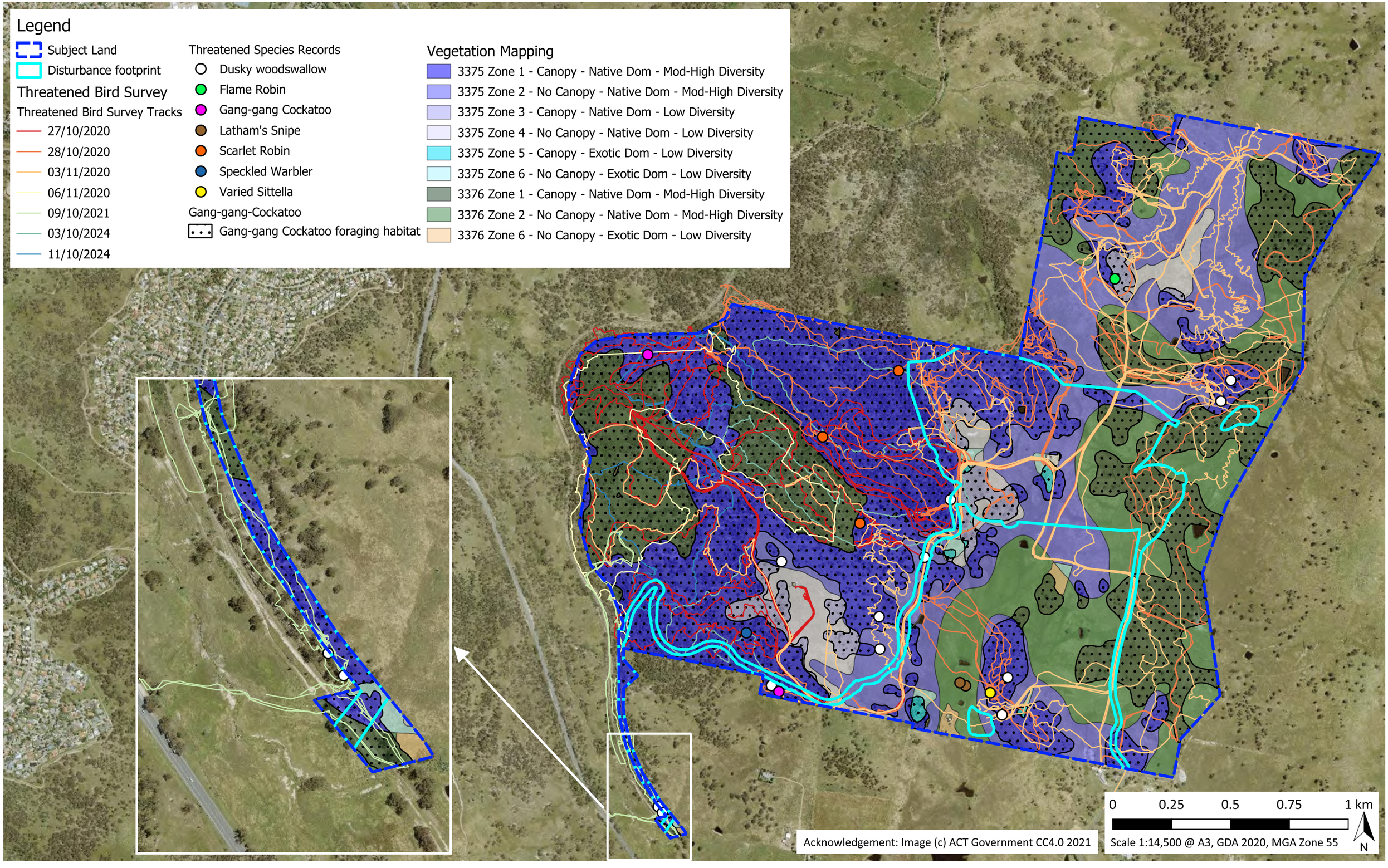


Figure 10. Threatened Bird Survey Results

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 6 June 2025

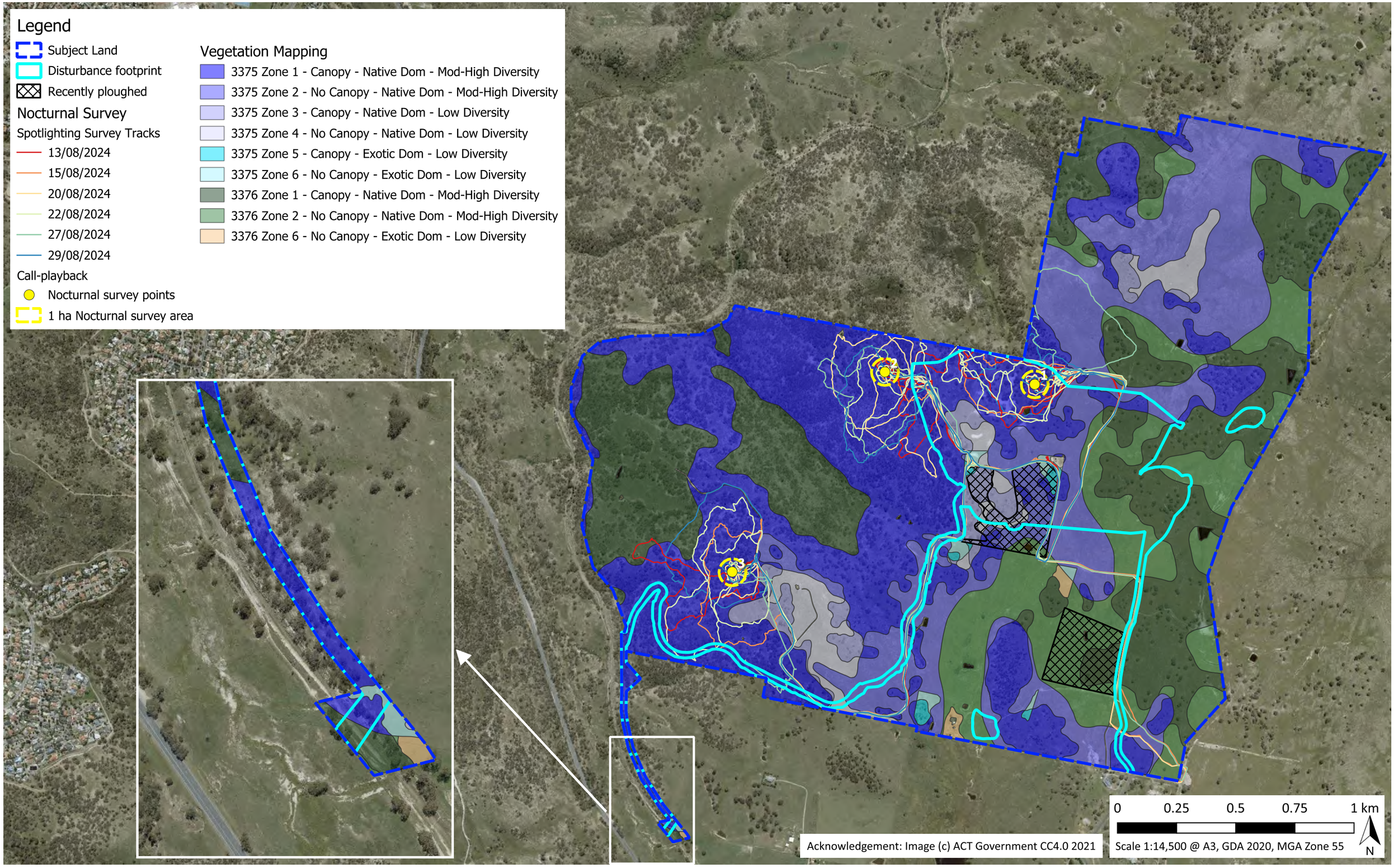


Figure 11. Nocturnal Fauna Survey Results

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 19 May 2025

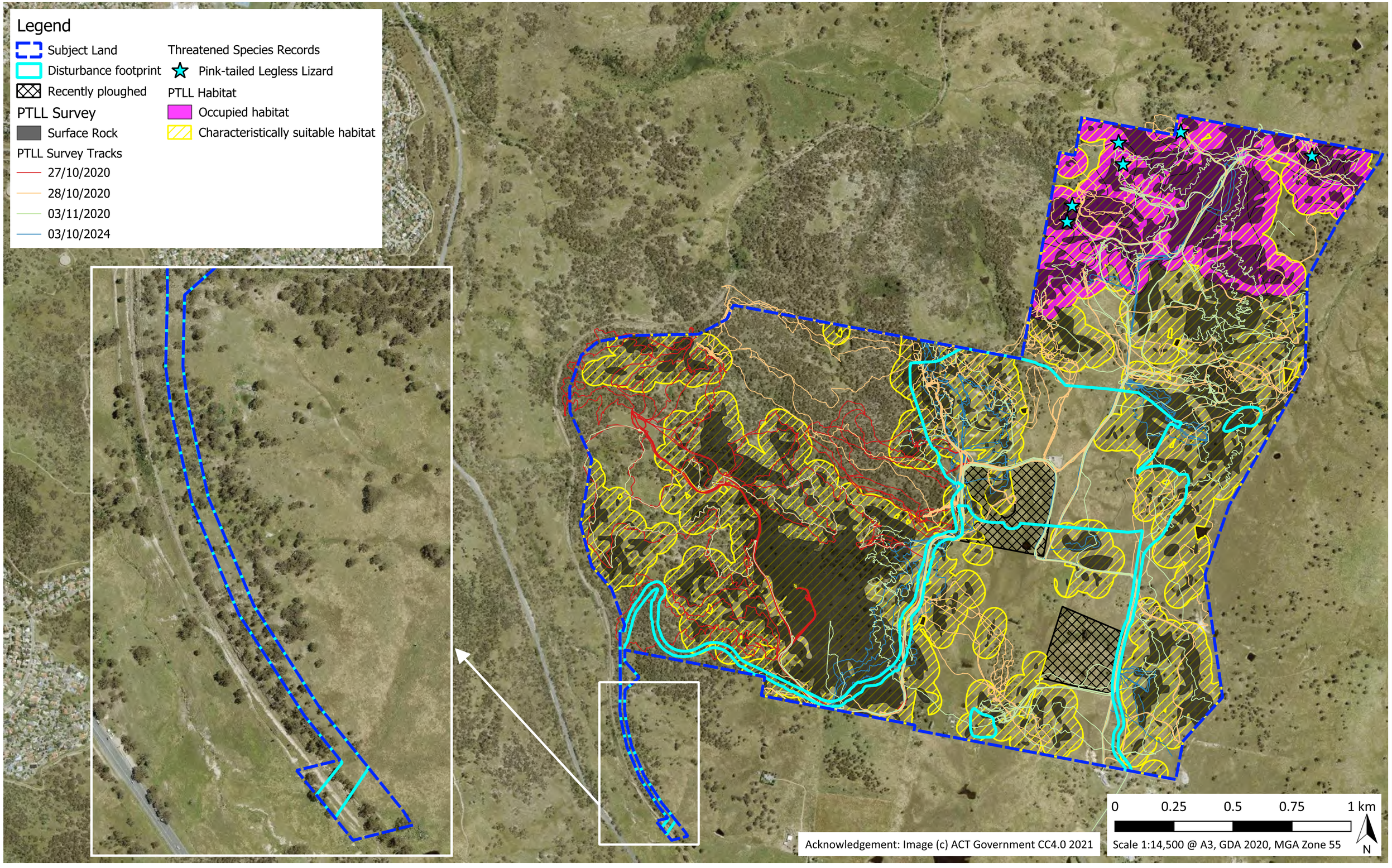


Figure 12. Pink-tailed Legless Lizard Survey Results

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 6 June 2025

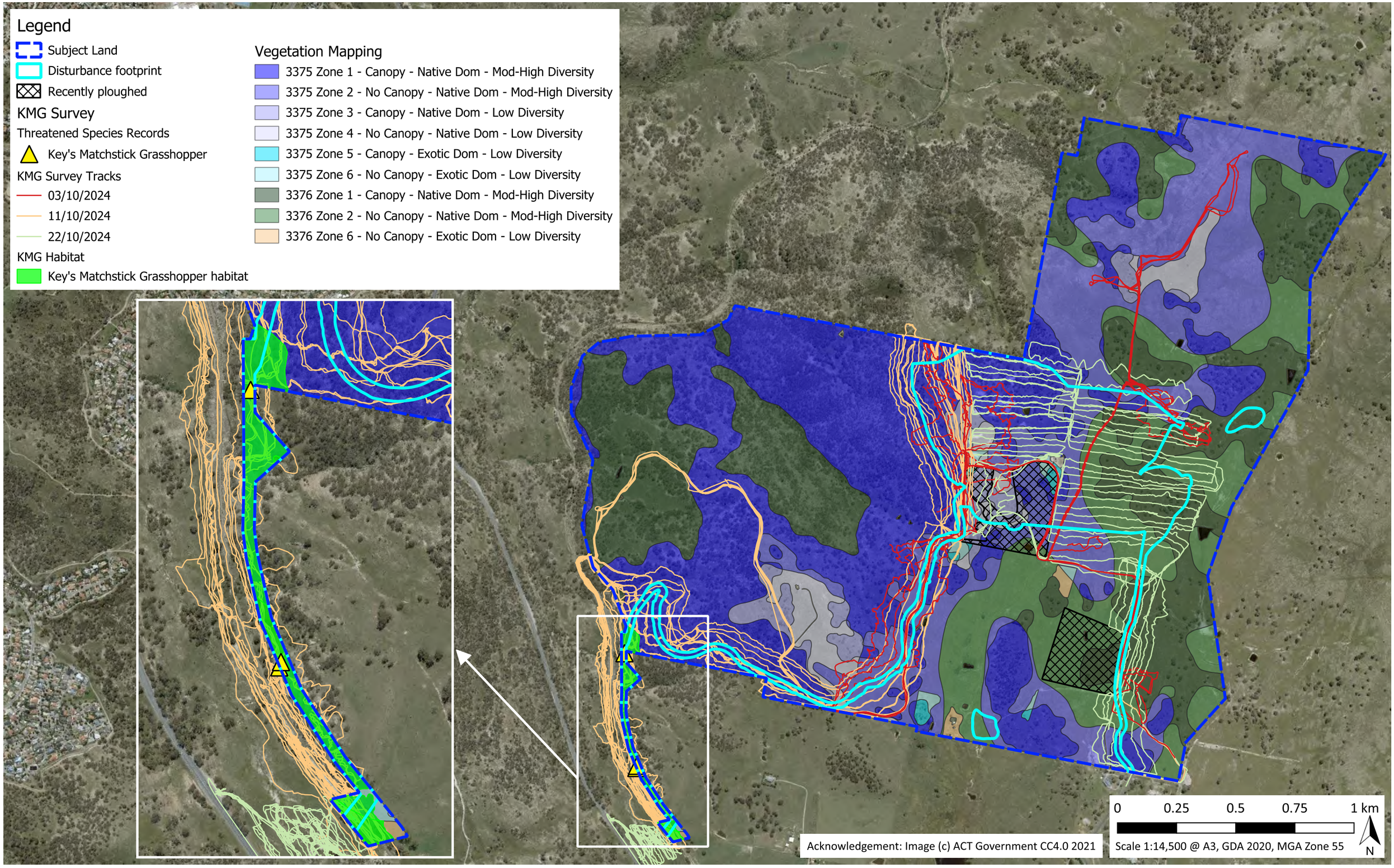


Figure 13. Key's Matchstick Grasshopper Survey Results

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 18 December 2024

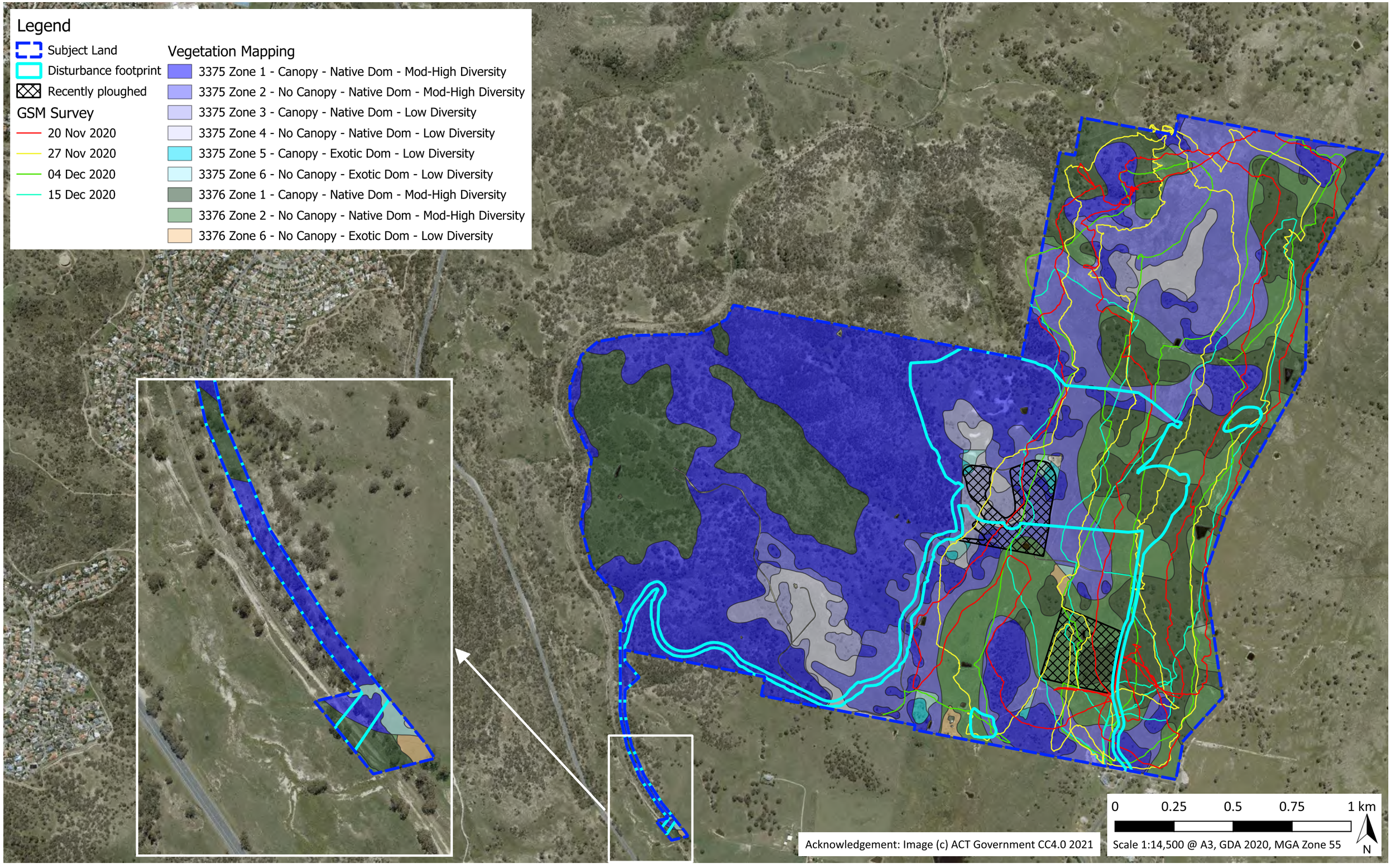


Figure 14. Golden Sun Moth Survey Results

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 19 May 2025

3 Part 2 – Impact Assessment (BAM Stage 2)

Part 2 of this BDAR provides an assessment of the impacts of the proposed development as set out in Stage 2 of the BAM.

3.1 Avoidance and Minimisation of Impacts on Biodiversity Values

In accordance with the BAM, an applicant is required to demonstrate that all reasonable and practicable measures have been employed to avoid and minimise the impacts of a project on biodiversity values. Accordingly, the applicant examined a range of alternatives for a number of the project components before deciding upon the location, scale, and form of the proposed development as presented in this BDAR. The following subsections, summarised / reproduced from Section 2.7 of the EIS, outline the feasible alternatives considered for these components and the reasons for not proceeding with the various alternative(s) and proceeding with the preferred alternative for each component.

3.1.1 Extraction area boundaries

The location of the proposed development was constrained by the location of the suitable hard rock resource. Early investigations dictated the potential location to an even greater extent, as it was identified that the resource on the eastern side of the Royalla Fault would not produce an aggregate with properties needed by the construction industry. These eastern areas were therefore removed from consideration.

Three potential extraction areas were subsequently identified, as shown in EIS Figure 2.11 (reproduced below). Investigation of these areas concluded the following.

- Extraction Area Option A was rejected due to the potential for views of the operation from within the ACT, occurrence of occupied Pink-tailed Legless Lizard habitat, occurrence of the highest density Silky Swainson-pea populations, and difficulty with access to the northern section of the property.
- Extraction Area Option B was considered the best opportunity as it represented extraction within a defined ridge and processing activities that would be separated from neighbours. It was also characterised by a low occurrence of threatened flora and fauna habitat. However, this area contained good condition Box-Gum Woodland along its eastern extent.
- Extraction Area Option C had the best prospects for access to the public road network. However, it would have required development within a narrow gully, was known to contain good condition Box-Gum Woodland, and was in close proximity to neighbours and the existing communications tower.

Accordingly, Extraction Area Option B was further investigated. The opportunity for existing topographic features such as Beatty Hill and Enchanted Hill to provide natural mitigation for possible noise or visual amenity impacts was also considered at this time.

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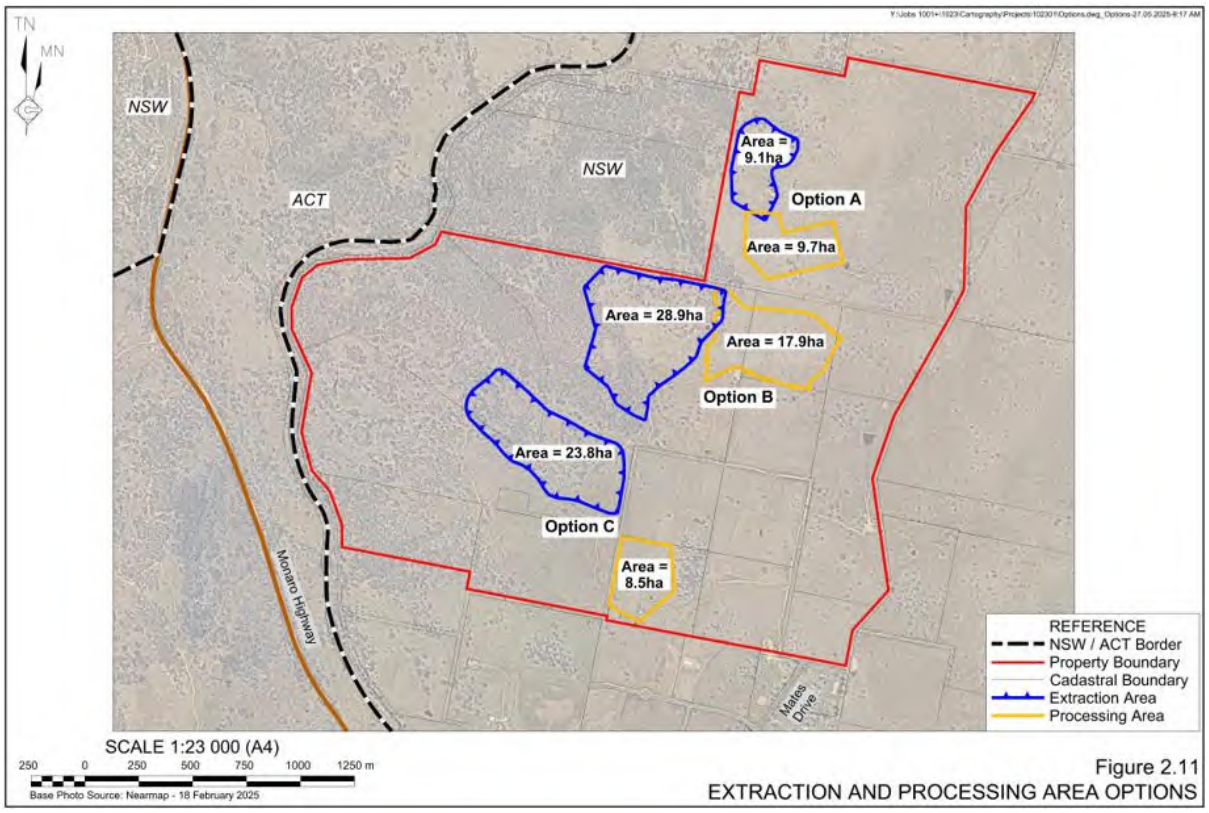


Figure 2.11
EXTRACTION AND PROCESSING AREA OPTIONS

The extent of Extraction Area Option B was further refined through a variety of surveys, including geotechnical and biodiversity investigations. EIS Figure 2.12 (reproduced below) presents the progressive refinement of the Extraction Area Option B that incorporated the following considerations.

- The outcomes of biodiversity field survey were used to define the western boundary of the extraction area and avoid the clearing of good condition vegetation, where feasible. This process was informed by analysis of vegetation density. These avoided areas also included additional Pale Pomaderris habitat and higher quality Gang-gang Cockatoo foraging habitat (i.e. dense vegetation connected to the portions of the subject land where the species was recorded).

- Biodiversity field surveys were also used to avoid Box-Gum Woodland vegetation in determining the location of the Processing and Stockpiling Area and the Visibility Barrier.

- The final Extraction Area boundary (Option B3) was determined after removal of a small area in the northwestern corner to avoid a culturally modified ring tree. Consultation with Aboriginal stakeholders indicated that the tree was considered significant, and the disturbance footprint was modified to avoid this location. This modification removed approximately 2 Mt of resource from the final project design. An additional culturally modified scar tree was avoided through an adjustment to the western end of the Visibility Barrier.

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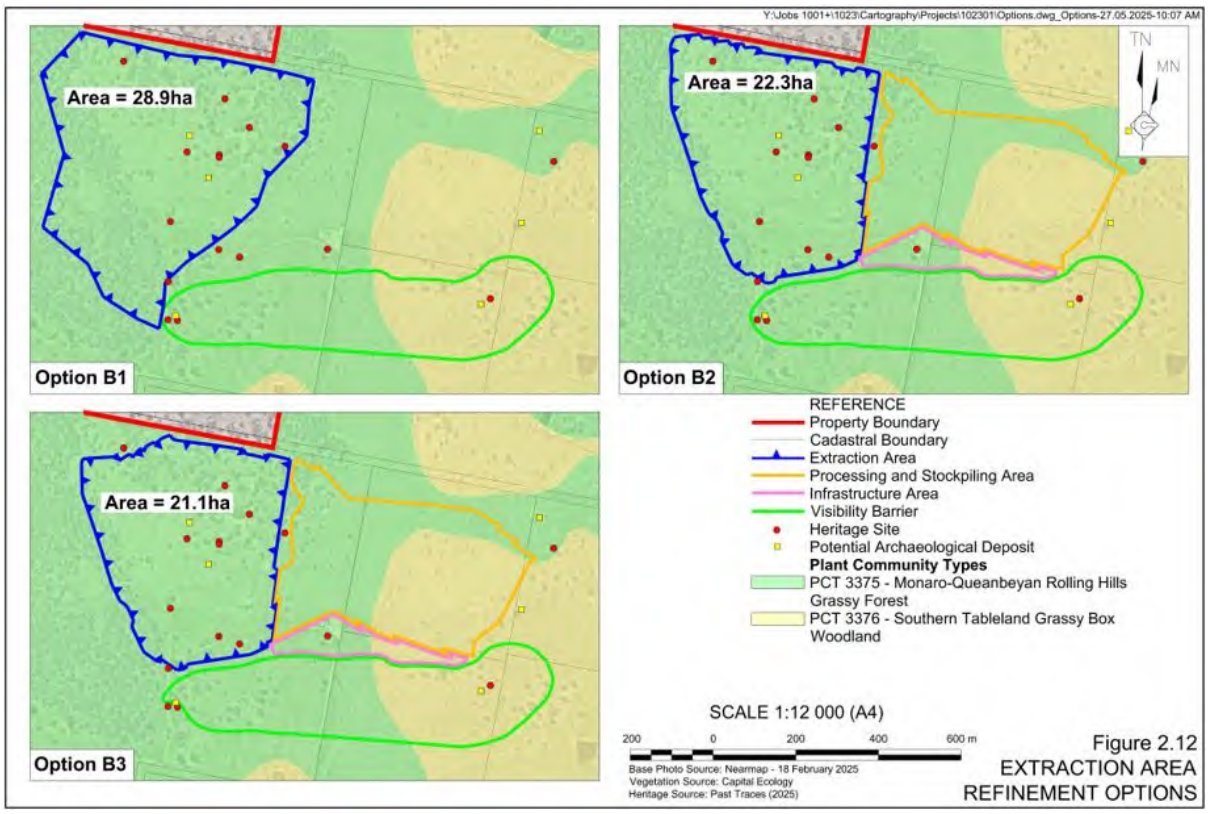


Figure 2.12
EXTRACTION AREA REFINEMENT OPTIONS

3.1.2 Project access

A range of options were considered to provide access to the proposed development (refer to EIS Figure 2.14, reproduced below). The majority of these options were dismissed on the basis of:

- the length of road required to be constructed;
- biodiversity impacts, including to high quality Box-Gum Woodland;
- complexity of the path, including the terrain and the need to cross drainage features; and
- the need to use private or public land for which access was not or could not be granted.

During community consultation, members of the community expressed a clear preference for transportation activities to avoid the use of Mates Drive and Monaro Station Road. While some use of these roads would occur during construction and for light vehicles during operations, heavy vehicle access for product transportation is not a preference of the applicant.

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Figure 2.14
PROJECT SITE ACCESS OPTIONS

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Two access options were considered in detail and a conceptual design developed to consider which alternative was preferred (as presented in EIS Figure 2.15, reproduced below). The detailed analysis undertaken of these options included consideration of the following.

- Biodiversity constraints. Both options would impact high quality Box-Gum Woodland, with Option 2 impacting a larger area. Option 1 would impact threatened flora in the rail corridor, while Option 2 would impact occupied Pink-tailed Legless Lizard habitat.
- Aboriginal heritage constraints. Both options would impact some culturally significant artefacts that would need to be removed.
- Amenity impacts. In comparison to Option 1, Option 2 may have resulted in higher noise and air quality impacts to nearby residents, and views of the road would be likely from private residences and vehicles travelling on Old Cooma Road.
- Proximity to residences. Option 1 would occur away from the majority of residences, while Option 2 would pass closer to private properties and therefore require a higher level of mitigation for views, noise generation, and dust dispersion.
- Community feedback. Option 1 was the clear preference for transportation activities.

In addition to the above, the detailed analysis also considered road safety, planning approval risks, road authority, configuration of public roads, construction complexity, cost, landowner agreements, and terrain.

While the above process supported both options in different ways, Option 1 was selected primarily due to the separation of transport activities from community and the likely long-term benefit of this option for the applicant and the community. This is despite the higher cost to construct and complexity in development of Option 1.

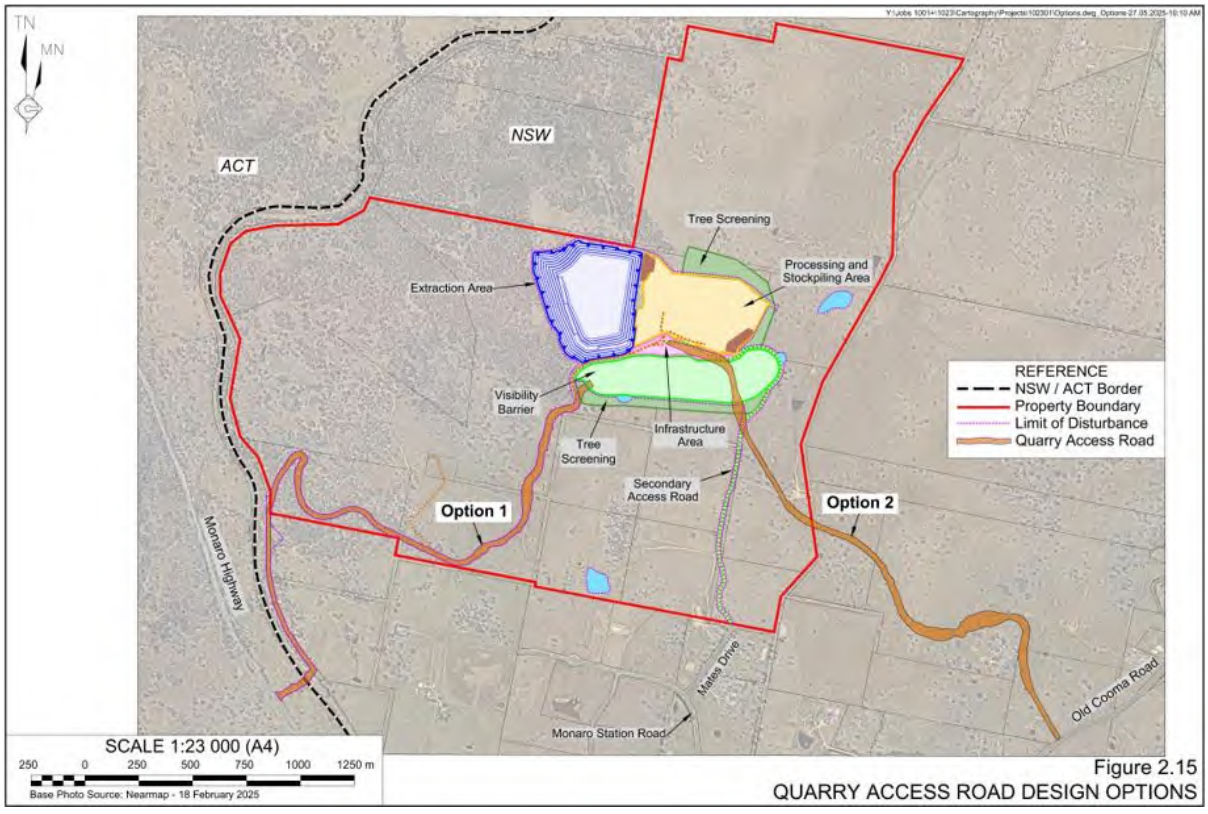


Figure 2.15
QUARRY ACCESS ROAD DESIGN OPTIONS

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3.1.3 Location and configuration of processing equipment

Various configurations and locations of processing equipment have been considered. The proposed strategy would utilise mobile processing equipment during Stage 1. During Stage 2, a fixed processing plant would be installed within the processing and stockpiling area adjacent to the extraction area.

A staged approach has been chosen to ensure that processing equipment is not in excess of what is required for the rate of extraction. The rate of extraction and subsequent noise generation and dust dispersion would be commensurate with the progressive development of the project and ensure that impacts are not excessive. Processing operations would be appropriately shielded (e.g. cut into the existing landform) to ensure that impacts to amenity are minimised.

3.1.4 Final landform and land use

Extraction activities would result in the development of a final void at closure that would have benched sides that would be revegetated and progressively filled with water. In order to fill the final void over 20 Mt of material would need to be sourced from the local area or imported. At this stage, sourcing materials from the local area is not feasible as it would require the clearing of substantial areas of native vegetation. Importing significant volumes of material to fill the void is also not feasible and not a part of the current application.

Over the life of the project, approximately 5.5 Mt of highly weathered material would be extracted and used to construct a Visibility Barrier. Construction would occur from site establishment to mitigate possible views of the operation from the private land or public vantage points. Opportunities to backfill the final void with this material were considered in planning to reduce the extent of the final void. However, the high cost of moving this material means this option is not feasible and it would fill only a small part of the final void. In addition, the Visibility Barrier would be planted native shrubs and canopy trees from initial development. Removing this barrier would therefore remove native vegetation that had been established over a 35-year period.

At this time, the most practical final land use remains to revegetate disturbed land with some areas designated for grazing activities. Other areas would be retained for biodiversity establishment and conservation, potentially as a Biodiversity Stewardship Site.

3.1.5 Ecological monitoring, management, and rehabilitation of native vegetation and habitat

As discussed in Section 3.3.1, A Biodiversity and Rehabilitation Management Plan would be developed as part of the project. This plan would include the following information.

- Cleaning protocols.
- Progressive rehabilitation strategy.
- Tree screening areas and the visibility barrier.
- Weed management.
- Feral animal management.
- Ecological monitoring.
- Reactive / adaptive management.
- Reporting and review.

For more detailed information on the Biodiversity and Rehabilitation Management Plan, refer to Section 3.3.1.

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3.2 Residual Biodiversity Impacts of the Proposed Development

3.2.1 Direct impacts on native vegetation and habitat

The proposed development would result in the direct clearance of vegetation and species credit species habitat as detailed in Table 27 and shown in Figure 15. In total, the proposed development would result in the clearance of 77.03 ha of BC Act native vegetation, which includes:

- 22.44 ha of EPBC Act / BC Act Box-Gum Woodland;
- 39.95 ha of characteristically suitable Pink-tailed Legless Lizard habitat, noting that no known occupied habitat would be impacted;
- 2.35 ha of Key's Matchstick Grasshopper habitat;
- 0.56 ha of Pale Pomaderris habitat;
- 0.13 ha of Small Purple-pea habitat; and
- 2.66 ha of Silky Swainson-pea habitat.

Table 27. Summary of direct impacts

Vegetation zone / species	Area	BC Act Native Vegetation	VI score	Listing status
PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest				
Zone 1	29.57 ha	Yes	81.3	-
Zone 2	15.92 ha	Yes	21.0	
Zone 3	5.49 ha	Yes	52.4	
Zone 4	2.88 ha	Yes	10.9	
Zone 5	0.73 ha	Yes	20.4	
Zone 6	0.80 ha	No	6.7	
PCT3376 Southern Tableland Grassy Box Woodland				
Zone 1	12.29 ha	Yes	59.3	Critically endangered (BC Act & EPBC Act)
Zone 2	10.15 ha	Yes	14.4	
Pink-tailed Legless Lizard *Aprasia parapulchella*				
PCT3375 Zone 1	17.50 ha	-	81.3	Vulnerable (BC Act & EPBC Act)
PCT3375 Zone 2	5.61 ha	-	21.0	
PCT3375 Zone 3	3.39 ha	-	52.4	
PCT3375 Zone 4	2.29 ha	-	10.9	
PCT3376 Zone 1	7.80 ha	-	59.3	
PCT3376 Zone 2	3.36 ha	-	14.4	
Key's Matchstick Grasshopper *Keyacris scurra*				
PCT3375 Zone 1	2.06 ha	-	81.3	Endangered (BC Act & EPBC Act)
PCT3376 Zone 1	0.29 ha	-	59.3	
Pale Pomaderris *Pomaderris pallida*				
PCT3375 Zone 1	0.56 ha	-	81.3	Vulnerable (BC Act & EPBC Act)

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Vegetation zone / species	Area	BC Act Native Vegetation	VI score	Listing status
Small Purple-pea *Swainsona recta*				
PCT3375 Zone 1	0.06 ha	-	81.3	Endangered (BC Act & EPBC Act)
PCT3376 Zone 1	0.07 ha	-	59.3	
Silky Swainson-pea *Swainsona sericea*				
PCT3375 Zone 1	1.60 ha	-	81.3	Vulnerable (BC Act)
PCT3375 Zone 2	0.42 ha	-	21.0	
PCT3376 Zone 1	0.10 ha	-	59.3	
PCT3376 Zone 2	0.54 ha	-	14.4	

3.2.2 Indirect impacts on native vegetation and habitat

The proposed development has the potential to indirectly impact retained and/or adjacent native vegetation and habitat. Following minimisation and mitigation measures, noise, edge effects, and dust may have an indirect impact on retained / adjacent areas. Appendix F presents a detailed assessment of the estimated extent and severity of the identified indirect impacts arising from the proposed development.

In summary, to account for possible indirect impacts on retained and/or adjacent areas, the following reductions in biodiversity value have been adopted (refer to Figure 15).

1. A 20% reduction in biodiversity value within 50 m of the extraction, processing, and stockpiling areas.
2. A 20% reduction in biodiversity value within 30 m of the unsealed section of the Quarry Access Road.
3. A 10% reduction in biodiversity value within 100 m of the extraction, processing, and stockpiling areas.
4. A 10% reduction in biodiversity value within 30 m of the sealed section of the Quarry Access Road.

These areas have been assessed so that they do not overlap and therefore are assessed as zones with either a 20% or 10% reduction in biodiversity value for the purpose of establishing biodiversity offsetting requirements.

The only way in which indirect impacts can be captured by the BAM Calculator is through altering vegetation integrity (VI) scores. While this method is imperfect in many ways, it is considered the best available method. As VI scores cannot be directly altered in the BAM Calculator, the estimated reduction in quality has been achieved by reducing the average composition, structure, and function scores by the relevant amount for each indirectly impacted vegetation zone[47]; these reductions are detailed in Table 28 and identified in the BAM Calculator by the inclusion of a “20p” suffix (for a 20% reduction in quality) or “10p” suffix (for a 10% reduction in quality).

By altering composition, structure, and function scores, the future VI scores for indirectly impacted vegetation zones are reduced. This reduction in VI in turn generates an ecosystem credit offset obligation for indirectly impacted vegetation. As detailed in Section 3.5.2.2, indirect impacts

[47] Note: PCT3375 Zone 5 and PCT3376 Zone 6 do not fall within the areas where indirect impacts are assumed to occur. These vegetation zones are therefore not included in Table 28.

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generate a total of 80 ecosystem credits, which represents 4.3% of the total ecosystem credit offset obligation associated with the project.

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Table 28. Indirect impacts – Calculated changes in Composition, Structure, and Function

Vegetation zone	Reduction in quality	Composition						Structure						Function					
		Tree	Shrub	Grass	Forb	Fern	Other	Tree	Shrub	Grass	Forb	Fern	Other	Large tree	Litter cover	Fallen logs	Sem size class	Tree regen.	HTW cover
PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest																			
Zone 1	Recorded average	2.4	7.2	8.6	14.1	0.9	1.8	22.2	12.4	42.7	4.5	0.1	0.2	0.9	31.6	24.4	3.2	Present	0.2
	-10%	2.2	6.5	7.7	12.7	0.8	1.6	20.0	11.2	38.4	4.1	0.1	0.2	0.8	28.4	22.0	2.9	Present	0.2
	-20%	1.9	5.8	6.9	11.3	0.7	1.4	17.8	9.9	34.2	3.6	0.1	0.2	0.7	25.3	19.5	2.6	Present	0.2
Zone 2	Recorded average	0.0	0.5	9.5	10.1	0.3	1.0	0.0	0.1	69.2	1.3	0.0	0.1	0.0	4.6	12.8	0.0	Absent	1.6
	-10%	0.0	0.5	8.6	9.1	0.3	0.9	0.0	0.1	62.3	1.2	0.0	0.1	0.0	4.1	11.5	0.0	Absent	1.6
	-20%	0.0	0.4	7.6	8.1	0.2	0.8	0.0	0.1	55.4	1.0	0.0	0.1	0.0	3.7	10.2	0.0	Absent	1.6
Zone 3	Recorded average	1.7	0.0	6.0	4.7	0.0	0.7	28.3	0.0	38.8	0.6	0.0	0.2	1.7	11.1	15.3	1.7	Present	0.1
	-10%	1.5	0.0	5.4	4.2	0.0	0.6	25.5	0.0	34.9	0.5	0.0	0.2	1.5	10.0	13.8	1.5	Present	0.1
	-20%	1.4	0.0	4.8	3.8	0.0	0.6	22.6	0.0	31.0	0.5	0.0	0.2	1.4	8.9	12.2	1.4	Present	0.1
Zone 4	Recorded average	0.0	0.0	7.0	3.7	0.0	0.7	0.0	0.0	56.8	0.5	0.0	0.1	0.0	4.2	0.3	0.0	Absent	10.2
	-10%	0.0	0.0	6.3	3.3	0.0	0.6	0.0	0.0	51.1	0.5	0.0	0.1	0.0	3.8	0.3	0.0	Absent	10.2
	-20%	0.0	0.0	5.6	3.0	0.0	0.6	0.0	0.0	45.4	0.4	0.0	0.1	0.0	3.4	0.2	0.0	Absent	10.2
Zone 6	Recorded average	0.0	0.0	3.0	1.0	0.0	0.0	0.0	0.0	61.1	0.1	0.0	0.0	0.0	1.4	0.0	0.0	Absent	1.0
	-10%	0.0	0.0	2.7	0.9	0.0	0.0	0.0	0.0	55.0	0.1	0.0	0.0	0.0	1.3	0.0	0.0	Absent	1.0
	-20%	0.0	0.0	2.4	0.8	0.0	0.0	0.0	0.0	48.9	0.1	0.0	0.0	0.0	1.1	0.0	0.0	Absent	1.0
PCT3376 Southern Tableland Grassy Box Woodland																			
Zone 1	Recorded average	1.5	1.5	12.0	13.8	0.5	1.3	16.4	0.6	56.1	6.9	0.1	0.3	0.9	9.6	8.3	1.9	Present	1.4
	-10%	1.4	1.4	10.8	12.4	0.5	1.2	14.8	0.5	50.5	6.2	0.1	0.3	0.8	8.6	7.5	1.7	Present	1.4
	-20%	1.2	1.2	9.6	11.0	0.4	1.0	13.1	0.5	44.9	5.5	0.1	0.2	0.7	7.7	6.6	1.5	Present	1.4
Zone 2	Recorded average	0.0	0.3	9.6	12.3	0.3	0.3	0.0	0.0	72.3	2.0	0.0	0.0	0.0	3.4	0.9	0.0	Absent	0.6
	-10%	0.0	0.3	8.6	11.1	0.3	0.3	0.0	0.0	65.1	1.8	0.0	0.0	0.0	3.1	0.8	0.0	Absent	0.6
	-20%	0.0	0.2	7.7	9.8	0.2	0.2	0.0	0.0	57.8	1.6	0.0	0.0	0.0	2.7	0.7	0.0	Absent	0.6

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Legend

Subject Land

Impact Areas

- Disturbance footprint
- Indirect_impact_10%
- Indirect_impact_20%

Impacted Threatened Species Habitat

- Pink-tailed Legless Lizard (characteristically suitable habitat)
- Keys Matchstick Grasshopper
- Gang-gang Cockatoo (foraging habitat)
- Pale Pomaderris
- Silky Swainson-pea
- Small Purple Pea

Impacted Vegetation

- 3375 Zone 1 - Canopy - Native Dom - Mod-High Diversity
- 3375 Zone 2 - No Canopy - Native Dom - Mod-High Diversity
- 3375 Zone 3 - Canopy - Native Dom - Low Diversity
- 3375 Zone 4 - No Canopy - Native Dom - Low Diversity
- 3375 Zone 5 - Canopy - Exotic Dom - Low Diversity
- 3375 Zone 6 - No Canopy - Exotic Dom - Low Diversity
- 3376 Zone 1 - Canopy - Native Dom - Mod-High Diversity
- 3376 Zone 2 - No Canopy - Native Dom - Mod-High Diversity

0 0.25 0.5 0.75 1 km

Scale 1:14,500 @ A3, GDA 2020, MGA Zone 55

N

Acknowledgement: Image (c) ACT Government CC4.0 2021

Figure 15. Residual Biodiversity Impacts of the Proposed Development

Capital Ecology Project No: 3289
Drawn by: S. Reid
Date: 6 June 2025

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3.2.3 Prescribed biodiversity impacts

As described in the BAM, some types of projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Clause 6.1 of the BC Regulation identifies the following as impacts that are 'prescribed biodiversity impacts' that must be assessed using the BOS.

> *(a) impacts of development on the habitat of threatened species or ecological communities associated with:*
>
> *(i) karst, caves, crevices, cliffs and other geological features of significance;*
>
> *(ii) rocks;*
>
> *(iii) human made structures;*
>
> *(iv) non-native vegetation;*
>
> *(b) impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range;*
>
> *(c) impacts of development on movement of threatened species that maintains their life cycle;*
>
> *(d) impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining);*
>
> *(e) impacts of wind turbine strikes on protected animals; and*
>
> *(f) impacts of vehicle strikes on threatened species or on animals that are part of a TEC.*

The following potential 'prescribed biodiversity impacts' arising due to the proposed development were identified during the development of this BDAR. As described in the following sections, these potential impacts were not determined to be a prescribed biodiversity impact as they were considered unlikely to notably impact threatened species habitat or threatened ecological communities in addition to that described in Section 3.2.1 and Section 3.2.2.

Notwithstanding this, the avoidance and minimisation measures detailed in Section 3.1 and the mitigation measures detailed in Section 3.3 would reduce the impact of the proposed development on the identified potential prescribed biodiversity impacts.

3.2.3.1 Rocks

As detailed in Section 2.3 and shown on Figure 12, the development footprint contains patches of loose surface rock, the removal of which is identified as a potential prescribed biodiversity impact. As detailed in Section 2.2.3.4 and Section 2.3.6, a rock turning survey was performed across the development footprint and wider subject land in order to determine the value of the loose surface rock to threatened fauna (particularly with respect to the Pink-tailed Legless Lizard, the species credit species associated with loose surface rock).

In summary, Pink-tailed Legless Lizard were only recorded close to the northern boundary of the subject land. However, in accordance with updated NSW Government requirements for determining Pink-tailed Legless Lizard presence/absence and habitat extent, all characteristically suitable Pink-

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tailed Legless Lizard habitat in the subject land has been used to determine the impact to the species pursuant to the BC Act and the resultant BOS offset liability. Given this, the proposed development is considered unlikely to have a prescribed biodiversity impact on any threatened species or ecological community that are associated with rocks beyond that which has already been captured through the generation of species credits for Pink-tailed Legless Lizard.

3.2.3.2 Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

As discussed in Section 2.1, the subject land is well connected to the surrounding landscape and likely forms part of an important connectivity corridor. This is reflected in the South East and Tablelands Regional Plan (where portions of the subject land are identified as a 'South East and Tablelands Corridors') and in ACTmapi[48] (where immediately adjacent areas are identified as supporting connected habitat for a variety of fauna).

This high degree of connectivity is particularly true for very mobile species, such as large marsupials and birds, but is also true for a wider variety of flora and fauna, including species with a more restricted ability to disperse (e.g. reptiles, amphibians). The subject land is also likely to provide habitat connectivity for threatened species, specifically those identified as ecosystem credit species in Table 25 and confirmed as species credit species in Section 2.3.6.

The proposed development therefore has the potential to impact habitat connectivity for threatened species via:

- the clearance of native vegetation, particularly woody vegetation;
- the clearance of habitat features, such as loose surface rock; and
- the introduction of barriers to movement, particularly the extraction, processing, and stockpiling areas and the fenced portion of the Quarry Access Road.

However, for the following reasons, the proposed development is considered unlikely to impact habitat connectivity for threatened species to the degree that it removes the ability of those species to move throughout the locality and/or isolates areas of habitat (refer to Figure 5).

- The extraction, processing, and stockpiling areas are largely located in areas that have either been cleared of vegetation or which support a thinned canopy. As such, existing habitat connectivity within these areas is already partly compromised.
- While the fenced portion of the Quarry Access Road is considered likely to impact habitat connectivity, it would do so primarily in the north-south direction. However, south of the proposed development is agricultural land that is already heavily cleared. These areas are therefore considered likely to support a lower diversity of native species. As such, the impact of the fenced portion of the Quarry Access Road on north-south habitat connectivity is likely to be reduced.
- A variety of existing impediments to habitat connectivity already exist in the immediate locality, including the Monaro Hwy, the Goulburn Bombala Rail Line, and cleared agricultural land.

[48] https://www.actmapi.act.gov.au/

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- Following development, substantial areas of intact vegetation and habitat would persist to the north, east, and west of the development footprint. These areas are considered likely to be sufficient to maintain movement corridors and thus habitat connectivity in the locality post-development.

The proposed development is therefore considered unlikely to have a prescribed biodiversity impact on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.

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

To manage potential impacts to water bodies and hydrological processes, a Water Management Plan (WMP) would be developed for the project which includes a comprehensive groundwater monitoring program, management strategy, and trigger action response plan. Furthermore, licensing of water taken through the development of the quarry must occur in accordance with NSW Government requirements, and any water that would be discharged from the quarry would meet the EPA water quality criteria for water releases. Finally, the project includes a detailed Erosion and Sediment Control Plan (ESCP) in the WMP that would be developed in consultation with the NSW Department of Planning and Environment - Water and would have the following objectives with regards to surface water management.

1. Separate clean and dirty water.
2. Maintain water quality through the capture of sediment laden water and treatment before discharge.
3. Avoid physical damage to water bodies such as through scouring or erosional impacts.

In combination, the above actions work to maintain water quality, water bodies, and hydrological processes beyond the development footprint.

As per the SEARs, particular consideration needs to be given to Groundwater Dependent Ecosystems (GDEs). GDEs are defined as 'ecosystems that need access to groundwater to meet all or some of their water requirements to maintain their communities of plants and animals, ecological processes, and ecosystem services'. The dependence of GDEs on groundwater varies from seasonal or episodic, to continual.

The presence of GDEs in the subject land was invested via the following spatial data resources.

- The GDE Ecological Value (HEAVE) spatial database, which categorises the ecological value of each groundwater dependent vegetation community from very high to very low.
    - No vegetation in the subject land is mapped on this database.
- The GDE Atlas, which maps the potential for groundwater/ecosystem interaction.
    - No Terrestrial GDEs or Terrestrial Inflow Dependent Ecosystems (IDE) are recorded in the subject land.
    - No Subterranean GDEs are recorded in the subject land.

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- Rock Gully Creek and Four Mile Creek, which occur in the subject land but outside the development footprint, are identified as having a high potential to support Aquatic GDE that are likely to be inflow dependent.

- The Spatial Layer of Probable Vegetation Groundwater Dependent Ecosystems in NSW, which identifies vegetation communities that have a probability of being a GDE. Probability categories are limited to high, medium, low, and non-GDE
    - Areas that do not support a canopy have low or no GDE probability.
    - Patches of PCT3376 are identified as having moderate GDE probability. Mapped areas are restricted to vegetation in the western half of the subject land.
    - Patches of PCT3375 are identified as having low GDE probability. Mapped areas are restricted to vegetation in the western half of the subject land

With respect to the above, none of the vegetation in the subject land has a high probability of being a GDE. Furthermore, there is no evidence of springs, swamps, or groundwater baseflow to creeks on the subject land or adjacent to it (Strategic Environmental and Engineering Consulting 2025). Therefore, it is unlikely that there are GDEs within Four Mile Creek or Rocky Creek given the absence of permanent flow.

However, as noted above, patches of PCT3376 across the western half of the subject land are mapped as having a moderate GDE probability in the Spatial Layer of Probable Vegetation Groundwater Dependent Ecosystems in NSW. As per the Groundwater Assessment (TheHydrogeologist 2025), groundwater is estimated to be located at depths between 5 m and 50 m below ground level within the majority of the development footprint. With respect to the areas to the west of the development footprint, where PCT3376 is mapped as having moderate GDE potential, the groundwater table mostly occurs at a depth of approximately 20 – 50 m. Given that an ecological community is more likely to rely on groundwater when it occurs close to the surface (i.e. < 10 m), the vegetation west of the development footprint would likely be more reliant on soil moisture in the capillary zone and groundwater at the soil-rock interface, rather than on the deeper regional groundwater table (Department of Primary Industries 2016[49]).

Finally, aside from disturbance impacts at the surface, changes to the groundwater setting are not expected until Stage 4E when the pit extends below 852 m AHD in approximately Year 15 of operation (TheHydrogeologist 2025). Groundwater drawdown is predicted to occur in the weathered rock layer that occurs at surface (TheHydrogeologist 2025). While there is groundwater drawdown predicted in the basement rock (a separate layer from a hydrogeological perspective), this is considered unlikely to impact vegetation due to the depth of this change.

With respect to the above, the proposed development is therefore considered unlikely to have a prescribed biodiversity impact on water quality, water bodies, or hydrological processes that sustain threatened species and threatened ecological communities.

3.2.3.4 Vehicle strikes on threatened species of animals or on animals that are part of a TEC

Vehicle and machinery movements are necessary during the construction and continued operation of quarrying activities. Measures to minimise any potential vehicle strikes would be achieved

[49] Department of Primary Industries (2016). *Methods for the identification of high probability groundwater dependent vegetation ecosystems*. Available at https://water.dpie.nsw.gov.au/our-work/science-data-and-modelling/groundwater-management-and-science/groundwater-and-the-environment

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through training, adherence to a Driver's Code of Conduct, signage, and reduced vehicle speeds within the quarry. As such, potential impacts from vehicle strikes on animals that are part of a threatened ecological community are anticipated to be very low.

3.2.4 Cumulative biodiversity impacts

As mentioned in Section 1 and shown in Figure 2, a small section of the proposed development occurs in the ACT. Accordingly, that section of the proposed development is not assessed as part of this BDAR. However, it is important to consider the cumulative impacts associated with the entire Monaro Rock Quarry project across both the ACT and NSW.

In summary, the current impact estimates for the ACT portion of the Monaro Rock Quarry project are as follows.

- Clearance of 1.62 ha of ACT *Nature Conservation Act 2014* (NC Act) native vegetation, which includes 1.43 ha of NC Act Box-Gum Woodland of which 0.67 ha is also EPBC Act Box-Gum Woodland.
- Clearance of a number of remnant native trees with a DBH >30 cm, including several with a DBH >50 cm and/or hollows.
- Clearance of foraging habitat for bird species listed as threatened pursuant to the EPBC Act and/or NC Act.

In total, the Monaro Rock Quarry project would therefore have a combined impact of 78.65 ha of NC Act / BC Act native vegetation, which includes 23.87 ha of NC Act / BC Act Box-Gum Woodland of which 23.11 ha is also EPBC Act Box-Gum Woodland. While the impacts that occur in the ACT will be assessed pursuant to the relevant ACT legislation, impacts to MNES (i.e. EPBC Act Box-Gum Woodland) must consider the combined impact within the ACT and NSW. This combined impact, while not assessed as part of this BDAR, will be included in the EPBC Act referral. However, given that the ACT section of the proposed development would only impact 0.67 ha of EPBC Act Box-Gum Woodland and would not impact any notable habitat for threatened flora or fauna, the inclusion of ACT impacts will not change the outcomes of the assessments of the significance of impacts as presented in this BDAR.

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Table 29. Assessment of impacts, potential indirect impacts, potential prescribed impacts, and amelioration measures

Impact	Amelioration measure	Responsibility	Timing	Outcome
Direct impact				
Impact on native vegetation - 77.03 ha of BC Act Native Vegetation. Impact on a Threatened Ecological Community - 22.44 ha of EPBC Act/ BC Act Box-Gum Woodland. Impact on threatened species - 39.95 ha of characteristically suitable Pink-tailed Legless Lizard habitat - 2.35 ha of Key's Matchstick Grasshopper habitat. - 0.56 ha of Pale Pomaderris habitat. - 0.13 ha of Small Purple-pea habitat. - 2.66 ha of Silky Swainson-pea habitat. Impact on an SAII - 22.44 ha of BC Act Box-Gum Woodland. - 0.56 ha of Pale Pomaderris habitat.	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Hygiene protocols to prevent the spread of weeds and/or pathogens. - Staged clearing protocol. - Marking and protecting areas of retained vegetation and habitat during construction, including erecting temporary fencing to protect significant environmental features, where necessary. - Pre-clearance survey by a qualified or suitably experienced ecologist or wildlife handler. - Clearing habitat trees (e.g. hollow-bearing trees, nest trees) outside of the breeding season of most of the locally occurring native fauna (i.e. August to December). - Fauna rescue and relocation procedures using a suitably qualified wildlife handler. - Stockpiling stripped topsoil for use in rehabilitation activities. - Salvage and relocation of key habitat features (e.g. fallen timber, tree hollows, surface rock). - Inclusion of tree screening areas, visibility barrier, progressive rehabilitation, and monitoring / management of surrounding areas as per the Biodiversity and Rehabilitation Management Plan (see Section 3.3.1).	Quarry manager	Prior to and during clearing	Direct impacts on ecological values cannot be entirely avoided and therefore would be offset in accordance with the BOS. See Section 3.5.2 for more information.
Potential indirect impact				
Inadvertent impacts on adjacent habitat or vegetation / trampling of threatened flora species	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Staged clearing protocol. - Marking and protecting areas of retained vegetation and habitat during construction, including erecting temporary fencing to protect significant environmental features, where necessary. - Monitoring, management, and reactive / adaptive management strategies for surrounding areas as per the Biodiversity and Rehabilitation Management Plan (see Section 3.3.1).	Quarry manager	Prior to and during clearing	Proposed controls are considered sufficient to reduce the risk of unintended impacts to an acceptably low level.
Reduced viability of adjacent habitat due to edge effects noise, dust, or light spill	- The implementation of the environmental safeguards as detailed in the relevant management plan listed in Section 3.3 for noise, dust, and light. - No machinery will be left running outside of operational hours (see Table 2). - Lights that meet Australian Standards with the light source shielded to face downwards. - Salvage and relocation of key habitat features (e.g. fallen timber, tree hollows, surface rock). - Inclusion of tree screening areas, visibility barrier, progressive rehabilitation, and monitoring / management of surrounding areas as per the Biodiversity and Rehabilitation Management Plan (see Section 3.3.1).	Quarry manager	During operation	As discussed in Section 3.2.2, indirect impacts on ecological values cannot be entirely avoided and therefore would be offset in accordance with the BOS. See section 3.5.2 for more information.

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Impact	Amelioration measure	Responsibility	Timing	Outcome
Transport of weeds and pathogens from the site to adjacent vegetation	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Hygiene protocols to prevent the spread of weeds and/or pathogens. - Stockpiling topsoil for use in rehabilitation activities. - Annual weed monitoring and control, with reporting on areas covered, any identifiable trends in weed presence, and methods applied for weed management. - Weed control to be implemented in consultation with surrounding landholders, where necessary.	Quarry manager	During operation	Proposed controls are considered sufficient to reduce the risk of unintended impacts to an acceptably low level.
Erosion and sedimentation of receiving waterways	- The implementation of the environmental safeguards as detailed in the relevant management plan listed in Section 3.3 for water, erosion, and sedimentation. The associated Erosion and Sediment Control Plan (ESCP) would be developed in accordance with the following principles. ○ Separate clean and dirty water. ○ Maintain water quality through the capture of sediment laden water and treatment before discharge. ○ Avoid physical damage to water bodies such as through scouring or erosional impacts.	Quarry manager	During operation	Proposed controls are considered sufficient to reduce the risk of unintended impacts to an acceptably low level.
Removal and disturbance of rocks, including bush rock	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Staged clearing protocol. - Marking and protecting areas of retained vegetation and habitat during construction, including erecting temporary fencing to protect significant environmental features, where necessary. - Pre-clearance survey by a qualified or suitably experienced ecologist or wildlife handler. - Salvage and relocation of key habitat features, including surface rock.	Quarry manager	Prior to and during clearing	Proposed controls are considered sufficient to reduce the risk of unintended impacts to an acceptably low level.
Increase in pest animal populations	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Annual inspections for signs of feral animals. - Control programs to also be informed by incidental sightings, adjacent land owners, or any other reports. - Control programs to be implemented in consultation with Local Land Services programs and surrounding landholders, where necessary. - Environmental management measures to reduce availability of additional resources for pest fauna (e.g. management of waste).	Quarry manager	During operation	Proposed controls are considered sufficient to reduce the risk of unintended impacts to an acceptably low level.
Potential prescribed impact				
Development on habitat of threatened species or ecological communities associated with rocks.	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Staged clearing protocol. - Marking and protecting areas of retained vegetation and habitat during construction, including erecting temporary fencing to protect significant environmental features, where necessary. - Pre-clearance survey by a qualified or suitably experienced ecologist or wildlife handler. - Salvage and relocation of key habitat features, including surface rock.	Quarry manager	Prior to and during clearing	As discussed in Section 3.2.3, the proposed development is considered unlikely to have a prescribed biodiversity impact
Development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.	- The avoidance and minimisation detailed in Section 3.1. Inclusion of tree screening areas, visibility barrier, progressive rehabilitation, and monitoring / management of surrounding areas as per the Biodiversity and Rehabilitation Management Plan (see Section 3.3.1).	Quarry manager	During operation	

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Impact	Amelioration measure	Responsibility	Timing	Outcome
Development on water quality, waterbodies, and hydrological processes that sustain threatened species and TECs.	- The implementation of the environmental safeguards as detailed in the relevant management plan listed in Section 3.3 for water, erosion, and sedimentation.	Quarry manager	During operation	
Vehicle strikes on threatened species of animals or on animals that are part of a TEC.	- The implementation of the safeguards as detailed in the relevant management plan listed in Section 3.3 for traffic. - Training staff and conducting site briefings to communicate the requirements for driving on site. - Adherence to a Driver's Code of Conduct. - Signage. - reduced vehicle speeds within the quarry.	Quarry manager	During operation	

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3.3 Mitigation of Residual Impacts on Biodiversity Values

Table 29 includes a summary of some of the standard mitigation measures that would form part of the project. In addition, Table 29 references the following management plans.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan (see Section 3.3.1).

The above management plans include a variety of safeguards that are designed to minimise and mitigate impacts to the environment. In combination, the measures outlined in Table 29 and the above management plans reduce the risk of unintended impacts.

3.3.1 Mitigation Measure – Biodiversity and Rehabilitation Management Plan

The Biodiversity and Rehabilitation Management Plan would be the key document that would guide the management of landscape-related risks for the ongoing operation of the proposed development and set out proposed final rehabilitation strategies and completion criteria. Table 30 provides a summary of the key management actions and activities that would form the Biodiversity and Rehabilitation Management Plan. In combination, these actions and activities are considered sufficient to reduce the risk of unintended impacts to adjacent areas of vegetation and habitat.

Table 30. Biodiversity and Rehabilitation Management Plan – Summary of key actions and activities

Mitigation Measures	Management Activity
Clearing protocols	- Training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented. - Hygiene protocols to prevent the spread of weeds and/or pathogens. - Staged clearing protocol. - Marking and protecting areas of retained vegetation and habitat during construction, including erecting temporary fencing to protect significant environmental features, where necessary. - Pre-clearance survey by a qualified or suitably experienced ecologist or wildlife handler. - Clearing habitat trees (e.g. hollow-bearing trees, nest trees) outside of the breeding season of most of the locally occurring native fauna (i.e. August to December). - Fauna rescue and relocation procedures using a suitably qualified wildlife handler. - Stockpiling stripped topsoil for use in rehabilitation activities. - Salvage and relocation of key habitat features (e.g. fallen timber, tree hollows, surface rock)

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Mitigation Measures	Management Activity
Progressive rehabilitation strategy	- All areas apart from the Quarry Access Road and Secondary Access Road will be progressively rehabilitated during, and after completion of, extraction operations. Final rehabilitation activities would require a further three to five years to complete beyond the cessation of extraction and processing activities. - Rehabilitation of the quarry site would not be a process of restoring the landform to its former condition. The final landform within the extraction area would comprise a final void that would form a water body. Quarry benches and faces would remain. Areas that are not inundated with water would be rehabilitated. This would include planting PCT appropriate tree and shrub tubestock. Refer to Appendix G for recommended planting species. - Rehabilitated areas would be monitored by a suitably qualified ecologist in accordance with the Biodiversity Assessment Method (BAM) and compared to set performance measures.
Tree screening areas and the visibility barrier	- Tree screening areas would be planted out with PCT appropriate tree and shrub tubestock (refer to Appendix G for recommended planting species, densities, and indicative methodology [e.g. timing and performance measures]). - The visibility barrier would initially be stripped of vegetation and topsoil, which would be relocated for use in progressive rehabilitation activities. The barrier itself would be progressively developed in stages. The southern facing slopes would then be stabilised and revegetated as soon as practical, using PCT appropriate grasses and shrubs. Refer to Appendix G for recommended planting species, densities, and indicative methodology (e.g. timing and performance measures).
Weed management	- Annual weed monitoring and control. - Hygiene protocols to prevent the spread of weeds and/or pathogens. - Stockpiling topsoil for use in rehabilitation activities.
Feral animal management	- Annual inspections for signs of feral animals. - Control programs to also be informed by incidental sightings, adjacent land owners, or any other reports. - Control programs to be implemented in consultation with Local Land Services programs and surrounding landholders, where necessary. - Environmental management measures to reduce availability of additional resources for pest fauna (e.g. management of waste).
Ecological monitoring	The following ecological monitoring would occur annually. - Vegetation assessment via BAM plots at fixed locations within tree screening areas. - Monitoring of Small Purple-pea populations in the portion of the Goulburn Bombala Rail Line that occurs adjacent to the development footprint. - Monitoring of rehabilitation success via BAM plots at fixed locations. - Annual weed monitoring and mapping. - Annual inspections for signs of feral animals. - Visual inspections of the condition of the quarry site, including indications of direct disturbance outside approved areas, indications of indirect impacts to vegetation / habitat outside of approved disturbance areas, signs of erosion, and fence and road conditions. The result of monitoring would be assessed against performance measures and to help inform reactive / adaptive management activities.

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Mitigation Measures	Management Activity
Reactive / adaptive management	The following triggers would be in place to provide for reactive / adaptive management. - Disturbance of land outside of the development footprint. - Pre-clearance and/or clearance protocols are not followed. - Identification of invasive weeds or feral animals. - Direct or indirect impacts to the Small Purple-pea populations in the portion of the Goulburn Bombala Rail Line that occurs adjacent to the development footprint. - Rehabilitation does not follow the committed strategy. - Non-compliance incident. - Pollution incident. In all cases, personnel are to immediately report triggers to the Quarry Manager. This information would be used to plan for management, as immediate responsive actions may not be appropriate (such as in the event of feral animal sightings). Where appropriate, the relevant NSW and/or Commonwealth departments would be notified, remediation measures scoped and actioned, and the incident included in annual reporting and review activities.
Reporting and review	Biodiversity monitoring outcomes would be published annually and made available to view on a publicly accessible website. Other publicly available documents would include the following. - A copy of the Biodiversity and Rehabilitation Management Plan. - Incident investigation reports. Within one year of the commencement of Stage 1 of operations, and every three years thereafter (unless directed otherwise), the proponents would commission an Independent Environmental Audit of the development. The audit would provide an independent evaluation of the performance of measures implemented under the conditions of consent, including the Biodiversity and Rehabilitation Management Plan and provide recommendations for improvement or update. Annual compliance reporting would also be conducted as per the NSW and/or Commonwealth conditions of approval.

3.3.2 Adaptive management for uncertain impacts

As per the BAM, an adaptive management strategy is required for impacts on biodiversity values that are infrequent or difficult to measure prior to commencement of the proposed development. Such impacts are referred to as uncertain impacts. If uncertain impacts are identified, the proponent must develop an adaptive management strategy.

The proposed development is unlikely to result in biodiversity impacts that are unforeseen or uncertain, especially given that:

- the development footprint, subject land, and adjacent areas do not support karst, caves, crevices, cliffs, or other geological features of significance;
- the proposed development does not include underground mining;
- the proposed development does not include wind turbines; and
- the proposed development is unlikely to increase the incidence of vehicle strikes on threatened species.

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As such, an adaptive management strategy is not required for the proposed development. Notwithstanding this, as detailed in Section 3.3.1, the Biodiversity and Rehabilitation Management Plan would include reactive / adaptive management strategies. As such, the proposed strategies would act to address any potential unforeseen biodiversity impacts on the significant vegetation and habitat that occur within the adjacent areas.

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3.4 Serious and irreversible impacts

The guidance to assist a decisionmaker to determine a serious and irreversible impact (NSW Government 2019[50]) provides a list of threatened species and ecological communities which are likely to be the subject of serious and irreversible impacts (SAII). The potential for a project to impact these SAII entities must be assessed in the BDAR.

The subject land supports the following ecological community and threatened flora species which are listed as SAII entities.

- PCT3376 - Southern Tablelands Grassy Box Woodland (BC Act Box-Gum Woodland).
- Pale Pomaderris *Pomaderris pallida*.

The proposed development would result in the clearance of 22.44 ha of BC Act Box-Gum Woodland, indirect impact to 5.39 ha of BC Act Box-Gum Woodland, and clearance of 0.56 ha of Pale Pomaderris habitat. The below additional information is provided to support the decision maker to determine if the proposed impacts constitute a SAII.

3.4.1 Box-Gum Woodland

The following information is presented according to the requirements outlined in the BAM and has been informed by the following databases and documents.

- NSW Government Saving Our Species (SOS) profile[51] and project report[52].
- *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Gazetted 17 July 2020 (NSW Threatened Species Scientific Committee 2020a).
- *Notice of and reason for the Final Determination (*NSW Threatened Species Scientific Committee 2020b[53]*).*
- *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020c[54]).
- NSW Government Office of Environment & Heritage White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland profile[55].
- *ACT native woodland conservation strategy and action plans* (ACT Government 2019a).
- *Approved Conservation Advice for the White Box – Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (DCCEEW 2023a).

[50] NSW Government (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. State of New South Wales and Department of Climate Change, Energy, the Environment, and Water. https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development

[51] https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10837

[52] https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=988&ReportProfileID=10837

[53] NSW Threatened Species Scientific Committee (2020b), *Notice of and reason for the Final Determination.*

[54] NSW Threatened Species Scientific Committee (2020c). *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*

[55] https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837

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- *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands* (Commonwealth of Australia 2006).
- *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (DECCW 2010[56]).

3.4.1.1 Box-Gum Woodland – SAII additional information

1. the action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII

The proposed development enacts the principles detailed in Section 3.1 to avoid and minimise impacts to BC Act Box-Gum Woodland. Potential indirect impacts to BC Act Box-Gum Woodland would be minimised and mitigated by the measures outlined in Section 3.2 and Section 3.3.

2. The current status of the TEC including:

a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW and estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal).

b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC regulation) indicated by:

i. change in community structure

ii. change in species composition

iii. disruption of ecological processes

iv. invasion and establishment of exotic species

v. degradation of habitat, and

vi. fragmentation of habitat

c. evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the

i. Extent of occurrence

ii. Area of occupancy, and

iii. Number of threat-defined locations

d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed under the NSW BC Act as a Critically Endangered ecological community. It is considered to

[56] DCCEEW (2010). *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* Department of Environment, Climate Change and Water NSW, Sydney

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be an SAII entity based on Principles 1 and 2[57]. As stated in the Final Determination (NSW Threatened Species Scientific Committee 2020a):

> *"White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland has undergone a very large reduction in geographic distribution. The Community has been extensively cleared throughout its range and remnants typically are small, isolated, highly fragmented, occur in predominantly cleared landscapes and exhibit highly modified understoreys (TSSC 2006). Based on a compilation of available maps depicting the current extent of the community, TSSC (2006) estimated that less than 5% of the original distribution remained, however the extent to which remaining examples continue to support characteristic biota, their interactions and function is unknown…*
>
> *…White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is subject to a number of threatening processes that have caused severe declines in biotic processes and interactions throughout its range and are likely to cause continuing decline in the future."*

***3.* Is the TEC 'Unknown' or 'Data deficient' for Principles 1 to 4?**

The TEC is not data deficient.

4. in relation to the impacts from the proposal on the TEC at risk of an SAII:

a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:

i. in hectares, and

ii. as a percentage of the current geographic extent of the TEC in NSW

The current geographic extent of the TEC in NSW varies widely between estimates. The following information was taken from Table 2a of the *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grass Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020c).

- Former (pre-1750) extent in NSW = 3,717,366 ha.
- Current extent in NSW = 250,729 ha (93% cleared).

The proposed development would directly impact 22.44 ha of BC Act Box-Gum Woodland, all of which meets the criteria for this TEC in high condition (i.e. PCT3376 Zone 1 [VI= 59.3], PCT3376 Zone 2 [VI = 14.4]). This impact represents 0.009% of the total extent in NSW.

The proposed development is also assumed to have an indirect impact on 5.39 ha of BC Act Box-Gum Woodland.

[57] https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development

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b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:

i. Estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500m of the development footprint or equivalent area for other types of proposals

In total, the subject land was assessed as supporting 218.11 ha of BC Act Box-Gum Woodland (i.e. PCT3376 Zones 1 and 2). When combined with the vegetation that occurs within 500 m of the subject land[58], the immediate locality supports an estimated 562.53 ha of BC Act Box-Gum Woodland.

The proposed development would have a direct impact on 22.44 ha of BC Act Box-Gum Woodland, which represents 10% the BC Act Box-Gum Woodland that occurs within the subject land and 4% of the of the BC Act Box-Gum Woodland that occurs in the immediate locality (i.e. including BC Act Box-Gum Woodland that occurs within 500 m of the subject land, Figure 16). The proposed development would also have an indirect impact on 5.39 ha of BC Act Box-Gum Woodland.

Following completion of the proposed development, the remaining areas of BC Act Box-Gum Woodland would not be functionally isolated and are considered to be of a sufficient size to ensure the existing level of ecosystem function is not compromised (refer to Figure 16).

ii. Describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:

- **Distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and**

The average minimum distance between all patches of the TEC within 500 m of the subject land (including vegetation within the subject land, refer to Figure 16):

- if the remnant is retained = 39.13 m; and
- if the remnant is removed as proposed = 39.13 m.

The proposed development would therefore result in no increase of the minimum distance between all patches of BC Act Box-Gum Woodland within 500 m of the subject land (Figure 16).

- **Estimated maximum dispersal distance for native flora species characteristic of the TEC, and**

As noted previously, following completion of the proposed development the remaining areas of BC Act Box-Gum Woodland would not be functionally isolated and are considered to be of a sufficient size to ensure the existing level of ecosystem function is not compromised (refer to Figure 16). As a result, the proposed development is considered unlikely to impact the dispersal of any flora species characteristic of the TEC.

[58] Capital Ecology has conducted vegetation surveys across many of the surrounding properties.

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- **Other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development**

The average area to perimeter ratio for all patches of the TEC within 500 m of the subject land (including vegetation within the subject land, refer to Figure 16):

- if the remnant is retained = 57.3; and
- if the remnant is removed as proposed = 54.4.

The proposed development would therefore result in an average decrease of 2.9 (5.1%) for the average area to perimeter ratio for all patches of the TEC within 500 m of the subject land.

iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zones(s). Include the relevant composition, structure and function condition scores for each vegetation zone.

The proposed development would have the following impacts on BC Act listed Box-Gum Woodland.

- PCT3376 Zone 1: 12.29 ha direct impact, 4.73 ha indirect impact. Vegetation Integrity Score of 59.3 (composition 74.0, structure 85.7 and function 32.8). As described in Table 16, this zone is characterised as *"The areas in the west show very little evidence of historic disturbance from agricultural activities, while the areas in the east and north have been thinned and support a higher cover of exotic grasses and broadleaf weeds. Zone 1 contains a canopy representative of the climax community and a diverse midstorey and shrubstorey. The groundstorey is dominated by a moderate to high diversity of native species. There is a low cover of significant weed species, and the vegetation is grazed primarily by stock and Eastern Grey Kangaroos".*
- PCT3376 Zone 2: 10.15 ha direct impact, 0.66 ha indirect impact. Vegetation Integrity Score of 14.4 (composition 62.0, structure 48.0, and function 0.1). As described in Table 17, this zone is characterised as *"The canopy and midstorey have been cleared across Zone 2, presumably to open up the area and improve conditions for stock grazing. Despite these historic impacts, the groundstorey is still dominated by a moderate to high diversity of native species. There is a low cover of significant weed species, and the vegetation is grazed primarily by stock and Eastern Grey Kangaroos"*.

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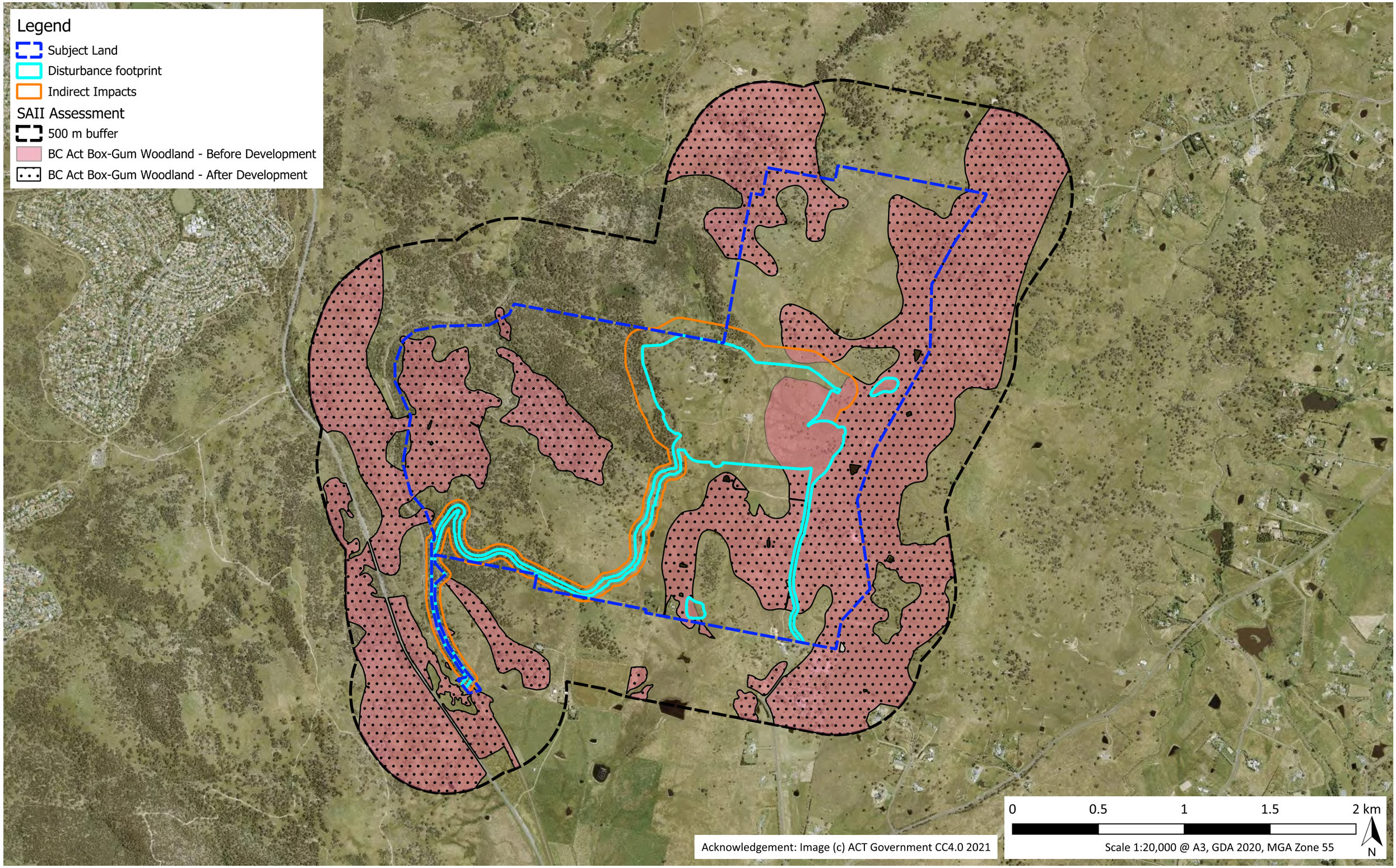


Figure 16. The Extent and Condition of Box-Gum Woodland in the Locality

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Drawn by: S. Reid
Date: 6 June 2025

3.4.2 Pale Pomaderris

The following information is presented according to the requirements outlined in the BAM and has been informed by the following databases and documents.

- NSW Government species profile and information in the TBDC.
- *ACT Nature Conservation (Pale Pomaderris) Conservation Advice 2019*[59]
- Commonwealth Approved Conservation advice[60] and SPRAT profile[61].

3.4.2.1 Pale Pomaderris – SAII additional information

1. the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII

The proposed development enacts the principles detailed in Section 3.1 to avoid and minimise impacts to Pale Pomaderris. Potential indirect impacts to Pale Pomaderris would be minimised and mitigated by the measures outlined in Section 3.2 and Section 3.3.

2. The current population of the species including:

a. evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:

i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or

ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites

b. evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:

i. an estimate of the species' current population size in NSW, and

ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and

iii. where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations.

[59] ACT Government (2019b). *ACT Nature Conservation (Pale Pomaderris) Conservation Advice 2019*. Notifiable instrument NI2019-237.
[60] Commonwealth of Australia (2008). *Approved conservation advice for Pomaderris Pallida*. Approved by the Minister / Delegate of the Minister on: 1/10/2008.
[61] https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=13684#:~:text=The%20Pale%20Pomaderris%20is%20currently,%3B%20NSW%20NPWS%202000%2C%20pers.

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c. evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:

- ***i. extent of occurrence***
- ***ii. area of occupancy***
- ***iii. number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and***
- ***iv. whether the species' population is likely to undergo extreme fluctuations.***

d. evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:

- ***i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site***
- ***ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or***
- ***iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).***

Pale Pomaderris is listed under the NSW BC Act as a Vulnerable species. It is considered to be an SAII entity based on Principle 4[62], being "*The impacted species is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable*".

Pale Pomaderris is generally found on river slopes and hillsides, and known habitat is characterised by dry open forests and shrub communities. As stated in the TBDC:

> *Pale Pomaderris has been recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It is also found along the Murrumbidgee River in the ACT and has been recently recorded in eastern Victoria.*

In terms of conserved areas, the ACT Nature Conservation (Pale Pomaderris) Conservation Advice 2019 states:

> *This species is conserved in Namadgi National Park (NP), Bullen Range Nature Reserve and Stony Creek Nature Reserve, each with fewer than 1000 individuals (Briggs & Leigh, 1995). It is also protected in Melrose Nature Reserve, Tuggeranong Nature Reserve, Rob Roy Nature Reserve and McQuoids Hill Nature Reserve.*
>
> *In NSW, five key sites for priority management have been identified, including Queanbeyan River (near Queanbeyan with 250 plants), Tinderry Nature Reserve (730 plants), Murrumbidgee River (500 plants), Dangelong Nature Reserve (300 plants) and Byadbo*

[62] https://www2.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/clear-and-develop-land/serious-irreversible-impacts#list-of-threatened-entities

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Wilderness (in Kosciuszko National Park with 3000 plants) (OEH 2018). Other populations are known from the Molonglo River, Kydra Trig and Shoalhaven River (DoE 2008).

In an attempt to gain a greater understanding of the current status of the species in NSW and the ACT, records from BioNet and NatureMapr have been combined and obvious duplicates removed. This information is presented in Figure 17. In summary:

- the species has been recorded from 213 locations;
- the Extent of Occurrence (EOO) is 1,446,918 ha;
- the Area of Occupation (AOO), which has been calculated by applying a 30 m buffer to each record, is 47.58 ha[63]; and
- population size is estimated to be between 7,558 and 35,542 plants, with the large variation due population size range estimates in the data (e.g. population size recorded as being "between 16 and 100 plants").

3. Is the species 'Unknown' or 'Data deficient' for Principles 1 to 4?

The species is not listed as data deficient in the TBDC.

4. in relation to the impacts from the proposal on the species at risk of an SAII

a. the impact on the species' population (Principles 1 and 2) presented by:

i. an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and

ii. an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or

iii. if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal

The BAM defines local as '*the population that occurs in the subject land'.* The subject land therefore supports a local population with the following characteristics.

- Recorded in six locations.
- A total of 164 – 264 plants, which the largest subpopulation supporting 150 – 250 plants. The remaining subpopulations support 1 – 10 plants.
- A total of 2.52 ha of habitat.

[63] The 47.58 ha AOO is likely a substantial underestimation of occupied habitat. For example, a nearby population of Pale Pomaderris in Gigerline Nature Reserve occupies an estimated 16 ha and supports over 500 plans (Sam Reid, pers. obs.). As this area is represented by a single point in NatureMapr, the employed methodology only records the occupied habitat as 0.28 ha. Similar situations are likely to exist for much of the data as recorded in BioNet and NatureMapr.

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The proposed development would impact two of the locations, each of which supports a single plant. In total, the proposed development would therefore impact 0.56 ha of habitat. This impact represents:

- 0.8% to 1.2% of the plants that occur in the subject land.
- 22.2% of the habitat that occurs in the subject land.
- 0.006 to 0.026% of the plants that occur in the EOO.
- 1.2% of the AOO.

b. impact on geographic range (Principles 1 and 3) presented by:

i. the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW.

ii. the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted.

iii. to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species.

iv. to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.

As discussed above, the proposed development would impact two of the six locations where the species occurs, each of which supports a single plant. In total, the proposed development would therefore impact 0.56 ha of habitat. This impact represents:

- 0.8% to 1.2% of the plants that occur in the subject land.
- 22.2% of the habitat that occurs in the subject land.
- 0% of the EOO (the EOO would not reduce as a result of the impact).
- 0.006 to 0.026% of the plants that occur in the EOO.
- 1.2% of the AOO.

Pale Pomaderris habitat is characterised by dry open forests and shrub communities. Based on this, the proposed development is considered unlikely to fragment the remaining populations as

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sufficient habitat would remain post-development to ensure that they remain connected and viable.

As stated in the references listed at the start of Section 3.4.2, the main threats to Pale Pomaderris are:

- rural residential development;
- competition from weeds (particularly Blackberry);
- grazing / trampling by deer, horses, goats, cattle, sheep, and rabbits;
- inappropriate fire regimes;
- fragmentation;
- loss of remnant habitat; and
- sediment runoff from the fire trail.

While the proposed development would impact two plants / 0.56 ha of habitat, the minimisation and mitigation measures detailed in Section 3.2 and Section 3.3 are considered sufficient to control the risk presented by the above identified threats.

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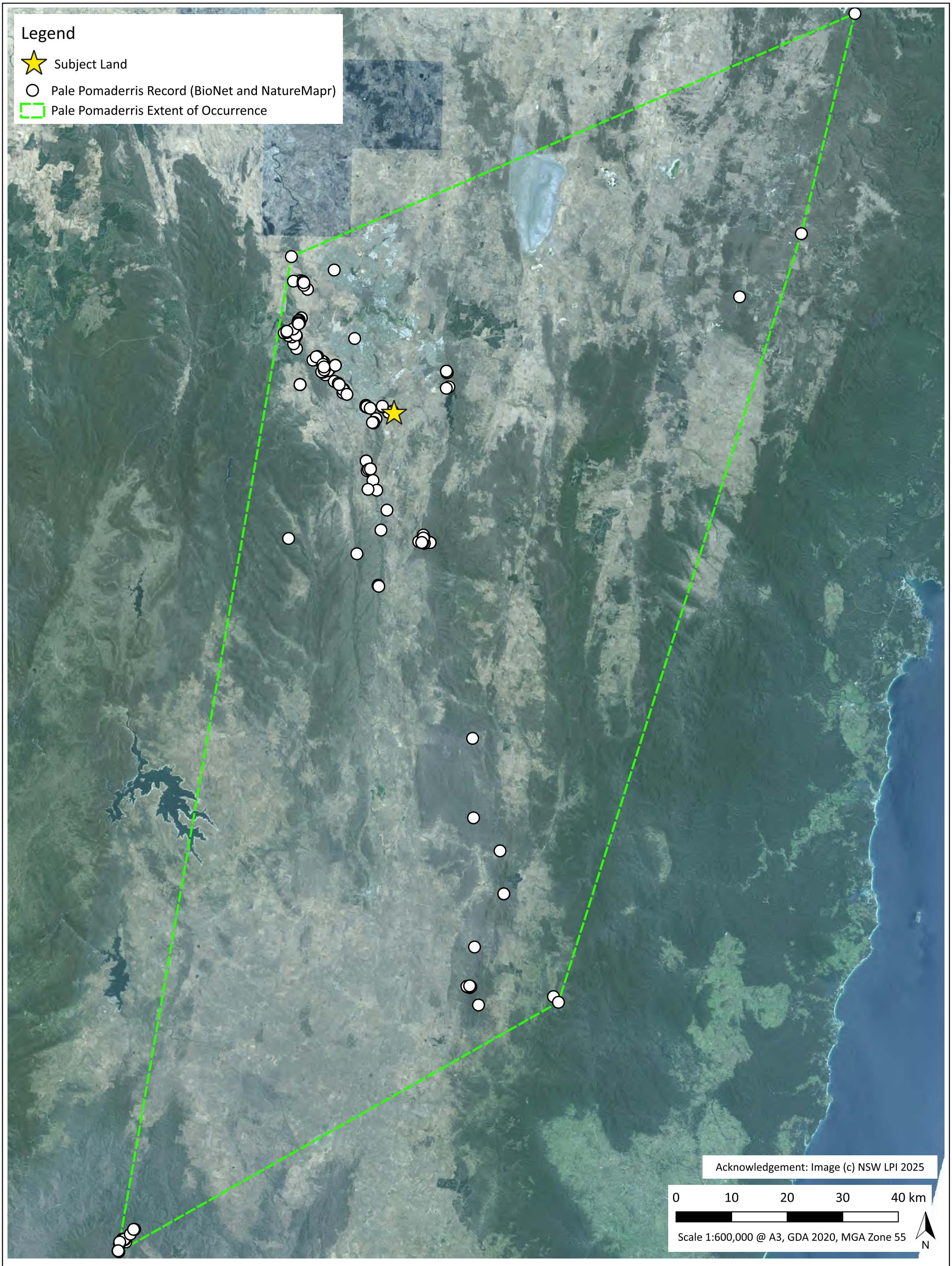


Figure 17. Pale Pomaderris – Recorded Locations and Extent of Occurrence

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Drawn by: S. Reid
Date: 6 June 2025

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3.5 Legislative Requirements

3.5.1 Commonwealth EPBC Act – Referral

The proposed development would result in the following impacts to EPBC Act listed MNES in the NSW portion of the subject land[64].

- Clearance of 22.44 ha of EPBC Act Box-Gum Woodland (EPBC Act critically endangered) and indirect impact of 5.39 ha of EPBC Act Box-Gum Woodland.
- Clearance of 2.35 ha of Key's Matchstick Grasshopper habitat (EPBC Act Endangered).
- Clearance of 0.56 ha of Pale Pomaderris habitat (EPBC Act Vulnerable).
- Clearance of 0.13 ha of Small Purple-pea habitat (EPBC Act Endangered).
- Clearance of 48.08 ha of Gang-gang Cockatoo foraging habitat (EPBC Act Endangered).

As discussed in Appendix H, the proposed development is considered: 1) likely to result in a significant impact to EPBC Act Box-Gum Woodland, Gang-gang Cockatoo, Key's Matchstick Grasshopper, and Small Purple-pea; and 2) unlikely to result in a significant impact to Pale Pomaderris. In light of the above, it is anticipated that the proposed development would be a controlled activity and would require assessment and approval under the EPBC Act.

Note: with regard to Pink-tailed Legless Lizard, the extent of habitat as determined by the Commonwealth Survey Guidelines is defined by the extent of occupied habitat (as opposed to characteristically suitable habitat). As the proposed development will not impact any occupied Pink-tailed Legless Lizard habitat, the proposed development is not considered to impact the species pursuant to the EPBC Act.

3.5.2 NSW BC Act – Biodiversity Offset Requirements

The BAM Calculator is the tool for quantifying the offset requirements for a project, the output being expressed as ecosystem credits and species credits. The results of the BAM credit calculations completed for the proposed development are provided below and detailed in Appendix I.

3.5.2.1 Biodiversity risk weighting

The biodiversity risk weighting is a tool used in the BOS to mitigate risks in offsetting the loss of vegetation, threatened entities, and/or their habitat. The biodiversity risk weighting does this by applying a multiplier to credit generation calculation based on two components:

- sensitivity to loss – based on threat status under legislation or evidence-based information that suggests the entity is at an increased risk of loss; and
- sensitivity to potential gain – based on life history characteristics and ecological information for a species.

The subject land contains vegetation with a vegetation integrity score that requires offsetting of residual impacts through ecosystem credits. The subject land also contains threatened species

[64] Additional impacts to MNES will occur in the ACT portion of the subject land. Those impacts will be included in the EPBC Act referral.

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habitat that requires offsetting for impacts on species credits. The biodiversity risk weighting for the identified ecosystem credits and species credits are shown below.

- PCT3375 – Biodiversity risk rating of 1.75.
- PCT3376 – Biodiversity risk rating of 2.5.
- Pink-tailed Legless Lizard – Biodiversity risk rating of 2.
- Key's Matchstick Grasshopper – Biodiversity risk rating of 2.
- Pale Pomaderris – Biodiversity risk rating of 3.
- Small Purple-pea – Biodiversity risk rating of 2.
- Silky Swainson-pea – Biodiversity risk rating of 2.

3.5.2.2 Ecosystem credit requirements

The results of the BAM ecosystem credit calculations completed for the proposed development are provided in Table 31. As shown in Table 31, a number of the assessed vegetation zones in the subject land have a vegetation integrity score sufficient for their clearance to result in generation of ecosystem credits, these being vegetation zones that have a vegetation integrity score of:

a. ≥15, where the PCT is representative of an EEC or a CEEC

b. ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community

c. ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

Accordingly, the proposed development generates an ecosystem credit obligation.

Table 31. Ecosystem credit requirements

PCT & Vegetation Zone	Impact Type	Area	VI Loss	Credits Required
PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest				
Zone 1	Direct impact	29.57 ha	81.3	1052
Zone 2		15.92 ha	21.0	146
Zone 3		5.49 ha	52.4	126
Zone 4		2.88 ha	10.9	0
Zone 5		0.73 ha	20.4	7
Zone 6		0.80 ha	6.7	0
Zone 1	Indirect impact (20%)	9.24 ha	8.0	32
Zone 2		4.18 ha	4.5	8
Zone 3		0.35 ha	9.7	1
Zone 4		0.03 ha	0.8	0
Zone 6		0.14 ha	1.0	0

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PCT & Vegetation Zone	Impact Type	Area	VI Loss	Credits Required
Zone 1	Indirect impact (10%)	19.54 ha	2.9	25
Zone 2		3.49 ha	2.1	3
Zone 3		0.13 ha	3.5	1
Zone 4		0.47 ha	0.4	0
Zone 6		0.23 ha	0.5	0
			TOTAL	**1401**
PCT3376 Southern Tableland Grassy Box Woodland				
Zone 1	Direct impact	12.29 ha	59.3	455
Zone 2		10.15 ha	14.4	0
Zone 1	Indirect impact (20%)	1.70 ha	6.1	6
Zone 2		0.14 ha	0.7	0
Zone 1	Indirect impact (10%)	3.03 ha	2.2	4
Zone 2		0.52 ha	0.2	0
			TOTAL	**465**

Table 32 provides the credit class, Offset Trading Group (OTG), and Hollow-bearing Tree (HBT) status for each of the credit types generated by the proposed development.

Table 32. Ecosystem credit summary, OTG, and HBT status

PCT/Species	Class	OTG	HBT	Credits
3375	Southern Tableland Grassy Woodlands	Southern Tableland Grassy Woodlands ≥ 50% and < 70% cleared	Yes	1237
			No	164
3376	Southern Tableland Grassy Woodlands	White Box - Yellow Box - Blakely's Red Gum…TEC	Yes	465
			No	0

3.5.2.3 Species credit requirements

The proposed development impacts habitat of several species credit species. Accordingly, as detailed in Table 33, the proposed development generates a species credit obligation.

Table 33. Species credit requirements.

Species	PCT & Vegetation Zone	Area	Credits Required
Aprasia parapulchella Pink-tailed Legless Lizard	PCT3375 Zone 1	17.50 ha	711
	PCT3375 Zone 2	5.61 ha	59
	PCT3375 Zone 3	3.39 ha	89
	PCT3375 Zone 4	2.29 ha	13
	PCT3376 Zone 1	7.80 ha	231
	PCT3376 Zone 2	3.36 ha	24
		TOTAL	**1127**

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Species	PCT & Vegetation Zone	Area	Credits Required
Keyacris scurra Key's Matchstick Grasshopper	PCT3375 Zone 1	2.06 ha	84
	PCT3376 Zone 1	0.29 ha	9
		TOTAL	**93**
Pomaderris pallida Pale Pomaderris	PCT3375 Zone 1	0.56 ha	34
		TOTAL	**34**
Swainsona recta Small Purple-pea	PCT3375 Zone 1	0.06 ha	2
	PCT3376 Zone 1	0.07 ha	2
		TOTAL	**4**
Swainsona sericea Silky Swainson-pea	PCT3375 Zone 1	1.60 ha	65
	PCT3375 Zone 2	0.42 ha	4
	PCT3376 Zone 1	0.10 ha	3
	PCT3376 Zone 2	0.54 ha	4
		TOTAL	**76**

3.5.2.4 Staged retirement of credits

The credit obligation would be met in two stages, as summarised in Table 34. Surface disturbance activities in each stage would not commence until the credit obligation relative to that stage have been satisfied.

Table 34. Staged retirement of credits

Credit type	Description	Impact type	Area	Credits
Stage 1 - Site Establishment and Stage 1 Extraction				
Ecosystem	PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest	Direct	27.85 ha	674
		Indirect	37.80 ha	70
	PCT3376 Southern Tableland Grassy Box Woodland	Direct	10.84 ha	208
		Indirect	5.39 ha	10
Species	Pink-tailed Legless Lizard (*Aprasia parapulchella*)	Direct	16.38 ha	456
	Key's Matchstick Grasshopper (*Keyacris scurra*)		2.35 ha	93
	Pale Pomaderris (*Pomaderris pallida*)		0.28 ha	17
	Small Purple-pea (*Swainsona recta*)		0.13 ha	4
	Silky Swainson-pea (*Swainsona sericea*)		2.32 ha	63
Stage 2 - Extraction Area Development				
Ecosystem	PCT3375 Monaro-Queanbeyan Rolling Hills Grassy Forest	Direct	27.54 ha	657
	PCT3376 Southern Tableland Grassy Box Woodland		11.60 ha	247
Species	Pink-tailed Legless Lizard (*Aprasia parapulchella*)		23.57 ha	671
	Pale Pomaderris (*Pomaderris pallida*)		0.28 ha	17
	Silky Swainson-pea (*Swainsona sericea*)		0.34 ha	13

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3.5.2.5 Credit obligation options

As detailed by the NSW DCCEEW[65], the proponent can address the offset obligation in the following ways.

1. Retiring biodiversity credits that they have generated at a Biodiversity Stewardship Site or purchased on the market.
2. Paying into the Biodiversity Conservation Fund and transferring the obligation to the Biodiversity Conservation Trust.
3. Funding a biodiversity conservation action according to the requirements set out in the Ancillary rules[66].

To meet the offset obligation, Monaro Rock is investigating the following three options. All offset obligations would be met via the 'like-for-like' offset rules.

1. Retiring biodiversity credits generated at a Biodiversity Stewardship Site to be established in the subject land. The land in the west of the subject land, between the development footprint and the Goulburn Bombala Railway Line, is being considered for a Biodiversity Stewardship Site. Initial investigations indicate that a such a Biodiversity Stewardship Site would generate enough credits to meet approximately 50% of the total offset obligation.
2. Retiring biodiversity credits that have been purchased on the market. A number of Biodiversity Stewardship Sites have been established in the Monaro / Murrumbateman IBRA Subregions[67]. This includes Beatty Hill, which directly borders the eastern boundary of the subject land, and an additional four Biodiversity Stewardship Sites in Williamsdale / Burra. These established Biodiversity Stewardship Sites, which have entered into active management, generate the same ecosystem credits and species credits as the proposed development. As such, purchasing credits from these Biodiversity Stewardship Sites could meet almost 100%[68] of the proposed development's offset obligation, and do so through conservation of land that is located close to the impacted area.
3. Paying into the Biodiversity Conservation Fund. The amount which must be paid into the Biodiversity Conservation Fund is determined at the time the proponent applies for an invoice from the Biodiversity Conservation Trust. A risk premium is included in that calculation to account for fact that the risks and costs involved in securing the offset have effectively been transferred to the Biodiversity Conservation Trust.

The final offset strategy would be determined prior to the clearing of any vegetation for the proposed development, and many include only one or a mix of the above options.

[65] https://www2.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/clear-and-develop-land/credit-obligations
[66] https://www2.environment.nsw.gov.au/node/1176
[67] Beatty Hill, Williamsdale North, Williamsdale South, Burra North, Burra South, Panorama Biobanking Agreement, Swans Biobanking Agreement, The Poplars North Biobanking Agreement, and The Poplars South Biobanking Agreement.
[68] The only credit type which is not available in sufficient numbers from these biodiversity stewardship sites is Small Purple-pea. However, as detailed in the Biodiversity Credits Catalogue, a small number of Small Purple-pea credits are available for purchase.

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Appendices

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Appendix A. BAM Plot/Transect Scores

PCT code	Veg. Zone	Plot No.	Composition (species richness)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
3375	Zone 1	3375.01.01	1	3	6	14	1	1
		3375.01.02	3	10	9	12	0	2
		3375.01.03	3	11	7	11	1	2
		3375.01.04	4	8	9	8	1	2
		3375.01.05	3	11	14	11	1	2
		3375.01.06	1	5	6	13	2	1
		3375.01.07	1	2	8	16	0	1
		3375.01.08	4	8	9	18	1	3
		3375.01.09	2	7	9	24	1	2
	Zone 2	3375.02.01	0	0	9	5	0	0
		3375.02.02	0	0	11	7	0	0
		3375.02.03	0	2	9	5	1	2
		3375.02.04	0	0	9	8	0	2
		3375.02.05	0	0	13	11	0	1
		3375.02.06	0	0	7	11	0	0
		3375.02.07	0	2	9	18	1	2
		3375.02.08	0	0	9	16	0	1
	Zone 3	3375.03.01	2	0	4	8	0	1
		3375.03.02	2	0	6	4	0	1
		3375.03.03	1	0	8	2	0	0
	Zone 4	3375.04.01	0	0	6	3	0	0
		3375.04.02	0	0	8	5	0	1
		3375.04.03	0	0	7	3	0	1
	Zone 5	3375.05.01	1	0	2	3	0	0
	Zone 6	3375.06.01	0	0	3	1	0	0

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PCT code	Veg. Zone	Plot No.	Composition (species richness)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
3376	Zone 1	3376.01.01	2	0	14	8	0	0
		3376.01.02	1	0	12	6	0	0
		3376.01.03	1	6	12	8	1	1
		3376.01.04	1	0	13	10	0	0
		3376.01.05	2	0	15	14	0	2
		3376.01.06	1	2	10	21	0	1
		3376.01.07	2	4	14	25	2	5
		3376.01.08	2	0	6	18	1	1
	Zone 2	3376.02.01	0	0	7	7	0	0
		3376.02.02	0	0	11	10	0	0
		3376.02.03	0	0	14	6	0	0
		3376.02.04	0	0	12	9	0	0
		3376.02.05	0	0	6	11	0	0
		3376.02.06	0	0	5	17	1	0
		3376.02.07	0	2	12	26	1	2

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PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
3375	Zone 1	3375.01.01	6	5.2	54.4	7.3	0.2	0.1
		3375.01.02	20.1	17.2	57.4	3.7	0	0.2
		3375.01.03	25.1	10.6	66.7	2	0.1	0.2
		3375.01.04	22.1	7.5	53.3	2.8	0.1	0.2
		3375.01.05	8.2	18.3	40	3.4	0.1	0.4
		3375.01.06	30	2	48.3	1.9	0.3	0.1
		3375.01.07	30	0.4	41.8	2.4	0	0.1
		3375.01.08	28.1	18.7	5.9	2.3	0.1	0.4
		3375.01.09	30	31.5	16.5	15.1	0.1	0.2
	Zone 2	3375.02.01	0	0	87.3	0.6	0	0
		3375.02.02	0	0	73.2	1.1	0	0
		3375.02.03	0	0.3	66	0.5	0.2	0.3
		3375.02.04	0	0	75.3	0.8	0	0.2
		3375.02.05	0	0	76.7	2	0	0.1
		3375.02.06	0	0	82.5	1.2	0	0
		3375.02.07	0	0.2	44.9	2.7	0.1	0.2
		3375.02.08	0	0	47.9	1.8	0	0.1
	Zone 3	3375.03.01	30	0	58	1.1	0	0.1
		3375.03.02	50	0	34.1	0.5	0	0.5
		3375.03.03	5	0	24.2	0.2	0	0
	Zone 4	3375.04.01	0	0	65.8	0.5	0	0
		3375.04.02	0	0	76.8	0.6	0	0.1
		3375.04.03	0	0	27.7	0.3	0	0.1
	Zone 5	3375.05.01	5	0	13	0.4	0	0
	Zone 6	3375.06.01	0	0	61.1	0.1	0	0

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PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
3376	Zone 1	3376.01.01	20.1	0	79.4	1.3	0	0
		3376.01.02	25	0	78.3	0.7	0	0
		3376.01.03	0.2	0.7	55.1	25.7	0.1	0.1
		3376.01.04	20	0	68	4.8	0	0
		3376.01.05	9	0	89.3	2.9	0	0.2
		3376.01.06	5	3.1	21.5	6.7	0	0.1
		3376.01.07	22	0.6	33.7	5.1	0.2	1.5
		3376.01.08	30	0	23.1	8.1	0.1	0.1
	Zone 2	3376.02.01	0	0	60.3	2.6	0	0
		3376.02.02	0	0	66.5	1.1	0	0
		3376.02.03	0	0	72	1.5	0	0
		3376.02.04	0	0	77.7	1.1	0	0
		3376.02.05	0	0	90.4	2	0	0
		3376.02.06	0	0	66.3	2.6	0.1	0
		3376.02.07	0	0.2	73	3	0.1	0.2

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PCT code	Veg. Zone	Plot No.	Function									
			Stem classes					No. of large trees	Hollow bearing trees	% Litter cover	Coarse woody debris (m)	% High threat weed cover
			Regen.	5-9	10-19	20-29	30-49					
3375	Zone 1	3375.01.01	1	0	0	0	0	1	0	22.6	24	0.2
		3375.01.02	1	1	1	1	1	0	0	12.6	3	0.1
		3375.01.03	1	1	1	1	1	3	1	47.8	4	0.1
		3375.01.04	1	1	1	1	0	2	0	43	0	0.2
		3375.01.05	1	1	1	1	1	1	0	49.4	31	0
		3375.01.06	0	1	1	1	1	1	0	41	24	0
		3375.01.07	0	0	1	1	0	0	0	5	118	0.1
		3375.01.08	1	1	1	1	1	0	0	52	14	1.1
		3375.01.09	0	1	1	1	1	0	0	11	2	0.2
	Zone 2	3375.02.01	0	0	0	0	0	0	0	4.4	88	0
		3375.02.02	0	0	0	0	0	0	0	9.6	0	0
		3375.02.03	0	0	0	0	0	0	0	8.8	0	5.1
		3375.02.04	0	0	0	0	0	0	0	6	4	2.2
		3375.02.05	0	0	0	0	0	0	0	2.8	8	0.1
		3375.02.06	0	0	0	0	0	0	0	1	0	0
		3375.02.07	0	0	0	0	0	0	0	1.8	0	0.3
		3375.02.08	0	0	0	0	0	0	0	2.4	2	5.2
	Zone 3	3375.03.01	1	0	0	0	0	3	0	14	19	0.1
		3375.03.02	1	1	0	0	1	2	0	15	17	0.2
		3375.03.03	1	1	0	1	1	0	1	4.4	10	0
	Zone 4	3375.04.01	0	0	0	0	0	0	0	4.2	0	0.4
		3375.04.02	0	0	0	0	0	0	0	4.2	0	5
		3375.04.03	0	0	0	0	0	0	0	4.2	1	25.2
	Zone 5	3375.05.01	0	0	1	0	1	3	0	3.8	100	1.2
	Zone 6	3375.06.01	0	0	0	0	0	0	0	1.4	0	1

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PCT code	Veg. Zone	Plot No.	Function									
			Stem classes					No. of large trees	Hollow bearing trees	% Litter cover	Coarse woody debris (m)	% High threat weed cover
			Regen.	5-9	10-19	20-29	30-49					
3376	Zone 1	3376.01.01	1	0	0	0	1	2	0	16.8	5	0.2
		3376.01.02	1	0	0	0	0	1	1	5.8	7	0.1
		3376.01.03	1	1	1	1	1	0	0	18.4	6	9
		3376.01.04	1	0	0	0	0	1	0	13	0	0.2
		3376.01.05	1	0	0	0	1	0	0	6	11	0.1
		3376.01.06	1	0	0	1	1	1	0	3	7	0
		3376.01.07	1	1	1	1	1	0	0	9	4	0.6
		3376.01.08	1	1	1	1	0	2	0	4.8	26	1.1
	Zone 2	3376.02.01	0	0	0	0	0	0	0	9.8	0	0
		3376.02.02	0	0	0	0	0	0	0	2.8	6	0.2
		3376.02.03	0	0	0	0	0	0	0	5.4	0	3.3
		3376.02.04	0	0	0	0	0	0	0	2.4	0	0
		3376.02.05	0	0	0	0	0	0	0	1	0	0.1
		3376.02.06	0	0	0	0	0	0	0	1.6	0	0.2
		3376.02.07	0	0	0	0	0	0	0	1	0	0.1

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Appendix B. Flora Species Recorded by Plot and Percent Cover or Presence

Species Name	3375																								3376													Site List
	Zone 1									Zone 2									Zone 3			Zone 4			Zone 5	Zone 6	Zone 1								Zone 2							
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 1	Plot 2	Plot 3	Plot 1	Plot 2	Plot 3	Plot 1	Plot 1	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	
Exotic species																																							
Aira spp.				0.1		0.1	0.2	0.3	0.1			0.1		0	0.1	0.1	0.1				0.1								0.1	0.1	0.1	1	0.1	0.1		0.1	0.2	1	1	X
Arctotheca calendula																																							X
Avena spp.												1																											X
Briza maxima												0.2																					0.1						X
Briza minor									0.1	0.1					0.5														0.1		0.1					0.1	0.2	0.1	0.1	X
Bromus hordeaceus																					0.2																		X
Bromus spp.													0.2				0.1		0.1					5	1	0.1			0.2	0.1		0.2							X
Carduus pycnocephalus																																							X
Carthamus lanatus							0.1									0.1	5							1							0.5				0.2			0.1		X
Celtis australis																																							X
Centaurea calcitrapa																																							X
Centaurium spp.	0.1	0.1	0.1		0.1	0.1			0.1	0.1	0.1				0.1	0.1										0.1		0.1		0.1		0.1					0.2	0.1	0.1	X
Cerastium spp.																		0.1																						X
Chondrilla juncea												0.1	0.1	0.1		0.1		0.1					0.1		0.1									0.1						X
Cirsium vulgare											0.1		0.1		0.1			0.1						0.5	0.1	0.1	0.2		0.1			0.1					0.1			X
Conyza spp.	0.1			0.2		0.1			0.1			0.1									0.1					0.1			0.1			0.1	0.1		0.1	0.1				X
Crataegus monogyna																			0.2																				X
Cynodon dactylon																					0.1																		X
Cynosurus echinatus																					0.1																		X
Cyperus eragrostis																								0.2															X
Dactylis glomerata																		1																					X
Echium plantagineum							0.1					0.5						0.1			0.1	0.1	0.1					0.1											X
Eragrostis curvula													2								0.2	5	25		1			4							3				X
Erodium botrys																									0.1														X
Erodium brachycarpum																																							X
Erodium cicutarium													0.1									0.1																	X
Festuca arundinacea																					0.1																		X
Fumaria bastardii																																							X
Gamochaeta spp.																					0.1	0.1							0.1						0.1				X
Geranium molle																								0.1															X
Gnaphalium americanum									0.1																														X
Hirschfeldia incana																		0.1	0.1	0.1																			X
Holcus lanatus											0.2				0.1					1	0.5	0.2		1					0.2						0.2				X
Hordeum spp.																		0.1			0.2			15															X
Hypericum perforatum	0.1	0.1		0.1				1	0.1			5	0.1					0.1					0.2			0.1		3		0.1				0.1	0.1				X
Hypochaeris glabra							0.1						0.2	0.2									0.1								0.1	0.1	0.1		0.1				X
Hypochaeris radicata	0.2	0.1				0.1	0.2	0.2	0.1	0.2	0.5			0.2	0.3	0.1	0.1	0.5	0.5	1	1	0.5	5		3	0.1	0.2	0.1	1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.2	3	0.1	X
Juncus bufonius										0.1			0.1		0.5							0.1							0.1											X
Juncus capitatus															0.1									0.1															0.1	X
Lactuca serriola																																							X
Lavandula spp.																																							X
Ligustrum spp.																																							X
Linaria arvensis								0.1	0.1							0.1														0.1	0.1				0.1		0.1	0.1	X
Linaria pelisserana																															0.1								X
Lolium perenne																				1																			X
Lolium rigidum																													0.1										X

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Lysimachia arvensis						0.1		0.1													0.1	0.1				0.1						0.1		0.1				0.1		X
Marrubium vulgare																									0.1															X
Modiola caroliniana																		0.1						0.1																X
Myosotis discolor																																								X
Nassella trichotoma																0.1											0.1		0.2					0.1						X
Onopordum acanthium							0.1																																	X
Orobanche minor																														0.1										X
Papaver somniferum																																								X
Parentucellia latifolia																																								X
Paronychia brasiliana													0.2				0.1		0.1		0.1				0.1		0.1			0.1	0.1	0.5	0.1			0.1			0.1	X
Paspalum dilatatum																																								X
Petrorhagia nanteuilii	0.1	0.1		0.1	0.1	0.1			0.1			0.1	0.1	0.1		0.1	0.1											0.1		0.1	0.1	0.2					0.1			0.1	X
Phalaris aquatica																																								X
Pinus spp.																																								X
Plantago lanceolata																	0.1		1	2	1	1	1	1	1			0.1			0.1	0.1						0.1			X
Polygonum aviculare																					0.1																				X
Rosa rubiginosa				0.1				0.1				0.1	0.1	0.1			0.1				0.1					0.1		2				0.1	0.1							X
Rubus fruticosus	0.1		0.1																		0.1																			X
Rumex acetosella	0.1		0.1			0.1			0.1	1	1	1	1	0.5		0.1	0.1	3	1	3	5	3	1	5	2	0.2	0.5	0.2	1	0.1			1	0.2	0.1			0.1	0.1	0.1	X
Rumex crispus																																								X
Salvia verbenaca																											0.1													X
Silene gallica																																								X
Silybum marianum																																								X
Sisyrinchium micranthum																																						0.1		X
Sisyrinchium spp.																									0.1													0.1		X
Solanum nigrum																		0.1																						X
Spergularia rubra	0.1												0.1								0.1																			X
Taraxacum officinale																																								X
Tolpis barbata	0.2										0.1	0.1		0.1							0.1														0.1	0.1	0.1			X
Tolpis umbellata							0.1		0.2						0.1	1															0.2	2					0.1	1	0.1	X
Tragopogon dubius																																								X
Trifolium angustifolium																											0.1													X
Trifolium campestre																											0.1													X
Trifolium spp.	0.1				0.1	0.1	20	2	5		0.1	0.5	0.1	0.2	2	20	15					0.1				0.1			0.3	0.1	3	10	3	0.2	0.1	0.1	0.2	0.5	5	2	X
Verbascum thapsus	5			0.1	0.1			0.5					0.1			0.1											0.1			0.1		0.1								X
Verbascum virgatum												0.5							0.2																					X
Vulpia spp.							20		2	0.2	0.2			0.2	3	0.5	0.5			0.3	0.2	0.1	1	1	0.2		0.2		0.5	0.2	1	0.1	5	0.2	0.1	0.2	0.2	5	10	1	X
Native Species																																								
Acacia dealbata		0.1	0.1		0.1																																		X
Acacia decurrens																																								X
Acacia genistifolia																																								X
Acacia gunnii																																								X
Acacia implexa								0.1																																X
Acacia mearnsii																																								X
Acacia melanoxylon								0.1																																X
Acacia parramattensis																																								X
Acacia pravissima																																								X
Acacia rubida																																								X
Acacia ulicifolia																																								X

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Acaena novae-zelandiae				0.1																																		X
Acaena ovina	0.1	0.1	0.1						0.1				0.1			0.1	0.1											0.1	0.1	0.1	0.1	0.1	0.2		0.1		0.1			0.1	X
Acrotriche serrulata																																								X
Ajuga australis							0.1																																	X
Allocasuarina cunninghamiana																																								X
Allocasuarina verticillata																															2									X
Alternanthera nana																																0.1								X
Alternanthera spp.																						0.1				0.1														X
Amyema spp.																			0.5												1									X
Anthosachne scabra			0.1				5	0.2	0.5			1		0.1			1						1				3			0.2	0.2	3								X
Aristida ramosa		1			10									0.1								0.5												1						X
Arthropodium fimbriatum																																								X
Arthropodium milleflorum																																								X
Arthropodium minus																																								X
Asperula conferta										0.1						0.1	0.3									0.2	0.1		2	0.5	0.1	0.1		0.1		0.1	0.1	0.1	0.1	0.1	X
Asplenium flabellifolium			0.1			0.2																																		X
Astroloma humifusum																0.1																								X
Austrostipa bigeniculata							1				1						0.1											0.1							0.1					X
Austrostipa densiflora	45				0.1																																			X
Austrostipa scabra					0.1		5	2	3		5	2	0.1	0.1		2	30	1	1		0.1				1		1	0.5		0.5	0.1	1			5				0.2	1	X
Bossiaea buxifolia		0.2	0.1	0.1	0.2				0.1																															X
Bossiaea prostrata																																								X
Bothriochloa macra				5									1	15		15	1											30	0.2		0.3	5	2		10		1			0.5	X
Brachychiton populneus				0.1																																				X
Brachyloma daphnoides		10	0.2		9			2	0.1																			0.1												X
Brachyscome rigidula																																								X
Bulbine bulbosa																																								X
Bulbine glauca																																								X
Bursaria spinosa			0.2																																					X
Bursaria spinosa subsp. lasiophylla				3			0.3	15	30																			0.1			3	0.1									X
Caladenia atrovespa																																									X
Caladenia fuscata																																									X
Calotis lappulacea																																									X
Carex appressa		0.1																								0.2	1		0.2												X
Carex breviculmis																										0.2															X
Carex inversa									0.1	0.1	1		0.2		0.1					0.5		0.1	0.5				0.2		2	0.1	0.1					0.2					X
Cassinia aculeata																																								X
Cassinia longifolia	5	2	5		0.3	0.5		1																																X
Cassinia quinquefaria	0.1	0.2	1	3	0.1				0.1																																X
Cheilanthes distans																																								X
Cheilanthes sieberi	0.2			0.1	0.1	0.1		0.1	0.1			0.2				0.1												0.1				0.1	0.1					0.1	0.1	X
Chloris truncata																																								X
Chrysocephalum apiculatum		0.5			2		0.1	0.1	2					0.1		0.1												15			0.5	0.2			0.1				1	0.1	X
Chrysocephalum semipapposum		0.2		2																									0.2			0.1								X
Clematis microphylla																																								X
Convolvulus erubescens												0.2	0.1			0.1															0.1	0.1								X
Craspedia variabilis																																								X
Crassula helmsii						0.1																																		X
Crassula sieberiana								0.1							0.1	0.1	0.1														0.1	0.1								X

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Cryptandra amara				0.5																							0.1												0.1	X
Cymbonotus lawsonianus																0.1	0.1													0.1	0.1	0.1							0.1	X
Cymbopogon refractus					1																										0.1									X
Cynoglossum australe				0.1				0.1	0.1																							0.1									X
Daucus glochidiatus						0.1	0.5	0.1	0.1						0.1	0.1														0.1	0.1						0.1	0.1	0.1	X
Daviesia mimosoides																																									X
Desmodium varians	0.1	0.1	0.1		0.3			0.2	0.1				0.1	0.1		0.1	0.1	0.1				0.1									0.1	0.1	0.2							0.1	X
Dianella revoluta			0.1	0.2																																				X
Dichelachne crinita								0.1	0.5						0.1												1				0.5	1					1	0.1		0.5	X
Dichelachne micrantha		0.1			0.1					0.1																				0.2										X
Dichelachne spp.																																									X
Dichondra repens																																									X
Dillwynia phylicoides					0.1																																				X
Dillwynia sericea					0.1																																				X
Diuris dendrobioides																																									X
Diuris pardina																																									X
Diuris semilunulata																																									X
Diuris spp.						0.1																																			X
Diuris sulphurea																																									X
Dodonaea viscosa				0.1								0.1																			0.2									X
Dodonaea viscosa subsp. angustissima			2																																						X
Drosera peltata																																									X
Einadia nutans	0.1			0.1				0.1										0.3	0.2	0.1							0.1				0.1									X
Eleocharis acuta																																									X
Eleocharis pusilla																																									X
Enneapogon nigricans																																									X
Epilobium billardierianum																																									X
Eragrostis brownii					0.1					20	10		20						1	1	25	30				15	10		15	1				10		30	20				X
Erodium crinitum																	0.1																								X
Eryngium ovinum							0.1								0.1															3											X
Eucalyptus blakelyi																										0.1		0.2	20	1											X
Eucalyptus bridgesiana																			15													25									X
Eucalyptus dives		19					30																																		X
Eucalyptus goniocalyx	6		10	10	0.1	30												25	35	5				5																	X
Eucalyptus melliodora				7				1																		20	25			8	5	20	5								X
Eucalyptus nortonii								25	10																																X
Eucalyptus polyanthemos									20																																X
Eucalyptus rossii			15	5	8			2										5																							X
Eucalyptus rubida		1																																							X
Euchiton spp.	0.1	0.1	0.1			0.1	0.2	0.1	0.3	0.1	0.2			0.1	0.1	0.1	0.1		0.1				0.1			0.1	0.2			0.1	0.1	0.1	1	2	0.1	0.1	0.2	0.1	0.1	0.1	X
Euphorbia dallachyana	0.1				0.1								0.1	0.1																					0.1						X
Euphorbia drummondii									0.1							0.1	0.1														0.1									X
Exocarpos cupressiformis																																									X
Galium gaudichaudii		0.1	0.1	0.1	0.1			0.1	0.1							0.1															0.1									X
Galium spp.																																									X
Geranium solanderi						0.1	0.2	0.1	0.1			0.1	0.1		0.1			0.1											0.1	0.1		0.1	0.5					0.1			X
Glossodia major																																									X
Glycine clandestina		0.1	0.1		0.1	0.1	0.1	0.1	0.1			0.1											0.1					0.1		0.1		0.1							0.1	X
Glycine tabacina				0.1				0.1																							0.1									X

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Gompholobium huegelii																																							X
Gonocarpus tetragynus		2	1	0.1	0.5	0.3			0.2					0.1		0.1	0.1										0.1			1	0.5	0.1			0.2				0.1	0.1	X
Goodenia hederacea																															0.1									X
Goodenia pinnatifida																																								X
Hackelia suaveolens	0.1												0.1					0.1												0.1	0.1								0.1	X
Haloragis heterophylla	0.1									0.2	0.2			1							0.2	0.2				0.5			2	0.1	0.1		3	0.1		0.1	0.1	0.1	0.1		X
Hardenbergia violacea				0.1																																				X
Hibbertia obtusifolia		1	0.2	0.1	1	0.2		0.1	0.1			0.2																0.1				0.2								X
Hibbertia riparia																																								X
Hovea heterophylla		0.1	0.1		0.1																																		0.1	X
Hydrocotyle laxiflora			0.1			0.1	0.2	0.1	0.1			0.1	0.1	0.1			0.1		0.1					0.1			0.1		0.1	0.1	0.1	0.2	2					0.1	0.1	X
Hymenochilus muticus																																								X
Hypericum gramineum		0.1	0.1		0.1	0.1	0.1		0.1	0.1				0.1	0.1							0.1				0.1			0.1			0.1		0.1				0.1		X
Hypoxis hygrometrica																																								X
Indigofera adesmiifolia																																								X
Indigofera australis																																								X
Isoetopsis graminifolia																																								X
Isolepis spp.																														0.1		0.1								X
Isotoma fluviatilis																																								X
Juncus australis										1	3									0.5	0.1				0.1	5	5		2						0.1	2				X
Juncus filicaulis																				1			0.1			0.2				0.3		0.1		0.2			1				X
Juncus spp.																																									X
Juncus usitatus										0.1				1							0.2	6							1							1					X
Kunzea ericoides																																								X
Kunzea parvifolia																																								X
Lachnagrostis filiformis										1												0.1				0.2			3							0.2					X
Lachnagrostis spp.																																					0.1				X
Lepidosperma laterale			0.1		0.1			0.1																																	X
Leptorhynchos elongatus									0.1																																	X
Leptorhynchos squamatus							0.1								0.2	0.1											0.1			0.2	1							0.1	0.1	0.3	X
Leptospermum myrtifolium																																									X
Leptospermum spp.																																									X
Leucopogon attenuatus		1	0.2		7																																			X
Leucopogon fletcheri																																								X
Leucopogon spp.																																								X
Leucopogon virgatus																																								X
Linum marginale																																								X
Lomandra bracteata																																								X
Lomandra filiformis subsp. coriacea		0.1				2		0.2	0.1		0.2	2		0.2	0.1	0.1	0.1		0.1	0.2			0.1			0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1		0.1	X
Lomandra filiformis subsp. filiformis			1	10	0.3			0.1														0.1					0.1		0.2										0.1	X
Lomandra longifolia				0.1	1	0.2	0.1																								0.1									X
Lomandra multiflora	0.2	0.1	0.2	0.2	0.2	0.1								0.2		0.1											0.1				0.1									X
Luzula densiflora																																								X
Luzula spp.			0.1																																					X
Lythrum hyssopifolia																										0.1					2										X
Malva spp.																		0.1																							X
Melichrus urceolatus		2	0.5		0.2	0.1		0.2	1							0.1											0.1				0.1								0.1	X
Mentha diemenica																																								X

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Species Name	3375																										3376													Site List
	Zone 1									Zone 2								Zone 3			Zone 4			Zone 5	Zone 6	Zone 1								Zone 2							
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 1	Plot 2	Plot 3	Plot 1	Plot 2	Plot 3	Plot 1	Plot 1	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	
Microlaena stipoides	0.2			10		1	0.2			45	5	5	10					50	25	15	40	30	20	10	60	20	25	5	40				5		1	2					X
Microseris lanceolata																																								X
Microtis unifolia							0.1																							0.1	0.1						0.1	0.1	X
Monotoca scoparia																												0.2												X
Opercularia spp.					0.1																								0.1											X
Ottelia ovalifolia subsp. ovalifolia																																								X
Oxalis perennans	0.1	0.1			0.1			0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1				0.1	0.1	0.1		0.1	0.1	0.1	0.1		0.1	0.1	X
Panicum effusum	5			1	1			0.2				1	3	1		0.1	0.5	2						3				1		0.2			3		0.2					X
Persoonia rigida					0.2																																			X
Persoonia spp.																																								X
Pimelea curviflora		0.2					0.1		0.1																					0.1											X
Pimelea glauca																																								X
Pimelea linifolia				0.5		1																																		X
Pimelea treyvaudii			1																																					X
Plantago gaudichaudii							0.2	0.1																						0.1										0.1	X
Plantago varia					0.1			0.1	0.5									0.1										0.2	0.1	0.1	0.1	0.5								0.1	X
Pleurosorus rutifolius																														0.1										X
Poa labillardierei																										20	2		1					5		0.3	1				X
Poa labillardieri																																								X
Poa meionectes		1	0.2																																					X
Poa sieberiana		10		15			5				3			3	1	0.5										2		0.2	1	5		2				1	5	1	0.5	X
Poa spp.																																								X
Polygala japonica																																								X
Pomaderris pallida																																								X
Pomaderris spp.																																								X
Poranthera microphylla																																								X
Pteridium esculentum																																								X
Pultenaea microphylla																																								X
Pultenaea procumbens		0.5	0.2	0.2	0.1	0.2		0.2																																X
Pultenaea subspicata		0.1																																						X
Ranunculus lappaceus																																								X
Rumex brownii							0.1		10						0.1		0.1	0.1						0.2		0.1				0.1	0.1	0.1	0.1				0.2	0.1		0.1	X
Rytidosperma caespitosum																										1									2						X
Rytidosperma carphoides								1			5	5	35	15		2										0.2	5	5						10	45	3	10			5	X
Rytidosperma pallidum			65	2	12	40			2	12		5							5	1			1												0.2	10					X
Rytidosperma racemosum	3						25	2	10					1	1	25	15									0.3			0.5	0.2	5	20				10		5	5	15	X
Rytidosperma spp.	1	5		10	9	5				8	10	5	5	10				5	2	5	0.4	10	5					10		1			10	5	1	10				X
Schoenus apogon									0.1						0.2		0.1													0.2	0.1	0.1	3				0.5	0.2	0.1	0.1	X
Scleranthus biflorus																																							0.1	X
Scleranthus diander									0.1							0.1																									X
Senecio diaschides																																								X
Senecio hispidulus																																								X
Senecio quadridentatus	0.1	0.1	0.1			0.1	0.1	0.1	0.1																						0.1									X
Solanum cinereum	0.1																																							X
Solanum linearifolium								0.1																																X
Solenogyne dominii									0.1		0.1					0.1										0.1				0.1	0.1	0.1		0.1	0.1		0.1			0.1	X
Solenogyne gunnii																																								X
Sonchus spp.	0.1						0.1	0.1									0.1													0.1	0.1									X
Sorghum leiocladum																0.1														0.1									0.1	X

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Species Name	3375																										3376														Site List
	Zone 1									Zone 2								Zone 3			Zone 4			Zone 5	Zone 6	Zone 1								Zone 2								
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 1	Plot 2	Plot 3	Plot 1	Plot 2	Plot 3	Plot 1	Plot 1	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	
Stackhousia monogyna																0.1																							0.1	X
Stellaria pungens			0.1			0.5																																		X
Stuartina muelleri																																								X
Stylidium graminifolium																																								X
Stypandra glauca																																								X
Styphelia triflora																																								X
Swainsona sericea																0.1															0.2									X
Themeda triandra		40			5		0.5		0.2		30	40		30	80		0.1									15	25	3	2	80	15	1		30	1	5	40	80	60	50	X
Thysanotus tuberosus									0.1																													0.1		X
Tricoryne elatior																												0.1									1	0.1		X
Triptilodiscus pygmaeus									0.2		0.1				0.1	0.1	0.1													0.1	0.1							0.1	0.1	X
Utricularia dichotoma																																								X
Veronica calycina						0.1																																		X
Veronica perfoliata																																								X
Viola betonicifolia																																								X
Vittadinia cuneata	0.1							0.1	0.1					0.1			0.1						0.1					0.1			0.1							0.1	0.1	X
Vittadinia gracilis	6											0.1	0.1					0.2																0.1						X
Vittadinia muelleri	0.1					0.1		0.2	0.1		0.1	0.1		0.1		1												10		0.1		0.1	0.1		0.1				0.1	0.3	X
Wahlenbergia communis							0.1	0.1								0.1	0.1													0.1	0.1	0.1					0.1	0.1	0.1	X
Wahlenbergia gracilis	0.1	0.1			0.1				0.1		0.1			0.1			0.1				0.1	0.1							0.1			0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	X
Wahlenbergia luteola																																								X
Wahlenbergia spp.													0.1															0.1												X
Wahlenbergia stricta								0.1	0.2																															X
Wurmbea dioica							0.1								0.1		0.1																0.1						0.1	X
Xerochrysum viscosum	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.5																									0.1							X

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Appendix C. Fauna Species Recorded

Classification	Scientific Name	Common Name	BC Status	EPBC Status
Aves	*Acridotheres tristis*	Common Myna	-	-
Aves	*Alauda arvensis*	Skylark	-	-
Aves	*Sturnus vulgaris*	Common Starling	-	-
Aves	*Turdus merula*	European Blackbird	-	-
Mammalia	*Cerva timorensis*	Rusa Deer	-	-
Mammalia	*Lepus capensis*	Brown Hare	-	-
Mammalia	*Oryctolagus cuniculus*	Rabbit	-	-
Mammalia	*Sus scrofa*	Feral Pig	-	-
Mammalia	*Vulpes vulpes*	Red Fox	-	-
Amphibia	*Crinia parinsignifera*	Eastern Sign-bearing Froglet	Protected	-
Amphibia	*Crinia signifera*	Common Eastern Froglet	Protected	-
Amphibia	*Limnodynastes tasmaniensis*	Spotted Grass Frog	Protected	-
Amphibia	*Litoria verreauxii*	Whistling tree frog	Protected	-
Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	Protected	-
Aves	*Acanthiza lineata*	Striated Thornbill	Protected	-
Aves	*Acanthiza pusilla*	Brown Thirnbill	Protected	-
Aves	*Acanthiza reguloides*	Buff-rumped Thornbill	Protected	-
Aves	*Acanthorhynchus tenuirostris*	Eastern Spinebill	Protected	-
Aves	*Aegotheles cristatus*	Australian Owlet-nightjar	Protected	-
Aves	*Anas superciliosa*	Pacific Black Duck	Protected	-
Aves	*Anthochaera carunculata*	Red Wattlebird	Protected	-
Aves	*Aquila audax*	Wedge-tail Eagle	Protected	-
Aves	***Artamus cyanopterus***	**Dusky Woodswallow**	**Vulnerable**	**-**
Aves	*Cacatua galerita*	Sulphur-crested Cockatoo	Protected	-
Aves	*Cacatua sanguinea*	Little Corella	Protected	-
Aves	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	Protected	-
Aves	*Cacomantis pallidus*	Pallid Cuckoo	Protected	-
Aves	*Caligavis chrysops*	Yellow-faced Honeyeater	Protected	-
Aves	***Callocephalon fimbriatum***	**Gang-gang Cockatoo**	**Endangered**	**Endangered**
Aves	*Calyptorhynchus funereus*	Yellow-tailed Black-cockatoo	Protected	-
Aves	*Chalcites basalis*	Horsfield's Bronze-cuckoo	Protected	-
Aves	*Chenonetta jubata*	Australian Wood Duck	Protected	-
Aves	***Chthonicola sagittata***	**Speckled Warbler**	**Vulnerable**	**-**
Aves	*Cincloramphus mathewsi*	Rufous Songlark	Protected	-
Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	Protected	-
Aves	*Corcorax melanorhamphos*	White-winged Chough	Protected	-
Aves	*Cormobates leucophaea*	White-throated Treecreeper	Protected	-
Aves	*Corvus coronoides*	Australian Raven	Protected	-
Aves	*Corvus mellori*	Little Raven	Protected	-
Aves	*Coturnix pectoralis*	Stubble Quail	Protected	-
Aves	*Cracticus torquatus*	Grey Butcherbird	Protected	-
Aves	*Dacelo novaeguineae*	Laughing Kookaburra	Protected	-
Aves	***Daphoenositta chrysoptera***	**Varied Sittella**	**Vulnerable**	**-**
Aves	*Dicaeum hirundinaceum*	Mistletoebird	Protected	-
Aves	*Egretta novaehollandiae*	White-faced Heron	Protected	-
Aves	*Eolophus roseicapilla*	Galah	Protected	-
Aves	*Falco berigora*	Brown Falcon	Protected	-

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Classification	Scientific Name	Common Name	BC Status	EPBC Status
Aves	*Falco cenchroides*	Nankeen Kestrel	Protected	-
Aves	***Gallinago hardwickii***	**Latham's Snipe**	**Vulnerable**	**Vulnerable, Marine, Migratory**
Aves	*Gerygone albogularis*	White-throated Gerygone	Protected	-
Aves	*Gerygone fusca*	Western Gerygone	Protected	-
Aves	*Grallina cyanoleuca*	Magpie-lark	Protected	-
Aves	*Gymnorhina tibicen*	Australian Magpie	Protected	-
Aves	*Hirundo neoxena*	Welcome Swallow	Protected	-
Aves	*Lalage sueurii*	White-winged Triller	Protected	-
Aves	*Malurus cyaneus*	Superb Fairy-wren	Protected	-
Aves	*Manorina melanocephala*	Noisy Miner	Protected	-
Aves	*Melithreptus brevirostris*	Brown-headed Honeyeater	Protected	-
Aves	*Myiagra rubecula*	Leaden Flycatcher	Protected	-
Aves	*Neochmia temporalis*	Red-browed Finch	Protected	-
Aves	*Nesoptilotis leucotis*	White-eared Honeyeater	Protected	-
Aves	*Ocyphaps lophotes*	Crested Pigeon	Protected	-
Aves	*Oriolus sagittatus*	Olive-backed Oriole	Protected	-
Aves	*Pachycephala pectoralis*	Golden Whistler	Protected	-
Aves	*Pachycephala rufiventris*	Rufous Whistler	Protected	-
Aves	*Pardalotus punctatus*	Spotted Pardalote	Protected	-
Aves	*Pardalotus striatus*	Striated Pardalote	Protected	-
Aves	*Petrochelidon nigricans*	Tree Martin	Protected	.
Aves	***Petroica boodang***	**Scarlet Robin**	**Vulnerable**	**-**
Aves	***Petroica phoenicea***	**Flame Robin**	**Vulnerable**	**-**
Aves	*Phaps chalcoptera*	Common Bronzewing	Protected	-
Aves	*Philemon corniculatus*	Noisy Friarbird	Protected	-
Aves	*Platycercus elegans*	Crimson Rosella	Protected	-
Aves	*Platycercus eximius*	Eastern Rosella	Protected	-
Aves	*Podargus strigoides*	Tawny Frogmouth	Protected	-
Aves	*Psephotus haematonotus*	Red-rumped Parrot	Protected	-
Aves	*Rhipidura albiscapa*	Grey Fantail	Protected	-
Aves	*Rhipidura leucophrys*	Willie Wagtail	Protected	-
Aves	*Smicrornis brevirostris*	Weebill	Protected	-
Aves	*Strepera graculina*	Pied Currawong	Protected	-
Aves	*Tachybaptus novaehollandiae*	Australasian Grebe	Protected	-
Aves	*Trichoglossus moluccanus*	Rainbow Lorikeet	Protected	-
Aves	*Vanellus miles*	Masked Lapwing	Protected	-
Aves	*Zosterops lateralis*	Silvereye	Protected	-
Insecta	***Keyacris scurra***	**Key's Matchstick Grasshopper**	**Endangered**	**Endangered**
Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo	Protected	-
Mammalia	*Macropus robustus*	Common Wallaroo	Protected	-
Mammalia	*Microchiroptera suborder*	Unidentified Microbat	Protected	-
Mammalia	*Petaurus breviceps*	Sugar Glider	Protected	-
Mammalia	*Pseudocheirus peregrinus*	Common Ringtail Possum	Protected	-
Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum	Protected	-
Mammalia	*Vombatus ursinus*	Common Wombat	Protected	-
Mammalia	*Wallabia bicolor*	Swamp Wallaby	Protected	-
Reptilia	*Amphibolurus muricatus*	Jacky Dragon	Protected	-
Reptilia	***Aprasia parapulchella***	**Pink-tailed Worm-lizard**	**Vulnerable**	**Vulnerable**
Reptilia	*Chelodina longicollis*	Eastern Long-necked Turtle	Protected	-

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Classification	Scientific Name	Common Name	BC Status	EPBC Status
Reptilia	*Ctenotus robustus*	Eastern Striped Skink	Protected	-
Reptilia	*Ctenotus taeniolatus*	Copper-tailed skink	Protected	-
Reptilia	*Lampropholis delicata*	Delicate Skink	Protected	-
Reptilia	*Morethia boulengeri*	Boulenger's Skink	Protected	-
Reptilia	*Parasuta dwyeri*	Dwyer's Snake	Protected	-
Reptilia	*Pseudechis porphyriacus*	Red-bellied Black Snake	Protected	-
Reptilia	*Ramphotyphlops nigrescens*	Blackish Blind Snake	Protected	-

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Appendix D. Golden Sun Moth Survey Conditions

Date: 20/11/2020 (Survey 1)				**Observer/s:** ST, BS
Survey Site: Monaro Rock				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1030	27.5	13 NW	0/8	Mostly still with light gusts, clear and hot.
Finish: 1505	32.6	20 NWN	1/8	
General site notes: Good conditions. Survey conducted through suitable habitat with large patches of Wallaby Grasses throughout the site. No GSM recorded. Males confirmed flying via ACT GSM email forum.				
Date: 27/11/2020 (Survey 2)				**Observer/s:** ST, BS
Survey Site: Monaro Rock				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1100	21.6	9 NE	2/8	Good conditions. Hot and still. Gusty towards the end of the survey.
Finish: 1420	29.8	9 NE	4/8	
General site notes: Good conditions. Survey conducted through suitable habitat with large patches of Wallaby Grasses throughout the site. No GSM recorded. Males confirmed flying via ACT GSM email forum.				
Date: 4/12/2020 (Survey 3)				**Observer/s:** RS, SR
Survey Site: Monaro Rock				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1140	25.3	15 W	0/8	Good still conditions. Cloudy, humid and warm.
Finish: 1400	26.8	24 W	0/8	
General site notes: Good conditions. Survey conducted through suitable habitat with large patches of Wallaby Grasses throughout the site. No GSM recorded. Males confirmed flying via ACT GSM email forum.				
Date: 15/12/2020 (Survey 4)				**Observer/s:** ST, BS
Survey Site: Monaro Rock				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1240	23.1	9 SW	8/8	Cloudy, still and warm.
Finish: 1430	25.2	6 N	8/8	
General site notes: Good conditions. Survey conducted through suitable habitat with large patches of Wallaby Grasses throughout the site. No GSM recorded. Males confirmed flying via ACT GSM email forum.				

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Appendix E. EPBC Act Protected Matters Search Tool (PMST) Results

Species	BC Act listing status	EPBC Act listing status	Threatened Biodiversity Data Collection
Birds			
Anthochaera phrygia Regent Honeyeater	Critically Endangered	Critically Endangered	**Ecosystem credit species / Species credit species** This species is assessed in Section 2.3.4 and Section 2.3.5.
Aphelocephala leucopsis Southern Whiteface	Vulnerable	Vulnerable	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Botaurus poiciloptilus Australasian Bittern	Endangered	Endangered	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Calidris acuminata Sharp-tailed Sandpiper	-	Vulnerable, Migratory	**Not included in the TBDC / BAM Calculator** As this species is not included in the TDBC, it cannot be assessed within the BAM Calculator. This species is therefore assessed in Section 2.3.3.
Calidris ferruginea Curlew Sandpiper	Critically Endangered	Critically Endangered, Migratory	**Ecosystem credit species / Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Callocephalon fimbriatum Gang-gang Cockatoo	Endangered	Endangered	**Ecosystem credit species / Species credit species** This species is assessed in Section 2.3.4 and Section 2.3.5.
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo	Vulnerable	Vulnerable	**Ecosystem credit species / Species credit species** This species is assessed in Section 2.3.4 and Section 2.3.5.
Climacteris picumnus victoriae Brown Treecreeper (south-eastern)	Vulnerable	Vulnerable	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Falco hypoleucos Grey Falcon	Vulnerable	Vulnerable	**Ecosystem credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.

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Species	BC Act listing status	EPBC Act listing status	Threatened Biodiversity Data Collection
Gallinago hardwickii Latham's Snipe	Vulnerable	Vulnerable, Migratory	**Not included in the TBDC / BAM Calculator** As this species is not included in the TDBC, it cannot be assessed within the BAM Calculator. This species is therefore assessed in Section 2.3.3.
Grantiella picta Painted Honeyeater	Vulnerable	Vulnerable	**Ecosystem credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Hirundapus caudacutus White-throated Needletail	Vulnerable	Vulnerable, Migratory	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Lathamus discolor Swift Parrot	Endangered	Critically Endangered	**Ecosystem credit species / Species credit species** This species is assessed in Section 2.3.4 and Section 2.3.5.
Melanodryas cucullata cucullata South-eastern Hooded Robin	Endangered	Endangered	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Neophema chrysostoma Blue-winged Parrot	Vulnerable	Vulnerable	**Ecosystem credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Polytelis swainsonii Superb Parrot	Vulnerable	Vulnerable	**Ecosystem credit species / Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Pycnoptilus floccosus Pilotbird	Vulnerable	Vulnerable	**Ecosystem credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Rostratula australis Australian Painted Snipe	Endangered	Endangered	**Ecosystem credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.

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Species	BC Act listing status	EPBC Act listing status	Threatened Biodiversity Data Collection
Stagonopleura guttata Diamond Firetail		Vulnerable	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Invertebrates			
Euastacus armatus Murray Crayfish	-	Vulnerable	**Not included in the TBDC / BAM Calculator** As this species is not included in the TDBC, it cannot be assessed within the BAM Calculator. This species is therefore assessed in Section 2.3.3.
Synemon plana Golden Sun Moth	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Fish			
Macquaria australasica Macquarie Perch	Endangered	Endangered	**Not included in the TBDC / BAM Calculator** As this species is not included in the TDBC, it cannot be assessed within the BAM Calculator. This species is therefore assessed in Section 2.3.3.
Amphibians			
Litoria castanea Yellow-spotted Tree Frog	Critically Endangered	Critically Endangered	**Species credit species** This species is assessed in Section 2.3.5.
Mammals			
Chalinolobus dwyeri Large-eared Pied Bat	Endangered	Endangered	**Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Dasyurus maculatus maculatus (SE mainland population) Spotted-tail Quoll	Vulnerable	Endangered	**Ecosystem credit species** This species is assessed in Section 2.3.4.
Petaurus australis australis Yellow-bellied Glider (south-eastern)	Vulnerable	Vulnerable	**Ecosystem credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.

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Species	BC Act listing status	EPBC Act listing status	Threatened Biodiversity Data Collection
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala	Endangered	Endangered	**Species credit species** This species is assessed in Section 2.3.5.
Pteropus poliocephalus Grey-headed Flying-fox	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Flora			
Calotis glandulosa Mauve Burr-daisy	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Dodonaea procumbens Trailing Hop-bush	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Eucalyptus aggregate Black Gum	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Lepidium aschersonii Spiny Peppercress	Vulnerable	Vulnerable	**Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Lepidium ginninderrense Ginninderra Peppercress	-	Critically Endangered	**Not included in the TBDC / BAM Calculator** As this species is not included in the TDBC, it cannot be assessed within the BAM Calculator. This species is therefore assessed in Section 2.3.3.
Lepidium hyssopifolium Basalt Pepper-cress	Endangered	Endangered	**Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Leucochrysum albicans subsp. tricolor Hoary Sunray	Endangered	Endangered	**Species credit species** This species is assessed in Section 2.3.5.
Pomaderris pallida Pale Pomaderris	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.

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Species	BC Act listing status	EPBC Act listing status	Threatened Biodiversity Data Collection
Prasophyllum petilum Tarengo Leek Orchid	Endangered	Endangered	**Species credit species** This species is assessed in Section 2.3.5.
Rutidosis leptorhynchoides Button Wrinklewort	Endangered	Endangered	**Species credit species** This species is assessed in Section 2.3.5.
Senecio macrocarpus Large-fruit Fireweed	-	Vulnerable	**Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Swainsona recta Small Purple-pea	Endangered	Endangered	**Species credit species** This species is assessed in Section 2.3.5.
Thesium australe Austral Toadflax	Vulnerable	Vulnerable	**Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.
Reptiles			
Aprasia parapulchella Pink-tailed Legless Lizard	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Delma impar Striped Legless Lizard	Vulnerable	Vulnerable	**Species credit species** This species is assessed in Section 2.3.5.
Tympanocryptis lineata Canberra Grassland Earless Dragon	Critically Endangered	Critically Endangered	**Species credit species** This species is not identified by the TBDC / BAM Calculator as has having the potential to occur in the subject land. As such, no further assessment is required.

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Appendix F. Calculating Indirect Impacts on Native Vegetation and Habitat

Noise

Increased noise has the potential to result in a variety of indirect impacts on ecological values, especially fauna. These impacts largely arise due to the masking effect of increased noise levels, which can result in altered communication, reproduction, predator-prey interactions, habitat use, species distribution, and species abundance (Barber et al. 2009[69], Barber et al. 2011[70], Francis et al. 2012[71], Newport et al. 2014[72], Cross et al. 2021[73]). The extent and severity of the impact is likely dependent on a variety of factors, including the nature of the noise (e.g. its strength, frequency, timing, etc) and the characteristics of the receiving fauna.

The key sources of noise associated with the proposed development arise from the following activities.

- Blasting and the load and haul of the quarry resource from the extraction area to the processing plant. Blasting would be limited to at most weekly blast events.
- Processing of the quarry resource or for concrete recycling, including the use of crushers, screens, conveyor belts, and the storage and handling of finished products.
- Concrete batching, including raw material loading, conveyance into batching bins, blending of raw materials, and washout of returning concrete agitators.
- Asphalt production, including raw material loading and conveyance to the rotary drum drier / mixer.
- Movement of light and heavy vehicles along the Quarry Access Road.
- Transport operations would occur between 5:00 am and 6:00 pm, Monday to Saturday.

As detailed in the Noise and Vibration Impact Assessment (Octave Acoustics 2025) and EIS Section 6.5, noise associated with the proposed development would be mitigated using a variety of techniques, including but not limited to the following.

- A 3 m high acoustic barrier will be constructed along the sealed section of the Quarry Access Road.
- All mobile equipment will be fitted with standard muffling apparatus and frequency modulated reversing alarms.

[69] Barber, J., Crooks, K., and Fristrup, M. (2009). *The costs of chronic noise exposure for terrestrial organisms*. Trends in Ecology and Evolution Vol.25 No.3. doi:10.1016/j.tree.2009.08.002

[70] Barber J., Burdett C., Reed S., Warner, K., Formichella, C., Crooks, K., Theobalk, D., and Fristrup, K. (2011). *Anthropogenic noise exposure in protected natural areas: estimating the scale of ecological consequences.* Landscape Ecol 26: 1281–95. DOI 10.1007/s10980-011-9646-7

[71] Francis, C., Kleist, N., Ortega, C., and Cruz, A. (2012). *Noise pollution alters ecological services: enhanced pollination and disrupted seed dispersal.* Proc. R. Soc. B (2012) 279, 2727–2735. doi:10.1098/rspb.2012.0230

[72] Newport, J., Shorthouse, D. and Manning, A. (2014). *The effects of light and noise from urban development on biodiversity: Implications for protected areas in Australia*. Ecological Management & Restoration, Vol 15, No 3. doi: 10.1111/emr.12120.

[73] Cross, S.L., Cross, A.T., Tomlinson, S., Clark-loannou, S.M., Nevill, P.G., and Bateman, P.W. (2021). *Mitigation and management plans should consider all anthropogenic disturbances to fauna*. Global Ecology and Conservation 26 (2021) e01500. https://doi.org/10.1016/j.gecco.2021.e01500

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- Internal roads, including the Quarry Access Road, will be well maintained to minimise body noise from empty trucks.
- Noise-generating activities will only occur during the nominated hours of operation.
- All vehicles, plant and equipment will be regularly maintained and serviced in accordance with the manufacturer's specifications.
- Dialogue will be maintained with surrounding landowners to ensure any concerns over operational noise are addressed.
- A complaints protocol will be implemented to document complaints and to guide investigation and response procedures.

Despite the implementation of the above mitigation measures, background noise levels would increase in the surrounding areas during operating hours (Octave Acoustics 2025); these increases are assumed to have an indirect impact on adjacent areas.

For the purposes of the current assessment, it is difficult to determine the likely extent and severity of indirect impacts arising from increased noise. While the existing literature shows that increased noise can have an effect over distances of 10's of meters to 1,000's of meters and impact a variety of ecologically relevant metrics by a few percent to 10's of percent (e.g. Barber et al. 2009, Bayne et al. 2008[74], Barber et al. 2011, Francis et al. 2012, Newport et al. 2014, Duarte et al. 2015[75], Angelova et al. 2020[76]), these findings cannot be easily extrapolated to the proposed development as: 1) the existing literature generally focusses on the response of specific taxa rather than on more general measures such as species richness; 2) the impacts documented in the literature generally arise from noise generating systems that differ to those of the proposed development; 3) the noise generated by the proposed development would not be experienced as a uniform change, but instead would vary by time and day depending on the activities being undertaken and the stage of development; and 4) impacts in the literature generally rely on metrics that cannot easily be compared to those employed in the BAM Calculator, being vegetation structure, composition, and function.

With regard to the above, and for the purposes of this BDAR, indirect impacts arising from increased noise generated by the proposed development are assumed to extend for 100 m surrounding the extraction, processing, and stockpiling areas and for 30 m surrounding the Quarry Access Road; these distances are within the span of those identified in the literature and referenced above. The severity of the impact is determined in combination with the other identified indirect impacts but is assumed to differ in the following manner.

1. Noise levels and thus their impact would reduce as distance to the extraction, processing, and stockpiling areas increases.
2. The section of the Quarry Access Road that is sealed and fenced would result in less noise generation in comparison to the unsealed and unfenced section.

[74] Bayne, E.M., Habib, L., and Boutin, S. (2008). *Impacts of Chronic Anthropogenic Noise from Energy-Sector Activity on Abundance of Songbirds in the Boreal Forest*. Conservation Biology, Volume 22, No. 5, 1186–1193. DOI: 10.1111/j.1523-1739.2008.00973.

[75] Duarte, M.H.L, Sousa-Lima, R.S. Young, R.J., Vasconcelos, M., Rodrigues, M., and Pieretti, N. *The impact of noise from open-cast mining on Atlantic forest biophony.* Biological Conservation 191 (2015) 623–631. http://dx.doi.org/10.1016/j.biocon.2015.08.006.

[76] Angelova, R.A., Velichkova, R., and Alexandrova, S. (2020). *Environmental impact of quarry activities: the case study of a gneiss deposit in the region of Blagoevgrad*. Proceedings of 1st International conference on Environmental protection and disaster RISK, p. 205-215. https://doi.org/10.48365/envr-2020.1.18

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Edge effects

Edge effects arise at the boundary between two or more habitat types. With respect to those generated by human activity, edge effects are generally caused by clearing vegetation. These introduced edges can have both abiotic impacts (e.g. changes in temperature, light, and humidity) and biotic impacts (e.g. increases in weeds, predators, and diseases) on the surrounding environment (Lindenmayer and Fischer 2007[77]). As a result, edge effects can alter vegetation composition and structure and the distribution and abundance of species. While the extent of the impact can extend for 100's of meters into the surrounding areas, the greatest impacts appear to occur within 50 m and are thought to be greater for large clearings in comparison to small / narrow clearings (Paton 1993[78], Lindenmayer and Fischer 2007, Eldengard et al. 2015[79]).

Edge effects associated with the proposed development arise from clearing vegetation for the extraction, processing, and stockpiling areas and for the Quarry Access Road. This impact is assumed to have an indirect impact on the immediately adjacent areas. For the following reasons, the extent and severity of edge effects is considered likely to be reduced.

1. The majority of the extraction, processing, and stockpiling areas have been historically cleared or thinned and are therefore subject to some degree of existing edge effects.

2. The Quarry Access Road is narrow (a 5 m to 20 m corridor has been assessed).

With respect to the above, indirect impacts arising from edge effects generated by the proposed development are assumed to extend for 50 m from extraction, processing, and stockpiling areas (due to the larger overall area to be cleared) and for 30 m from the Quarry Access Road (due to the narrow width of clearance); these distances are within the span of those identified in the literature and referenced above. The severity of the impact is determined in combination with the other identified indirect impacts.

Dust

Increased levels of dust have the potential to impact vegetation through altered photosynthesis, respiration, transpiration, and greater penetration of pollutants, resulting in altered vegetation composition and structure (Farmer 1993[80], Cross et al. 2021, Kumar and Yarrakula 2022[81]).

The key sources of dust associated with the proposed development arise from the following activities.

- Blasting and the load and haul of the quarry resource from the extraction area to the processing plant. Blasting would be limited to at most weekly blast events.

[77] Lindenmayer, D.B. and Fischer, J. (2007). *Edge Effects*. p165-178 In: *Managing and Designing Landscapes for Conservation: Moving from Perspectives to Principles*. Edited by Lindenmayer and Hobbs. Blackwell Publishing.
[78] Paton, P.S.C. (1993). The *Effect of Edge on Avian Nest Success: How Strong Is the Evidence?* Conservation Biology, p17-26, Volume 8, No 1.
[79] Eldengard, K., Orjan, T., and Moe, S. (2015). *Edge effects on plant communities along power line clearings*. Journal of Applied Ecology 2015, 52, 871–880. doi: 10.1111/1365-2664.12460
[80] Farmer, A.M. (1993). *The effects of dust on vegetation – a review*. Environmental Pollution 79, 63-75.
[81] Kumar, V. and Yarrakula, K. (2022). *Environmental impact assessment of limestone quarry using multispectral satellite imagery.* Earth Science Informatics. https://doi.org/10.1007/s12145-022-00845-0

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- Processing of the quarry resource or for concrete recycling, including the use of crushers, screens, conveyor belts, and the storage and handling of finished products.
- Concrete batching, including raw material loading, conveyance into batching bins, blending of raw materials, and washout of returning concrete agitators.
- Asphalt production, including raw material loading and conveyance to the rotary drum drier / mixer.
- Movement of light and heavy vehicles along the Quarry Access Road.
- Transport operations would occur between 5:00 am and 6:00 pm, Monday to Saturday.

As detailed in the Air Quality Impact Assessment (Northstar 2025) and EIS Section 6.2, dust associated with the proposed development would be mitigated using a variety of techniques, including the following.

- All vehicles, plant and equipment will be regularly maintained and serviced in accordance with the manufacturer's specifications.
- The Quarry access road and secondary access road will be maintained to minimise dust emissions.
- Dust generating activities will be modified during adverse weather conditions, including strong winds, or in the event that dust is observed leaving the site.
- Weather forecasts will be checked prior to undertaking material handling or processing.
- Completed sections of the site will be progressively rehabilitated to reduce the potential for wind erosion.
- Water will be regularly applied to internal roads, material stockpiles and other disturbed surfaces during dry and/or windy conditions (wind speeds in excess of 10 m/s) to prevent wind erosion.
- Drop heights will be minimised during material handling operations to limit dust generation.
- Materials will be watered prior to handling to limit dust generation.
- Soil stockpiles stored for extended periods of time (greater than 2 weeks) will be stabilised to achieve an effective 70% cover within one month following formation.
- Ensure that all product trucks have their loads covered prior to entering the weighbridge.
- Ensure all drivers of product trucks have completed and signed the Driver's Code of Conduct.
- All product trucks must follow designated routes and enforced speed limits.
- A complaints protocol will be implemented to document complaints and to guide investigation and response procedures.

These measures are considered sufficient to control most of the dust emissions from extraction, processing, and stockpiling activities. However, despite mitigation, increased dust emissions are expected from the project (Northstar 2025) and this increase is assumed to have a small indirect impact on the adjacent areas.

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With respect to the above, indirect impacts arising from increased dust generated by the proposed development are assumed to extend for 30 m from the unsealed section of the Quarry Access Road; this distance is within the span of those identified in the literature and referenced above. The severity of the impact is determined in combination with the other identified indirect impacts.

Extent and severity of indirect impacts

It is difficult to determine the likely severity of indirect impacts arising from the proposed development. This is because: 1) the existing literature generally focusses on the response of specific taxa rather than on more general measures such as species richness; 2) the impacts documented in the literature generally arise from noise generating systems that differ to those of the proposed development; 3) the noise generated by the proposed development would not be experienced as a uniform change, but instead would vary by time and day depending on the activities being undertaken and the stage of development; and 4) impacts in the literature generally rely on metrics that cannot easily be compared to those employed in the BAM Calculator, being vegetation structure, composition, and function.

For the purposes of this BDAR, the severity of indirect impacts has been determined in the following manner. These reductions in quality fall within the span of those identified in the literature and referenced in the previous sections of this appendix.

1. A 20% reduction in biodiversity value within 50 m of the extraction, processing, and stockpiling areas.
2. A 20% reduction in biodiversity value within 30 m of the unsealed section of the Quarry Access Road.
3. A 10% reduction in biodiversity value within 100 m of the extraction, processing, and stockpiling areas.
4. A 10% reduction in biodiversity value within 30 m of the sealed section of the Quarry Access Road.

These areas have been assessed so that they do not overlap and therefore are assessed as zones with either a 20% or 10% reduction in biodiversity value for the purpose of establishing biodiversity offsetting requirements.

The only way in which indirect impacts can be captured by the BAM Calculator is through altering vegetation integrity (VI) scores. While this method is imperfect in many ways, such as attempting to capture the indirect impacts of noise on fauna by altering vegetation associated metrics, no other options are available. As VI scores cannot be directly altered in the BAM Calculator, the estimated reduction in quality has been achieved by reducing the average composition, structure, and function scores by the relevant amount for each indirectly impacted vegetation zone. These reductions are identified in the BAM Calculator by the inclusion of a “20p” suffix (for a 20% reduction in quality) or “10p” suffix (for a 10% reduction in quality) to the associated vegetation zone.

For the following reasons, indirect impacts are not assumed for the identified species credit species.

- The main source of indirect impacts arising from the proposed development is due to increased noise levels, with less attributed to edge effects and dust. Increased noise is likely to have a greater impact on species that rely on vocal communication. This therefore does not include the flora or fauna species credit species identified in Section 2.3.6.

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- Populations of the flora or fauna species credit species identified in Section 2.3.6 persist close to similar sources of disturbance (reference BioNet and NatureMapr). This includes:
    - nearby populations of Small Purple-pea, Silky Swainson-pea, Hoary Sunray, and Key's Matchstick Grasshopper within 30 m – 50 m of the Monaro Hwy and other substantial roads in NSW and the ACT;
    - nearby populations of Pale Pomaderris within 60 m – 200 m of residential development in the ACT; and
    - nearby populations of Pink-tailed Work-lizard within 50 m of residential development in the ACT and NSW, and within 200 m – 800 m of existing quarries in the ACT and NSW.

With respect to the above, indirect impacts are therefore only reflected in changes to VI and the subsequent generation of ecosystem credits.

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Appendix G. Planting Program for Rehabilitation, Tree Screening Areas, and the Visibility Barrier

The list of recommended plant species has been developed to provide a list of suitable species for the canopy and midstorey strata, based on the objective of augmenting or recreating the strata of the following Plant Community Types (PCTs).

- PCT3375 – *Monaro-Queanbeyan Rolling Hills Grassy Forest*
- PCT3376 – *Southern Tableland Grassy Box Woodland*

It is noted that some of the species listed may not be readily available from local suppliers, particularly during certain seasons. Accordingly, whilst the objective of the list is to ensure that only suitable species are planted, it is also important to maximise the species options. Therefore, whilst not exhaustive, the below table provides a list of suitable species of which a sufficient diversity should be available. Species considered key planting species for each PCT within the subject land are **bolded** and underlined.

For the tree screening areas and visibility barrier, planting density should aim for one plant every 4 m, comprised of approximately 40% canopy plants and 60% midstorey plants. Planting should, in general, occur between April and September. Performance measures should aim for at least a 75% survival rate after 5 years.

For rehabilitation activities, the planting density and canopy / midstorey ratio will depend on the final objectives of the works (e.g. providing habitat connectivity vs. recreating the structure and composition of the associated PCT). As such, no recommendations are made at this time.

Scientific Name	Common Name	PCT3375	PCT3376
Canopy			
Eucalyptus blakelyi	Blakely's Red Gum		**X**
Eucalyptus bridgesiana	Apple Box	**X**	X
Eucalyptus dives	Broad-leaf Peppermint	**X**	
Eucalyptus goniocalyx	Bundy	**X**	
Eucalyptus mannifera	Brittle Gum	X	
Eucalyptus melliodora	Yellow Box	X	**X**
Eucalyptus nortonii	Bundy	**X**	
Eucalyptus polyanthemos	Red Box	**X**	X
Eucalyptus rossii	Scribbly Gum	**X**	
Eucalyptus rubida	Candlebark	X	X
Midstorey			
Acacia buxifolia	Box-leaf Wattle	X	X
Acacia dawsonii	Poverty Wattle	X	X
Acacia dealbata	Silver Wattle	X	X
Acacia decurrens	Green Wattle	X	X
Acacia genistifolia	Early Wattle	X	X
Acacia gunnii	Ploughshare Wattle	X	X
Acacia implexa	Hickory Wattle	X	X
Acacia mearnsii	Black Wattle	X	X
Acacia melanoxylon	Blackwood	X	X
Acacia rubida	Red-stem Wattle	X	X

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Scientific Name	Common Name	PCT3375	PCT3376
Acacia ulicifolia	Prickly Moses	X	X
Bursaria spinosa	Native Blackthorn	X	X
Cassinia aculeata	Common Cassinia	X	X
Cassinia longifolia	Cauliflower Bush	X	X
Cassinia quinquefaria	Rosemary Cassinia	X	X
Daviesia mimosoides	Narrow-leaf Bitter-pea	X	X
Dillwynia sieberi	Prickly Parrot-pea	X	
Dodonaea viscosa	Hop Bush	X	X
Indigofera australis	Austral Indigo	X	X
Kunzea ericoides	Burgan	X (Note: can have invasive tendencies)	X (Note: can have invasive tendencies)
Leptospermum myrtifolium	Myrtle Tea-tree		X (wet depressions)
Pomaderris eriocephala	Woolly-head Pomaderris	X	

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Appendix H. Commonwealth Significant Impact Criteria Assessment

Under the EPBC Act, an action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- extinct in the wild;
- critically endangered;
- endangered; or
- vulnerable.

The EPBC Act Matters *of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013a) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon a species listed as vulnerable or endangered/critically endangered pursuant to the EPBC Act.

The impact of the proposed development, hereto referred to as the 'proposed action', on the following ecological communities, fauna species, and flora species listed as threatened pursuant to the EPBC Act is assessed against the relevant significant impact criteria based on each value's respective listing category pursuant to the EPBC Act.

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act critically endangered).
- Gang-gang Cockatoo *Callocephalon fimbriatum* (EPBC Act endangered).
- Key's Matchstick Grasshopper *Keyacris scurra* (EPBC Act endangered).
- Small Purple-pea *Swainsona recta* (EPBC Act endangered).
- Pale Pomaderris *Pomaderris pallida* (EPBC Act vulnerable).

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H.1. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act critically endangered)

The EPBC Act *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013a) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon an EPBC Act listed 'critically endangered or endangered ecological community'. An assessment of the proposed action against each of these criteria is provided below.

Is there a real chance or possibility that the action will reduce the extent of the ecological community?

The proposed action would directly impact 22.44 ha of EPBC Act Box-Gum Woodland, consisting of 12.29 ha in Condition Class A (i.e. PCT33746 Zone 1) and 10.15 ha in Condition Class B (i.e. PCT3376 Zone 2) (refer to Section 2.2.5.1). In addition, the proposed action would also have an indirect impact on 5.39 ha of EPBC Act Box-Gum Woodland.

As discussed in Section 3.4.1.1 and shown in Figure 16, the 22.44 ha direct impact represents 10% the 218.11 ha of EPBC Act Box-Gum Woodland that occurs within the subject land, 4% of the of the 562.53 ha of EPBC Act Box-Gum Woodland that occurs in the immediate locality (i.e. including EPBC Act Box-Gum Woodland that occurs within 500 m of the subject land[82]), and 0.006% of the estimated 405,000 ha of the ecological community that remains across its range (DCCEEW 2010).

Given the above, the clearance of vegetation for the proposed action would result in a reduction in the extent of the community by 22.44 ha. A further 5.39 ha of the community would be partially impacted.

Is there a real chance or possibility that the action will fragment or increase fragmentation of the ecological community, for example by clearing vegetation for roads or transmission lines?

The proposed action has the potential to fragment / increase fragmentation of the ecological community through:

- the clearance of native vegetation, particularly woody vegetation; and
- the introduction of barriers to movement, particularly the extraction, processing, and stockpiling areas and the fenced portion of the Quarry Access Road.

With reference to Figure 16, the following points are noted.

- The proposed action is largely located between large expanses of Box-Gum Woodland. As a result, the direct impacts associated with proposed action occur on the edges of these expanses. Following development, these large areas of Box-Gum Woodland would therefore persist, and are considered likely to be sufficiently large and suitably located to maintain movement corridors and thus connectivity in the locality post-development.
- The majority of the impacted areas have been historically cleared / thinned. As such, the proposed action would primarily impact areas which are already partly fragmented.
- The disturbance footprint associated with the Quarry Access Road and Secondary Access Road are < 30 m wide. As per the Approved Conservation Advice (DCCEEW 2023a), 'breaks'

[82] Capital Ecology has conducted vegetation surveys across many of the surrounding properties.

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in a patch of the ecological community are only assumed for distances greater than 30 m for understorey vegetation and greater than 75 m for canopy vegetation.

- All areas apart from the Quarry Access Road and Secondary Access Road would be progressively rehabilitated during, and after completion of, extraction operations. As such, any potential fragmentation of the ecological community would only occur for the operational life of the proposed action (i.e. 30 – 35 years).

With consideration of the above, the proposed action is considered unlikely to fragment / increase fragmentation of the ecological community.

Is there a real chance or possibility that the action will adversely affect habitat critical to the survival of the ecological community?

As per the Approved Conservation Advice (DCCEEW 2023a), all areas of the ecological community that meet the minimum condition criteria should be considered habitat critical to the survival of the ecological community.

With consideration of the above, all EPBC Act Box-Gum Woodland in the subject land is therefore considered habitat critical to the survival of the ecological community. The proposed action would therefore directly impact 22.44 ha and indirectly impact 5.39 ha of habitat that is defined in DCCEEW (2023a) as 'critical to the survival of the ecological community'.

Is there a real chance or possibility that the action will modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?

The proposed action, being a quarry and associated infrastructure, would directly impact an area of 78.69 ha (i.e. the development footprint). Outside of the development footprint, impacts that may modify / destroy abiotic factors necessary for the ecological community's survival would be minimised through the implementation of the following management plans.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

With respect to groundwater levels / surface water drainage patters and the potential presence of Groundwater Dependent Ecosystems (GDEs), we note the following.

- The GDE Ecological Value (HEAVE) spatial database, which categorises the ecological value of each groundwater dependent vegetation community from very high to very low.
    - No vegetation in the subject land is mapped on this database.

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- The GDE Atlas, which maps the potential for groundwater/ecosystem interaction.
    - No Terrestrial GDEs or Terrestrial Inflow Dependent Ecosystems (IDE) are recorded in the subject land.
    - No Subterranean GDEs are recorded in the subject land.
    - Rock Gully Creek and Four Mile Creek, which occur in the subject land but outside the development footprint, are identified as having a high potential to support Aquatic GDE that are likely to be inflow dependent.
- The Spatial Layer of Probable Vegetation Groundwater Dependent Ecosystems in NSW, which identifies vegetation communities that have a probability of being a GDE. Probability categories are limited to high, medium, low, and non GDE.
    - Areas that do not support a canopy have low or no GDE probability.
    - Patches of PCT3376 are identified as having moderate GDE probability. Mapped areas are restricted to vegetation in the western half of the subject land.
    - Patches of PCT3375 are identified as having low GDE probability. Mapped areas are restricted to vegetation in the western half of the subject land

With respect to the above, none of the vegetation in the subject land has a high probability of being a GDE. Furthermore, there is no evidence of springs, swamps, or groundwater baseflow to creeks on the subject land or adjacent to it (Strategic Environmental and Engineering Consulting 2025). Therefore, it is unlikely that there are GDEs within Four Mile Creek or Rocky Creek given the absence of permanent flow.

However, as noted above, patches of PCT3376 across the western half of the subject land are mapped as having a moderate GDE probability in the Spatial Layer of Probable Vegetation Groundwater Dependent Ecosystems in NSW. As per the Groundwater Assessment (TheHydrogeologist 2025), groundwater is estimated to be located at depths between 5 m and 50 m below ground level within the majority of the development footprint. With respect to the areas to the west of the development footprint, where PCT3376 is mapped as having moderate GDE potential, the groundwater table mostly occurs at a depth of approximately 20 – 50 m. Given that an ecological community is more likely to rely on groundwater when it occurs close to the surface (i.e. < 10 m), the vegetation west of the development footprint would likely be more reliant on soil moisture in the capillary zone and groundwater at the soil-rock interface, rather than on the deeper regional groundwater table (Department of Primary Industries 2016).

Finally, aside from disturbance impacts at the surface, changes to the groundwater setting are not expected until Stage 4E when the pit extends below 852 m AHD in approximately Year 15 of operation (TheHydrogeologist 2025). Groundwater drawdown is predicted to occur in the weathered rock layer that occurs at surface (TheHydrogeologist 2025). While there is groundwater drawdown predicted in the basement rock (a separate layer from a hydrogeological perspective), this is considered unlikely to impact vegetation due to the depth of this change.

With consideration of the above, the proposed action is considered unlikely to modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological community's survival.

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Is there a real chance or possibility that the action will cause a substantial change in the species composition of an occurrence of the ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?

The proposed action would directly impact 22.44 ha of EPBC Act Box-Gum Woodland and indirectly impact 5.39 ha of EPBC Act Box-Gum Woodland. Outside of the impacted areas, the proposed action is considered unlikely to have any additional direct or indirect impact. This would be achieved through the following management plans.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

Apart from the impact within the development footprint, the proposed action is therefore considered unlikely to adversely alter the species composition of EPBC Act Box-Gum Woodland. In addition, while the EPBC Act Box-Gum Woodland within the development footprint supports a moderate to high diversity of native species, it is analogous with that that which occurs throughout much of the locality and is not of any greater importance to the conservation of the ecological community.

Is there a real chance or possibility that the action will cause a substantial reduction in the quality or integrity of an occurrence of the ecological community, including, but not limited to:

- **assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?**

Many of the exotic species which occur in the locality already occur throughout the subject land and broader locality. As such, the proposed action is unlikely to result in the introduction and establishment of additional invasive species. While the construction and operation of the proposed action may temporarily increase the occurrence of the weed species already present, weed management measures would be implemented to minimise the risk of weed introduction and spread (refer to Section 3.1 and Section 3.3).

Additionally, due to the agricultural location of the subject land, a number of exotic pest fauna species such as European Rabbit, European Brown Hare, Feral Pig, Red Fox, Feral Cats, Goat, various Deer species, European Starling, and Common Myna already occur within the subject land or surrounding properties. Notably, the proposed action is not likely to introduce or increase the numbers of exotic avifauna present in the area. In addition, feral animal management measures would be implemented to minimise the risk of exotic pest fauna (refer to Section 3.1 and Section 3.3).

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It is likely that herbicides would be used in to control any existing / new weed infestation. These herbicides would be applied in a targeted manner to treat specific species. Weed control works would be undertaken by suitably qualified and experienced personnel. It is noted that such chemicals are currently widely used in the locality.

In addition, potential indirect impacts to EPBC Act Box-Gum Woodland would be minimised and mitigated during construction and operation by the measures outlined in the following management plans.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

Consideration of the above information indicates that the proposed development is unlikely to cause a substantial reduction in the quality or integrity of an occurrence of the ecological community.

Is there a real chance or possibility that the action will interfere with the recovery of the ecological community?

Objectives consistent with those described in the National Recovery Plan (DCCEEW 2010) are:

1. achieving no net loss in extent and condition of the ecological community throughout its geographic distribution;
2. increasing protection of sites in good condition;
3. increasing landscape function of the community through management and restoration of degraded sites;
4. increasing transitional areas around remnants and linkages between remnants; and
5. bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity, and function of Box-Gum Grassy Woodland.

The proposed action would directly impact 22.44 ha of EPBC Act Box-Gum Woodland and indirectly impact 5.39 ha of EPBC Act Box-Gum Woodland. However, as per Section 3.5.2, these impacts would ultimately be offset through the BOS via the purchase and retirement of 'like-for-like' credits that are generated by a Biodiversity Stewardship Site. Through this process, the BOS aims to achieve 'no net loss' to biodiversity, thereby satisfying Point 1 above. Furthermore, by encouraging the establishment of Biodiversity Stewardship Sites, the BOS satisfies Points 2 to 5 above by increasing the protection of sites in good condition, increasing landscape function of the community through management and restoration of degraded sites, increasing transitional areas around remnants and linkages between remnants, and bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity, and function of Box-Gum Grassy Woodland.

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With consideration of the above, the proposed action is therefore considered unlikely to interfere with the recovery of the ecological community.

Conclusion

The proposed action is likely to have a significant impact on EPBC Act Box-Gum Woodland through a reduction in the extent of the ecological community by 22.44 ha and indirect impact to an additional 5.39 ha, all of which meets the definition of 'habitat critical to the survival of the ecological community' as per DCCEEW (2023a). Accordingly, EPBC Act referral for impacts to EPBC Act Box-Gum Woodland is considered warranted and is recommended.

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H.2. Gang-gang Cockatoo *Callocephalon fimbriatum* (EPBC Act endangered)

The EPBC Act *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013a) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon an EPBC Act listed 'critically endangered or endangered ecological species'. An assessment of the proposed action against each of these criteria is provided below.

Is there a real chance or possibility that the action will:

- **lead to a long-term decrease in the size of a population**

  and/or

- **reduce the area of occupancy of the species**

As detailed in Section 2.3.6.2, Gang-gang Cockatoo were observed on two occasions, both of which were in PCT3375 Zone 1 (Figure 10). The south-eastern observation was of a pair of Gang-gang Cockatoos flying through the canopy on 28 October 2020, while the north-western observation was of a lone male Gang-gang Cockatoo on 27 October 2020. Based on these observations, the subject land is estimated to support 348.57 ha of Gang-gang Cockatoo foraging habitat, composed of those vegetation zones that support a canopy (i.e. PCT3375 Zones 1, 3, and 5 and PCT3376 Zone 1).

While no signs of breeding activity were recorded in 2020, additional targeted surveys for Gang-gang Cockatoos were conducted on 3 October 2024 and 11 October 2024 (Figure 10). In addition, during all other surveys in 2024 a direction was given for any detection of Gang-gang Cockatoos to take precedence and be immediately investigated. No further signs of Gang-gang Cockatoos were detected.

Given the small number of Gang-gang Cockatoo observations in the subject land over multiple years and the absence of any sign of breeding activity, the species is considered unlikely to breed in the subject land.

The proposed action would directly impact 48.08 ha of Gang-gang Cockatoo foraging habitat. This represents 14% of the foraging habitat that occurs in the subject land.

Based on species records from BioNet and NatureMapr, Gang-gang Cockatoo foraging habitat is likely to be widespread throughout the surrounding areas that support a canopy. Accordingly, the 2,091 ha of woody vegetation that occurs within 1,500 m of the subject land is likely to represent foraging habitat for the species (Figure 5). As such, the impact to 48.08 ha therefore represents 2.3% of the Gang-gang Cockatoo foraging habitat that occurs within 1,500 m of the subject land.

More widely, DAWE (2022)[83] estimates that the Area of Occupation (AOO) for the species is 30,000 km^2, which equals 3,000,000 ha. The impact to 48.08 ha therefore represents 0.002 % of the AOO.

In conclusion, the proposed action is considered unlikely to lead to a long-term decrease in the size of a population given it would not impact breeding habitat and would only impact a relatively small

[83] DAWE (2022). *Conservation Advice for Callocephalon fimbriatum (Gang-gang Cockatoo)*. Department of Agriculture, Water and the Environment, in effect from 2 March 2022.

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proportion of the available foraging habitat within the immediate locality and wider AOO. However, the proposed action would reduce the AOO for the species by 48.08 ha.

Is there a real chance or possibility that the action will fragment an existing population into two or more populations?

While the proposed action would directly impact 48.08 ha of Gang-gang Cockatoo foraging habitat, substantial areas of intact vegetation and habitat would persist to the north, east, and west of the development footprint. These areas are considered likely to be sufficient to maintain Gang-gang Cockatoo movement corridors and thus habitat connectivity post-development. As such, the proposed development is unlikely to fragment an existing population into two or more populations.

Is there a real chance or possibility that the action will adversely affect habitat critical to the survival of a species?

As detailed in DAWE (2022), habitat critical to the survival of the species is defined as 'all foraging habitat during both the breeding and non-breeding season' and 'hollow bearing trees with known or potential Gang-gang Cockatoo hollow chambers'.

With consideration of the above, all Gang-gang Cockatoo foraging habitat in the subject land is therefore considered habitat critical to the survival of the species. The proposed action would therefore directly impact 48.08 ha of habitat that is defined in DAWE (2022) as 'critical to the survival of the species'.

Is there a real chance or possibility that the action will disrupt the breeding cycle of a population?

As detailed in DAWE (2022), breeding usually occurs between October and January. The species prefers old growth forest and woodland assemblages for breeding, and they nest in tree hollows that support specific characteristics. Nesting sites are often near water, where larger hollow-bearing trees can be more common. Breeding aggregations are reliant on stands of suitable hollow-bearing trees, and multiple nests tend to be situation within a few hundred metres of each other.

As described previously, the subject land is considered unlikely to support breeding habitat for Gang-gang Cockatoo. As substantial areas of suitable habitat would remain post-development and the proposed action is considered unlikely to fragment an existing population, the removal of 48.08 ha of foraging habitat is considered unlikely to disrupt the breeding cycle of any nearby breeding population.

With consideration of the above, the proposed action is considered unlikely to disrupt the breeding cycle of a population.

Is there a real chance or possibility that the action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposed action would directly impact 48.08 ha of Gang-gang Cockatoo foraging habitat. This represents 14% foraging habitat in the subject land, 2.3% of the foraging habitat that occurs within 1,500 m of the subject land, and 0.002 % of the AOO. The proposed action would not impact breeding habitat or and is considered unlikely to fragment an existing population. Beyond the development footprint, unintended impacts would be minimised through the implementation of the following management plans.

- Water Management Plan.

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- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

With consideration of the above, the proposed action is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or possibility that the action will result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?

Many of the exotic species which occur in the locality already occur throughout the subject land and broader locality. As such, the proposed action is unlikely to result in the introduction and establishment of additional invasive species. While the construction and operation of the proposed action may temporarily increase the occurrence of the weed species already present, weed management measures would be implemented to minimise the risk of weed introduction and spread (refer to Section 3.1 and Section 3.3).

Additionally, due to the agricultural location of the subject land, a number of exotic pest fauna species such as European Rabbit, European Brown Hare, Feral Pig, Red Fox, Feral Cats, Goat, various Deer species, European Starling, and Common Myna already occur within the subject land or surrounding properties. Notably, the proposed action is not likely to introduce or increase the numbers of exotic avifauna present in the area. In addition, feral animal management measures would be implemented to minimise the risk of exotic pest fauna (refer to Section 3.1 and Section 3.3).

In addition, the potential introduction of invasive species into Gang-gang Cockatoo habitat would be minimised and mitigated during construction and operation by the measures outlined in the Biodiversity and Rehabilitation Management Plan.

Consideration of the above information indicates that the proposed development is unlikely to result in invasive species that are harmful to Gang-gang Cockatoo becoming established in the species' habitat.

Is there a real chance or possibility that the action will introduce disease that may cause the species to decline?

Gang-gang Cockatoos are known to be susceptible to Psittacine Beak and Feather Disease (PBFD). This infectious disease is capable of causing very high death rates in nestlings, and the potential effects of the disease on parrot populations vary from inconsequential to devastating, depending on environmental conditions and the general health and immunity of the parrots. The disease can be introduced to threatened populations of parrots via the movements of common species carrying the disease.

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While extent of the disease is known in some populations due to high prevalence (i.e. the subpopulation of Gang-gang Cockatoo in the Hornsby and Ku-ring-gai LGAs), the extent in other subpopulations, including those in the Canberra region, is largely unknown.

However, there is no reason to believe that the development of a quarry and associated infrastructure would introduce this disease or increase its prevalence in the population. The proposed action is therefore considered unlikely to introduce disease that may cause the species to decline.

Is there a real chance or possibility that the action will interfere with the recovery of the species?

As detailed in DAWE (2022), actions that remove habitat critical to survival would interfere with the recovery of Gang-gang Cockatoos. If removal of habitat critical to the survival cannot be avoided or mitigated, then an offset must be provided. Suitable offsets may include the following.

- Restoration of the quality and extent of feeding and breeding habitat.
- Restoration of native forest and woodlands adjacent to habitat critical to the survival to reduce edge effects.
- Management of threats in and adjacent to habitat critical to the survival.
- Other compensatory measures that will help address knowledge gaps to improve and maximise efficiency of the recovery of the species.

The proposed action would directly impact 48.08 ha of Gang-gang Cockatoo foraging habitat. However, as per Section 3.5.2, these impacts would ultimately be offset through the BOS via the purchase and retirement of 'like-for-like' ecosystem credits that are generated by a Biodiversity Stewardship Site. Ideally, these ecosystem credits would be generated by either an existing, nearby Biodiversity Stewardship Site or by establishing a Biodiversity Stewardship Site in the subject land. In such an instance, the generation of 'like-for-like' ecosystem credits would likely represent appropriate Gang-gang Cockatoo foraging habitat.

Conclusion

The proposed action is likely to have a significant impact on Gang-gang Cockatoo through a reduction in the AOO by 48.08 ha of foraging habitat, all of which meets the definition of 'habitat critical to the survival of the species' as per DAWE (2022). Accordingly, EPBC Act referral for impacts to Gang-gang Cockatoo is considered warranted and is recommended.

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H.3. Key's Matchstick Grasshopper *Keyacris scurra* (EPBC Act endangered)

The EPBC Act *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013a) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon an EPBC Act listed 'critically endangered or endangered ecological species'. An assessment of the proposed action against each of these criteria is provided below.

Is there a real chance or possibility that the action will:

- **lead to a long-term decrease in the size of a population**

  and/or

- **reduce the area of occupancy of the species**

Within the subject land, Key's Matchstick Grasshopper was recorded in two locations, both of which were adjacent to the Goulburn Bombala Rail Line in PCT3375 Zone 1 (Figure 13). These areas were characterised by a partially open canopy (i.e. a scattered canopy as opposed to a dense canopy) combined with a diverse and native dominate groundstorey that contained areas of bare ground and a substantial component of Kangaroo Grass. In total, the subject land was estimated to support 3.08 ha of Key's Matchstick Grasshopper habitat in PCT3375 Zone 1, PCT3376 Zone 1, and PCT3376 Zone 2.

Based on the condition of the surrounding vegetation, it is likely that the identified Keys Matchstick Grasshopper habitat extends to both the east and west of the Quarry Access Road. Indeed, as noted in NSW Threatened Species Scientific Committee (2020d)[84], the species is known to occur frequently "along the railway easement between Tralee and Williamsdale". Taking into account the characteristically suitable habitat that adjoins the recorded habitat in the subject land, the 'local population' is estimated to have access to 15.07 ha of characteristically suitable habitat.

In 2020, the area of occupancy was estimated to be 124 km^2 (12,400 ha) (NSW Threatened Species Scientific Committee 2020d). However, following the species listing under both the EPBC Act and BC Act, more intensive targeted surveys for the species have occurred throughout the species' range. As such, the estimated AOO is likely to be larger than previously reported. This assumption is supported by the increase in species records, with 66% of records on BioNet[85] and 71% of records on NaturMapr[86] being added since 2020. Within the immediate locality, Key's Matchstick Grasshopper have been recorded in 11 other distinct locations within 10 km of the subject land (ref BioNet and NatureMapr).

The proposed action would directly impact 2.35 ha of Key's Matchstick Grasshopper habitat. This represents 76% of the habitat in the subject land, 16% of the characteristically suitable habitat that is available to the local population, 1 of 12 populations that occur within 10 km of the subject land, and 0.02% of the AOO. Given that the species can persist in small areas of suitable habitat (NSW Threatened Species Scientific Committee 2020d, NSW Threatened Species Scientific Committee

[84] NSW Threatened Species Scientific Committee (2020d). *Conservation Assessment of Keyacris scurra (Rehn 1952) Key's Matchstick Grasshopper (Morabidae)*. Ben Hope and Brad Law, Version 2, June 2020.
[85] 39 of 59 records have been added since 2020.
[86] 144 of 201 records have been added since 2020.

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2020e[87], ACT Government 2023[88]), the local population is considered likely to have sufficient suitable habitat available to persist on either side of the Quarry Access Road post-development.

In conclusion, the proposed action may lead to a long-term decrease in the size of a population as 16% of the characteristically suitable habitat that is available to the local population would be impacted. That said, the local population is considered likely to have sufficient suitable habitat available to persist on either side of the Quarry Access Road post-development. Finally, the proposed action would reduce the AOO for the species by 2.35 ha.

Is there a real chance or possibility that the action will fragment an existing population into two or more populations?

As noted above, the local population is estimated to have access to 15.07 ha of characteristically suitable habitat. The proposed action would bisect this area of estimated habitat. Being flightless, Key's Matchstick Grasshopper does not disperse over large distances (NSW Threatened Species Scientific Committee 2020d, NSW Threatened Species Scientific Committee 2020e, ACT Government 2023); even small barriers are therefore likely to impact habitat connectivity for the species. As the disturbance footprint of the Quarry Access Road is approximately 20 – 30 m wide as it passes through the identified Key's matchstick Grasshopper habitat, and will be fenced with a 3 m high Colourbond or wooden fence, the proposed action is considered likely to fragment an existing population into two or more populations.

Is there a real chance or possibility that the action will adversely affect habitat critical to the survival of a species?

Habitat critical to the survival of the species is not defined in any of the Commonwealth, NSW, or ACT conservation assessments, advice, or final determinations. However, based on criteria used for other species listed as endangered pursuant to the EPBC Act, it is likely that occupied Key's Matchstick Grasshopper habitat would classify as 'habitat critical to the survival of the species.'

With consideration of the above, all Key's Matchstick Grasshopper habitat in the subject land is therefore considered habitat critical to the survival of the species. Of that, the proposed action would directly impact 2.35 ha.

Is there a real chance or possibility that the action will disrupt the breeding cycle of a population?

As detailed in NSW Threatened Species Scientific Committee (2020d):

> *There is only one generation a year with no overlapping generations. Hatching from the egg takes place from December to January and eggs are buried in the soil (Rowell and Crawford 1995). Most males become adult by May, but females overwinter as nymphs and do not mature until the spring. Copulation has been observed in nature from September to the end of November. Fecundity is low; the maximum number of eggs obtained from a pair mating in captivity was 21 (White 1956) and eggs are laid in the soil (Rowell and Crawford 1995).*

[87] NSW Threatened Species Scientific Committee (2020e). *Key's Matchstick Grasshopper Keyacris scurra Notice of and reasons for the Final Determination*. Publication date: 17/07/2020

[88] ACT Government (2023). *ACT Nature Conservation (Key's Matchstick Grasshopper) Conservation Advice 2023*. Notifiable instrument NI2023–222.

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As mentioned previously, the proposed action would impact 16% of the characteristically suitable habitat that is available to the local population and is considered likely to fragment the local population. As such, this impact has the potential to disrupt the breeding cycle of a population.

Is there a real chance or possibility that the action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposed action would directly impact 2.35 ha of Key's Matchstick Grasshopper habitat. This represents 76% of the habitat in the subject land, 16% of the characteristically suitable habitat that is available to the local population, 1 of 12 populations that occur within 10 km of the subject land, and 0.02% of the AOO. As mentioned previously, while the proposed action is considered likely to fragment the local population, sufficient suitable habitat is available for the species to persist on either side of the Quarry Access Road post-development.

Beyond the development footprint, unintended impacts would be minimised through the implementation of the following management plans.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

With consideration of the above, the proposed action is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or possibility that the action will result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?

Many of the exotic species which occur in the locality already occur throughout the subject land and broader locality. As such, the proposed action is unlikely to result in the introduction and establishment of additional invasive species. While the construction and operation of the proposed action may temporarily increase the occurrence of the weed species already present, weed management measures would be implemented to minimise the risk of weed introduction and spread (refer to Section 3.1 and Section 3.3).

Additionally, due to the agricultural location of the subject land, a number of exotic pest fauna species such as European Rabbit, European Brown Hare, Feral Pig, Red Fox, Feral Cats, Goat, various Deer species, European Starling, and Common Myna already occur within the subject land or surrounding properties. Notably, the proposed action is not likely to introduce or increase the numbers of exotic avifauna present in the area. In addition, feral animal management measures would be implemented to minimise the risk of exotic pest fauna (refer to Section 3.1 and Section 3.3).

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In addition, the potential introduction of invasive species into Key's Matchstick Grasshopper habitat would be minimised and mitigated during construction and operation by the measures outlined in the Biodiversity and Rehabilitation Management Plan.

Consideration of the above information indicates that the proposed development is unlikely to result in invasive species that are harmful to Key's Matchstick Grasshopper becoming established in the species' habitat.

Is there a real chance or possibility that the action will introduce disease that may cause the species to decline?

The introduction of disease in Key's Matchstick Grasshopper populations is not known to occur as a result of disturbance / development. The proposed action is therefore unlikely to result in the introduction of a disease that may cause the species to the decline.

Is there a real chance or possibility that the action will interfere with the recovery of the species?

No recovery plan for the species has been developed by either the Commonwealth, NSW, or ACT. However, actions that align with the principal threats to the species are likely to interfere with the recovery of the species. As noted in NSW Threatened Species Scientific Committee (2020d), the principal threats are:

- loss of habitat;
- small colony size;
- inappropriate disturbance (e.g. mowing, too frequent or poorly timed burning or over-grazing);
- lack of disturbance leading to regeneration of eucalypts or weed invasion;
- new burials (at active cemetery sites);
- cultivation and pasture improvement;
- urban development;
- insecticides;
- climate change;
- weed invasion; and
- poor understanding on management requirements.

The proposed action would directly impact 2.35 ha of Key's Matchstick Grasshopper habitat. However, as per Section 3.5.2, these impacts would ultimately be offset through the BOS via the purchase and retirement of 'like-for-like' species credits that are generated by a Biodiversity Stewardship Site. As per the like-for-like offset rules, this means impacts on a specific species credit species must be offset with the same threatened species. Through this process, the BOS aims to achieve 'no net loss' to biodiversity. Furthermore, by encouraging the establishment of Biodiversity Stewardship Sites that generate Key's Matchstick Grasshopper credits, the BOS works to protect, manage, and improve Key's Matchstick Grasshopper habitat in perpetuity.

With consideration of the above, the proposed action is therefore considered unlikely to interfere with the recovery of the species.

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Conclusion

The proposed action is likely to have a significant impact on Key's Matchstick Grasshopper through a reduction in the AOO by 2.35 ha of habitat, all of which likely meets the definition of 'habitat critical to the survival of the species' as per DAWE (2022). In addition, the proposed action is considered likely to fragment an existing population into two or more populations and may disrupt the breeding cycle of a population. Accordingly, EPBC Act referral for impacts to Key's Matchstick Grasshopper is considered warranted and is recommended.

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H.4. Small Purple-pea *Swainsona recta* (EPBC Act endangered)

The EPBC Act *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013a) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon an EPBC Act listed 'critically endangered or endangered ecological species'. An assessment of the proposed action against each of these criteria is provided below.

Is there a real chance or possibility that the action will:

- **lead to a long-term decrease in the size of a population**

  and/or

- **reduce the area of occupancy of the species**

At least 150 Small Purple-pea plants were recorded in multiple locations in 2.98 ha along the south-western boundary of the subject land (Figure 9, Plate 3). All plants were located within the fenced area of the Goulburn Bombala Rail Line, which is known as an important area for the species (ACT Government 2019a, DCCEEW 2023b). As such, the species polygon for Small Purple-pea has been defined by the intersection of the fenced area and all vegetation zones with a native dominant groundstorey. Following this method, the subject land is estimated to support 0.42 ha of Small Purple-pea habitat in PCT3375 Zone 1, PCT3376 Zone 1, and PCT3376 Zone 2.

More widely, current population estimates for the species are 9,512 plants which are located at 27 extant sites and have a combined AOO of 34.23 ha (DCCEEW 2023b). Of relevance to the proposed action, the largest known population of about 3,000 plants occurs within approximately 4.5 ha of habitat that is scattered along a 22-30 km section of railway easement between Tralee and Williamsdale, NSW (ACT Government 2019a, DCCEEW 2023b).

The proposed action would directly impact 0.13 ha of habitat which supports approximately seven plants. This impact represents:

- 4% of the habitat and 5% of the plants that occur within the immediately adjacent fenced area of the Goulburn Bombala Rail Line;
- 3% of the habitat and 0.2% of the plants that occur within the 22-30 km section of railway easement between Tralee and Williamsdale, NSW; and
- 0.4% of the habitat and 0.07% of the plants that occur within the AOO.

Based on BioNet and NatureMapr, the closest Small Purple-pea plants to the south of the subject land are 790 m away and were recorded in 1991/92. These plants are therefore considered to be part of a separate population as they are over 500 m from those recorded in the subject land (NSW Office of Environment and Heritage 2012[89], TBDC). As the proposed action impacts the southern-most extent of the 2.98 ha of habitat that occurs within the fenced area of the Goulburn Bombala Rail Line, the proposed action is considered unlikely to bisect a population of Small Purple-pea.

In conclusion, the proposed action is considered unlikely to lead to a long-term decrease in the size of a population given it would not fragment a population and would only impact a small proportion

[89] NSW Office of Environment and Heritage (2012). *National Recovery Plan for Small Purple-pea (Swainsona recta)*. Hurstville, NSW.

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of the habitat and plants that occur within the immediately adjacent fenced area of the Goulburn Bombala Rail Line. However, the proposed action would reduce the AOO for the species by 0.13 ha (0.4%).

Is there a real chance or possibility that the action will fragment an existing population into two or more populations?

As noted above, the closest Small Purple-pea plants to the south of the subject land are 790 m away and were recorded in 1991/92. These plants are therefore considered to be part of a separate population as they are over 500 m from those recorded in the subject land (NSW Office of Environment and Heritage 2012, TBDC). As the proposed action impacts the southern-most extent of the 2.98 ha of habitat that occurs within the fenced area of the Goulburn Bombala Rail Line, the proposed action is considered unlikely to fragment an existing population of Small Purple-pea into two or more populations.

Is there a real chance or possibility that the action will adversely affect habitat critical to the survival of a species?

As per DCCEEW (2023b) and NSW Office of Environment and Heritage (2012):

> *Given the small number of extant populations, small area of occupancy and the reliance on in-situ protection for the conservation of the species, all occupied habitat is critical to the survival of the small purple pea.*

All of the Small Purple-pea habitat in the subject land is therefore considered habitat critical to the survival of the species. Of that, the proposed action would directly impact 0.13 ha.

Is there a real chance or possibility that the action will disrupt the breeding cycle of a population?

As detailed in DCCEEW (2023b):

> *In autumn and winter (usually from April to August), the small purple pea re-sprouts from underground rootstocks. The species flowers in spring, peaking in a 2–3 week period during October, before dying down in late summer…The seed ripens between early and late December. The plants then die back to the perennial rootstock until they re-sprout again in the following autumn to winter... Pollination appears to be primarily by insects, although plants also appear to have some capacity to self-pollinate… there may be an inbreeding effect in small populations, where most remaining individuals may be closely related… The life span of the species is not known with certainty but given the size of the rootstock and monitoring observations to date it could be as long as 50 years.*

As discussed previously, the proposed action impacts the southern-most extent of the 2.98 ha of habitat that occurs within the fenced area of the Goulburn Bombala Rail Line and is considered unlikely to fragment the existing population. The 0.13 ha impact to seven plants represents 4% of the habitat and 5% of the plants that occur within that 2.98 ha of habitat. Given the remaining habitat, remaining plants, and absence of fragmentation, the proposed action is considered unlikely to disrupt the breeding cycle of a population.

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Is there a real chance or possibility that the action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposed action would directly impact 0.13 ha of Small Purple-pea habitat. This impact represents:

- 4% of the habitat and 5% of the plants that occur within the immediately adjacent fenced area of the Goulburn Bombala Rail Line;
- 3% of the habitat and 0.2% of the plants that occur within the 22-30 km section of railway easement between Tralee and Williamsdale, NSW; and
- 0.4% of the habitat and 0.07% of the plants that occur within the AOO.

In addition to the above, the proposed action is considered unlikely to fragment and existing population or disrupt the breeding cycle of a population. Beyond the development footprint, unintended impacts would be minimised through the implementation of the following management plans.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

With consideration of the above, the proposed action is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or possibility that the action will result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?

Many of the exotic species which occur in the locality already occur throughout the subject land and broader locality. As such, the proposed action is unlikely to result in the introduction and establishment of additional invasive species. While the construction and operation of the proposed action may temporarily increase the occurrence of the weed species already present, weed management measures would be implemented to minimise the risk of weed introduction and spread (refer to Section 3.1 and Section 3.3).

Additionally, due to the agricultural location of the subject land, a number of exotic pest fauna species such as European Rabbit, European Brown Hare, Feral Pig, Red Fox, Feral Cats, Goat, various Deer species, European Starling, and Common Myna already occur within the subject land or surrounding properties. Notably, the proposed action is not likely to introduce or increase the numbers of exotic avifauna present in the area. In addition, feral animal management measures would be implemented to minimise the risk of exotic pest fauna (refer to Section 3.1 and Section 3.3).

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In addition, the potential introduction of invasive species into Small Purple-pea habitat would be minimised and mitigated during construction and operation by the measures outlined in the Biodiversity and Rehabilitation Management Plan.

Consideration of the above information indicates that the proposed development is unlikely to result in invasive species that are harmful to Small Purple-pea becoming established in the species' habitat.

Is there a real chance or possibility that the action will introduce disease that may cause the species to decline?

The introduction of disease in Small Purple-pea populations is not known to occur as a result of disturbance / development. The proposed action is therefore unlikely to result in the introduction of a disease that may cause the species to the decline.

Is there a real chance or possibility that the action will interfere with the recovery of the species?

As detailed in DCCEEW (2023b), all populations of the Small Purple-pea should be considered important for the species' long-term recovery. As per the National Recovery Plan (NSW Office of Environment and Heritage 2012), the recovery objectives for the species are:

- all natural populations are stable or increasing;
- maintain current genetic diversity across the range of the species; and
- achieve formal protection for currently unprotected populations.

The proposed impact to 0.13 ha and seven plants therefore has the potential to interfere with the recovery of the species. As per the National Recovery Plan:

> *In circumstances where loss of individuals is permitted, the loss should be offset by achieving improved long term protection and management of a suitable, currently unreserved population or other compensatory arrangements are agreed to by the consent authority.*

As per Section 3.5.2, the proposed impacts would ultimately be offset through the BOS via the purchase and retirement of 'like-for-like' species credits that are generated by a Biodiversity Stewardship Site. As per the like-for-like offset rules, this means impacts on a specific species credit species must be offset with the same threatened species. Through this process, the BOS aims to achieve 'no net loss' to biodiversity. Furthermore, by encouraging the establishment of Biodiversity Stewardship Sites that generate Small Purple-pea credits, the BOS works to protect, manage, and improve Small Purple-pea credits habitat in perpetuity.

Conclusion

The proposed action is likely to have a significant impact on Small Purple-pea through a reduction in the AOO by 0.13 ha of habitat, all of which meets the definition of 'habitat critical to the survival of the species' as per DCCEEW (2023b). Accordingly, EPBC Act referral for impacts to Small Purple-pea is considered warranted and is recommended.

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H.5. Pale Pomaderris *Pomaderris pallida* (EPBC Act vulnerable)

The EPBC Act *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013a) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon an EPBC Act listed vulnerable species'. An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species;*
- *reduce the area of occupancy of an important population;*
- *fragment an existing important population into two or more populations;*
- *adversely affect habitat critical to the survival of a species;*
- *disrupt the breeding cycle of an important population;*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;*
- *introduce disease that may cause the species to decline; or*
- *interfere substantially with the recovery of the species.*

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans and/or that are:

- *key source populations either for breeding or dispersal;*
- *populations that are necessary for maintaining genetic diversity, and/or*
- *populations that are near the limit of the species' range.*

Assessment of 'important population'

With regard to the above, an obvious precursor to assessing whether the proposed action will have, or are likely to have, a 'significant impact' upon the Pale Pomaderris is to determine whether the population within the subject land constitutes an 'important population', pursuant to the above definition.

Per the relevant Commonwealth Conservation Advice[90] and ACT Nature Conservation Advice[91], Pale Pomaderris occurs in the ACT, NSW, and Victoria. The majority of populations are located along the Murrumbidgee, Cotter, and Paddys Rivers in the ACT. Other populations are known from the Molonglo River, Kydra Trig, Tinderry Nature Reserve, Shoalhaven River, and Queanbeyan River. In NSW, five key sites for priority management have been identified, including Queanbeyan River,

[90] Commonwealth of Australia (2008). Approved *Conservation Advice for Pomaderris pallida*. In effect under the *Environment Protection and Biodiversity Conservation Act 1999* from 1 October 2008.
[91] ACT Government (2019b). *Nature Conservation (Pale Pomaderris) Conservation Advice 2019*. Notifiable instrument NI2019–237, 1 May 2019.

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Tinderry Nature Reserve, Murrumbidgee River, Dangelong Nature Reserve, and Byadbo Wilderness (in Kosciuszko National Park).

In an attempt to gain a greater understanding of the current status of the species, records from BioNet and NatureMapr have been combined and obvious duplicates removed. This information is presented in Figure 17. In summary:

- the species has been recorded from 213 locations;
- the Extent of Occurrence (EOO) is 1,446,918 ha;
- the Area of Occupation (AOO), which has been calculated by applying a 30 m buffer to each record, is 47.58 ha[92]; and
- population size is estimated to be between 7,558 and 35,542 plants, with the large variation due population size range estimates in the data (e.g. population size recorded as being "between 16 and 100 plants").

With respect to the above:

- the subject land does not form part of any of the above noted key populations / management areas;
- the subject land is not near the limit of the species' range; and
- given substantial populations of Pale Pomaderris occur in multiple locations to the north and south of the subject land, the population in the subject land is not considered necessary for maintaining genetic diversity or as a key source population for breeding or dispersal.

The population in the subject land is therefore not considered to be an 'important population' pursuant to the EPBC Act definition. As such, the proposed action would not 'lead to a long-term decrease in the size of an important population', 'significantly reduce the area of occupancy of an important population', 'disrupt the breeding cycle of an important population', or 'fragment an existing important population into two or more populations'.

Assessment of other criteria

A number of the significant impact criteria are of relevance to the species rather than of specific relevance to an 'important population'. An assessment of the proposed action against each of these criteria is provided below.

Is there a real chance or possibility that the action will:

- **adversely affect habitat critical to the survival of a species**

and/or

[92] The 47.58 ha AOO is likely a substantial underestimation of occupied habitat. For example, a nearby population of Pale Pomaderris in Gigerline Nature Reserve occupies an estimated 16 ha and supports over 500 plans (Sam Reid, pers. obs.). As this area is represented by a single point in NatureMapr, the employed methodology only records the occupied habitat as 0.28 ha. Similar situations are likely to exist for much of the data as recorded in BioNet and NatureMapr.

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- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

and/or

- **interfere substantially with the recovery of the species.**

The subject land supports a local population with the following characteristics.

- Recorded in six locations.
- A total of 164 – 264 plants, which the largest subpopulation supporting 150 – 250 plants. The remaining subpopulations support 1 – 10 plants.
- A total of 2.52 ha of habitat.

The proposed action would impact two of the recorded locations, each of which supports a single plant. In total, the proposed development would therefore impact 0.56 ha of habitat. This impact represents:

- 0.8% to 1.2% of the plants that occur in the subject land;
- 22.2% of the habitat that occurs in the subject land;
- 0.006 to 0.026% of the plants that occur in the EOO; and
- 1.2% of the AOO.

As discussed in Commonwealth of Australia (2008) and ACT Government (2019b), Pale Pomaderris is found in dry open forests and shrub communities associated with *Eucalyptus mannifera – E. macrorhyncha – Callitris* Woodland on granite slopes, river slopes, and hillsides. The mid-stratum often has *Grevillea juniperina, Bursaria spinosa, Acacia rubida*, and *Kunzea ericoides*. The ACT sites are only on the eastern banks of the rivers, with an aspect ranging from north-westerly through westerly to southerly. The soils are shallow, pale brown sandy loams over granite rock and large, exposed granite boulders may be present.

Based on the above habitat description, the proposed action is considered unlikely to fragment the remaining populations as sufficient habitat would remain post-development to ensure that they remain connected and viable.

Finally, as per Commonwealth of Australia (2008) and ACT Government (2019b), the main threats to Pale Pomaderris are:

- rural residential development;
- competition from weeds (particularly Blackberry);
- grazing / trampling by deer, horses, goats, cattle, sheep, and rabbits;
- inappropriate fire regimes;
- fragmentation;
- loss of remnant habitat; and
- sediment runoff from the fire trail.

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While the proposed action would impact two plants / 0.56 ha of habitat, the minimisation and mitigation measures detailed in following management plans are considered sufficient to control the risk presented by the above identified threats.

- Water Management Plan.
- Erosion and Sediment Control Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Noise Management Plan.
- Traffic Management Plan.
- Biodiversity and Rehabilitation Management Plan.

With consideration of the above, the proposed action is considered unlikely 'adversely affect habitat critical to the survival of a species' or 'modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline' or 'interfere substantially with the recovery of a species'.

Is there a real chance or possibility that the action will result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Many of the exotic species which occur in the locality already occur throughout the subject land and broader locality. As such, the proposed action is unlikely to result in the introduction and establishment of additional invasive species. While the construction and operation of the proposed action may temporarily increase the occurrence of the weed species already present, weed management measures would be implemented to minimise the risk of weed introduction and spread (refer to Section 3.1 and Section 3.3).

Additionally, due to the agricultural location of the subject land, a number of exotic pest fauna species such as European Rabbit, European Brown Hare, Feral Pig, Red Fox, Feral Cats, Goat, various Deer species, European Starling, and Common Myna already occur within the subject land or surrounding properties. Notably, the proposed action is not likely to introduce or increase the numbers of exotic avifauna present in the area. In addition, feral animal management measures would be implemented to minimise the risk of exotic pest fauna (refer to Section 3.1 and Section 3.3).

In addition, the potential introduction of invasive species into Pale Pomaderris habitat would be minimised and mitigated during construction and operation by the measures outlined in the Biodiversity and Rehabilitation Management Plan.

Consideration of the above information indicates that the proposed development is unlikely to result in invasive species that are harmful to Pale Pomaderris becoming established in the species' habitat.

Is there a real chance or possibility that the action will introduce disease that may cause the species to decline?

The introduction of disease in Pale Pomaderris populations is not known to occur as a result of disturbance / development. The proposed action is therefore unlikely to result in the introduction of a disease that may cause the species to the decline.

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Conclusion

Based on the above assessment, it is unlikely that the proposed action would have, or is likely to have, a significant impact on the Pale Pomaderris or an important population of the Pale Pomaderris under any criterion relevant to EPBC listed 'vulnerable' species per the EPBC Act *Matters of National Environmental Significance – Significant Impact Guidelines 1.1.*

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Appendix I. BAM Summary Reports

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BAM Vegetation Zones Report

Proposal Details

Assessment Id
00049505/BAAS20006/24/00049506

Assessment name
3289 Monaro Rock - SSD-BDAR - BAM Stage 2 - Impact and Indirect Impact - Draft 03

BAM data last updated *
05/08/2025

Assessor Name
Samuel F Reid

Report Created
08/08/2025

BAM Data version *
Current classification (live - default) (82)

Assessor Number
BAAS20006

Assessment Type
Major Projects

BAM Case Status
Finalised

Assessment Revision
3

BOS entry trigger

Date Finalised
08/08/2025

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3375_Zone_01	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_01	29.57	4	

2	3375_Zone_02	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_02	15.92	3	
3	3375_Zone_03	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_03	5.49	3	
4	3375_Zone_04	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_04	2.88	2	
5	3375_Zone_05	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_05	0.73	1	
6	3375_Zone_06	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_06	0.8	1	
7	3376_Zone_01	3376-Southern Tableland Grassy Box Woodland	Zone_01	12.29	3	
8	3376_Zone_02	3376-Southern Tableland Grassy Box Woodland	Zone_02	10.15	3	
9	3375_Zone_01_20p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_01_20p	9.24	3	
10	3375_Zone_02_20p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_02_20p	4.18	2	
11	3375_Zone_03_20p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_03_20p	0.35	1	
12	3375_Zone_04_20p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_04_20p	0.03	1	
13	3375_Zone_06_20p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_06_20p	0.14	1	

14	3376_Zone_01_20p	3376-Southern Tableland Grassy Box Woodland	Zone_01_20p	1.7	1	
15	3376_Zone_02_20p	3376-Southern Tableland Grassy Box Woodland	Zone_02_20p	0.14	1	
16	3375_Zone_01_10p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_01_10p	19.54	3	
17	3375_Zone_02_10p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_02_10p	3.49	2	
18	3375_Zone_03_10p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_03_10p	0.13	1	
19	3375_Zone_04_10p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_04_10p	0.47	1	
20	3375_Zone_06_10p	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Zone_06_10p	0.23	1	
21	3376_Zone_01_10p	3376-Southern Tableland Grassy Box Woodland	Zone_01_10p	3.03	2	
22	3376_Zone_02_10p	3376-Southern Tableland Grassy Box Woodland	Zone_02_10p	0.52	1	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00049505/BAAS20006/24/00049506	3289 Monaro Rock - SSD-BDAR - BAM Stage 2 - Impact and Indirect Impact - Draft 03	05/08/2025
Assessor Name	**Report Created**	**BAM Data version ***
Samuel F Reid	08/08/2025	Current classification (live - default) (82)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS20006	Major Projects	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
3		08/08/2025

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

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

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Diamond Firetail	Stagonopleura guttata	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Eastern False Pipistrelle	Falsistrellus tasmaniensis	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Flame Robin	Petroica phoenicea	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Gang-gang Cockatoo	Callocephalon fimbriatum	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland

Grey-headed Flying-fox	Pteropus poliocephalus	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Large Bent-winged Bat	Miniopterus orianae oceanensis	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Little Eagle	Hieraaetus morphnoides	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Little Lorikeet	Glossopsitta pusilla	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Little Whip Snake	Suta flagellum	3376-Southern Tableland Grassy Box Woodland
Olive Whistler	Pachycephala olivacea	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Regent Honeyeater	Anthochaera phrygia	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Rosenberg's Goanna	Varanus rosenbergi	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Scarlet Robin	Petroica boodang	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
South-eastern Hooded Robin	Melanodryas cucullata cucullata	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Southern Whiteface	Aphelocephala leucopsis	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Speckled Warbler	Chthonicola sagittata	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Spotted Harrier	Circus assimilis	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Spotted-tailed Quoll	Dasyurus maculatus	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Square-tailed Kite	Lophoictinia isura	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Swift Parrot	Lathamus discolor	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Turquoise Parrot	Neophema pulchella	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest

Varied Sittella	Daphoenositta chrysoptera	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
White-bellied Sea-Eagle	Haliaeetus leucogaster	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
White-throated Needletail	Hirundapus caudacutus	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3376-Southern Tableland Grassy Box Woodland

Threatened species Manually Added

None added

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

Common Name	Scientific Name	Plant Community Type(s)
Australasian Bittern	Botaurus poiciloptilus	3376-Southern Tableland Grassy Box Woodland
Black-necked Stork	Ephippiorhynchus asiaticus	3375-Monaro-Queanbeyan Rolling Hills Grassy Forest
		3376-Southern Tableland Grassy Box Woodland

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

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Australasian Bittern	Botaurus poiciloptilus	Habitat constraints
Black-necked Stork	Ephippiorhynchus asiaticus	Habitat constraints

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00049505/BAAS20006/24/00049506	3289 Monaro Rock - SSD-BDAR - BAM Stage 2 - Impact and Indirect Impact - Draft 03	05/08/2025
Assessor Name	**Report Created**	**BAM Data version ***
Samuel F Reid	08/08/2025	Current classification (live - default) (82)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS20006	Major Projects	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
3		08/08/2025

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

List of Species Requiring Survey

Name	Presence	Survey Months
Aprasia parapulchella Pink-tailed Legless Lizard	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Callocephalon fimbriatum Gang-gang Cockatoo	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Dillwynia glaucula Michelago Parrot-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus aggregata Black Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Keyacris scurra Key's Matchstick Grasshopper	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Leucochrysum albicans subsp. tricolor Hoary Sunray	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox connivens Barking Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox strenua Powerful Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pomaderris pallida Pale Pomaderris	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Prasophyllum petilum Tarengo Leek Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Rutidosis leptorrhynchoides Button Wrinklewort	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Swainsona recta Small Purple-pea	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Swainsona sericea Silky Swainson-pea	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Synemon plana Golden Sun Moth	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Brush-tailed Phascogale	Phascogale tapoatafa	Refer to BAR
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Buttercup Doubletail	Diuris aequalis	Refer to BAR
Creeping Hop-bush	Dodonaea procumbens	Refer to BAR

Eastern Pygmy-possum	Cercartetus nanus	Refer to BAR
Giant Burrowing Frog	Heleioporus australiacus	Refer to BAR
Green and Golden Bell Frog	Litoria aurea	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Koala	Phascolarctos cinereus	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Mauve Burr-daisy	Calotis glandulosa	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Silver-leafed Gum	Eucalyptus pulverulenta	Refer to BAR
Southern Bell Frog	Litoria raniformis	Refer to BAR
Southern Greater Glider	Petauroides volans	Refer to BAR
Southern Myotis	Myotis macropus	Habitat constraints
Squirrel Glider	Petaurus norfolcensis	Refer to BAR
Striped Legless Lizard	Delma impar	Refer to BAR
Swift Parrot	Lathamus discolor	Habitat constraints
Yellow-spotted Tree Frog	Litoria castanea	Refer to BAR

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00049505/BAAS20006/24/00049506

Proposal Name
3289 Monaro Rock - SSD-BDAR - BAM Stage 2 - Impact and Indirect Impact - Draft 03

BAM data last updated *
05/08/2025

Assessor Name
Samuel F Reid

Assessor Number
BAAS20006

BAM Data version *
Current classification (live - default) (82)

Proponent Names

Report Created
08/08/2025

BAM Case Status
Finalised

Assessment Revision
3

BOS entry trigger

Assessment Type
Major Projects

Date Finalised
08/08/2025

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	3376-Southern Tableland Grassy Box Woodland

Species
Pomaderris pallida / Pale Pomaderris

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Botaurus poiciloptilus / Australasian Bittern
Ephippiorhynchus asiaticus / Black-necked Stork

BAM Biodiversity Credit Report (Like for like)

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3375-Monaro-Queanbeyan Rolling Hills Grassy Forest	Not a TEC	93.2	1237	164	1401
3376-Southern Tableland Grassy Box Woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	27.8	465	0	465

3375-Monaro-Queanbeyan Rolling Hills Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_01	Yes	1052	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_02	No	146	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_03	Yes	126	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_04	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_05	No	7	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_06	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_01_20p	Yes	32	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_02_20p	No	8	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_03_20p	Yes	1	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_04_20p	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_06_20p	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_01_10p	Yes	25	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_02_10p	No	3	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_03_10p	Yes	1	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_04_10p	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3365, 3366, 3367, 3368, 3369, 3370, 3372, 3373, 3374, 3375, 3376, 3377	Southern Tableland Grassy Woodlands >=50% and <70%	3375_Zone_06_10p	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

3376-Southern Tableland Grassy Box Woodland	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597,	-	3376_Zone_01	Yes	455	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281,	-	3376_Zone_02	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW	-	3376_Zone_01_20p	Yes	6	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376,					

	3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597,	-	3376_Zone_02_20p	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281,	-	3376_Zone_01_10p	Yes	4	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW	-	3376_Zone_02_10p	No	0	Monaro, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376,					

	3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	**3375_Zone_01, 3375_Zone_02, 3375_Zone_03, 3375_Zone_04, 3376_Zone_01, 3376_Zone_02**	40.0	1127.00
Keyacris scurra / Key's Matchstick Grasshopper	**3375_Zone_01, 3376_Zone_01**	2.4	93.00
Pomaderris pallida / Pale Pomaderris	**3375_Zone_01**	0.6	34.00
Swainsona recta / Small Purple-pea	**3375_Zone_01, 3376_Zone_01**	0.1	4.00
Swainsona sericea / Silky Swainson-pea	**3375_Zone_01, 3375_Zone_02, 3376_Zone_01, 3376_Zone_02**	2.7	76.00

Credit Retirement Options

Like-for-like credit retirement options

	Spp	IBRA subregion
Aprasia parapulchella / Pink-tailed Legless Lizard	**Aprasia parapulchella /** Pink-tailed Legless Lizard	Any in NSW

Keyacris scurra / Key's Matchstick Grasshopper	Spp	IBRA subregion
	Keyacris scurra / Key's Matchstick Grasshopper	Any in NSW
Pomaderris pallida / Pale Pomaderris	Spp	IBRA subregion
	Pomaderris pallida / Pale Pomaderris	Any in NSW
Swainsona recta / Small Purple-pea	Spp	IBRA subregion
	Swainsona recta / Small Purple-pea	Any in NSW
Swainsona sericea / Silky Swainson-pea	Spp	IBRA subregion
	Swainsona sericea / Silky Swainson-pea	Any in NSW

BAM Credit Summary Report

Proposal Details

Assessment Id
00049505/BAAS20006/24/00049506

Proposal Name
3289 Monaro Rock - SSD-BDAR - BAM Stage 2 - Impact and Indirect Impact - Draft 03

BAM data last updated *
05/08/2025

Assessor Name
Samuel F Reid

Report Created
08/08/2025

BAM Data version *
Current classification (live - default) (82)

Assessor Number
BAAS20006

BAM Case Status
Finalised

Date Finalised
08/08/2025

Assessment Revision
3

BOS entry trigger

Assessment Type
Major Projects

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Monaro-Queanbeyan Rolling Hills Grassy Forest												
1	3375_Zone_01	Not a TEC	81.3	81.3	29.6	PCT Cleared - 61%	High Sensitivity to Gain			1.75		1052

2	3375_Zone_02	Not a TEC	21	21.0	15.9	PCT Cleared - 61%	High Sensitivity to Gain			1.75		146
3	3375_Zone_03	Not a TEC	52.4	52.4	5.5	PCT Cleared - 61%	High Sensitivity to Gain			1.75		126
4	3375_Zone_04	Not a TEC	10.9	10.9	2.9	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
5	3375_Zone_05	Not a TEC	20.4	20.4	0.73	PCT Cleared - 61%	High Sensitivity to Gain			1.75		7
6	3375_Zone_06	Not a TEC	6.7	6.7	0.8	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
9	3375_Zone_01_20p	Not a TEC	81.3	8.0	9.2	PCT Cleared - 61%	High Sensitivity to Gain			1.75		32
10	3375_Zone_02_20p	Not a TEC	21	4.5	4.2	PCT Cleared - 61%	High Sensitivity to Gain			1.75		8
11	3375_Zone_03_20p	Not a TEC	52.4	9.7	0.35	PCT Cleared - 61%	High Sensitivity to Gain			1.75		1
12	3375_Zone_04_20p	Not a TEC	10.9	0.8	0.03	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0

13	3375_Zone_06_20p	Not a TEC	6.7	1.0	0.14	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
16	3375_Zone_01_10p	Not a TEC	81.3	2.9	19.5	PCT Cleared - 61%	High Sensitivity to Gain			1.75		25
17	3375_Zone_02_10p	Not a TEC	21	2.1	3.5	PCT Cleared - 61%	High Sensitivity to Gain			1.75		3
18	3375_Zone_03_10p	Not a TEC	52.4	3.5	0.13	PCT Cleared - 61%	High Sensitivity to Gain			1.75		1
19	3375_Zone_04_10p	Not a TEC	10.9	0.4	0.47	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
20	3375_Zone_06_10p	Not a TEC	6.7	0.5	0.23	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
											Subtotal	**1401**

Southern Tableland Grassy Box Woodland												
7	3376_Zone_01	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	59.3	59.3	12.3	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	455

8	3376_Zone_02	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	14.4	14.4	10.2	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

14	3376_Zone_01_20p	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	59.3	6.1	1.7	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	6

15	3376_Zone_02_20p	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	14.4	0.7	0.14	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

21	3376_Zone_01_10p	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	59.3	2.2	3	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	4

22	3376_Zone_02_10p	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	14.4	0.2	0.52	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
											Subtotal	**465**
											Total	**1866**

Species credits for threatened species

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

Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
3375_Zone_01	81.3	81.3	17.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	711
3375_Zone_02	21.0	21.0	5.6	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	59
3375_Zone_03	52.4	52.4	3.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	89
3375_Zone_04	10.9	10.9	2.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	13
3376_Zone_01	59.3	59.3	7.8	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	231
3376_Zone_02	14.4	14.4	3.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	24
								Subtotal	**1127**

Keyacris scurra / Key's Matchstick Grasshopper (Fauna)									
3375_Zone_01	81.3	81.3	2.1	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Endangered	Endangered	False	84
3376_Zone_01	59.3	59.3	0.29	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Endangered	Endangered	False	9
								Subtotal	**93**
Pomaderris pallida / Pale Pomaderris (Flora)									
3375_Zone_01	81.3	81.3	0.56	Biodiversity Conservation Act listing status	Reproductive Strategy	Vulnerable	Vulnerable	True	34
								Subtotal	**34**
Swainsona recta / Small Purple-pea (Flora)									
3375_Zone_01	81.3	81.3	0.06	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Endangered	False	2
3376_Zone_01	59.3	59.3	0.07	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Endangered	False	2
								Subtotal	**4**

Swainsona sericea / Silky Swainson-pea (Flora)									
3375_Zone_01	81.3	81.3	1.6	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Not Listed	False	65
3375_Zone_02	21.0	21.0	0.42	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Not Listed	False	4
3376_Zone_01	59.3	59.3	0.1	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Not Listed	False	3
3376_Zone_02	14.4	14.4	0.54	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Not Listed	False	4
								Subtotal	**76**