



Googong Township – Neighbourhoods 3 to 5

Biodiversity Certification Assessment Report

Draft 07 – March 2021

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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

Googong Township Pty Ltd (GTPL) is currently progressing with the planning and approval process to develop Googong Township Neighbourhoods 3 to 5 (the 'proposed development'), comprising Lots 10, 11, and 42 DP754881, Lots 1 and 2 DP1231713, Lot 121 DP1240191, Lot 901 DP1242930, and Lots 6 and 7 DP1246784, Googong, NSW (the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by GTPL to complete the necessary biodiversity surveys and prepare this Biodiversity Certification Assessment Report (BCAR) to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

Scope

Although general biodiversity values are identified and considered, the primary purpose of this BCAR 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).

The development of the majority of Googong Township was subject to a Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral (EPBC Act Ref: 2011/5859) and corresponding EPBC Act approval. With respect to the subject land of this BCAR, all areas except for a small section in the south-west (known as the 'Hamson' property) were included in the EPBC Act referral. Therefore, this BCAR only includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the EPBC Act for the Hamson property. Any development of the subject land outside of the Hamson property must occur in accordance with the EPBC Act approval and associated conditions.

The 'study area' for this BCAR encompasses a total area of 261.43 ha. The 'subject land' for this BCAR, encompassing a total area of 152.18 ha, relates only to the portion of the study area which will be impacted by the proposed development. Extending the area of investigation to include the larger study area ensured that all of the potential biodiversity values present in the locality were identified. The impact of the proposed development is subsequently determined based on the biodiversity values which occur within the subject land.

Survey overview

Vegetation and potential flora/fauna habitat were surveyed and mapped in accordance with the BAM. This involved the following 10 ecological surveys performed by Capital Ecology between 11 September 2018 and 5 February 2019:

- Plant Community Types and Vegetation Zone assessment and mapping;
- BAM plots;
- a remnant tree survey;
- threatened flora surveys via random meander, surveys of rocky areas, and opportunistic observations;
- threatened bird surveys via random meander and opportunistic observations;
- a fauna nesting survey via inspections of each tree in the subject land for signs of fauna breeding in hollows or nests;

- surveys for the Koala *Phascolarctos cinereus* by inspecting each tree for signs of Koala occupation (e.g. presence of individuals, characteristic scratch marks);
- surveys for the Pink-tailed Worm-lizard *Aprasia parapulchella* via an intensive rock turning survey consistent with the Commonwealth guidelines;
- a full program of targeted Golden Sun Moth *Synemon plana* surveys involving belt transects on four separate days following methodology consistent with the Commonwealth guidelines; and
- ANABAT® surveys for threatened bats.

Results

Native vegetation

The subject land supports three Plant Community Types (PCTs).

- PCT999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion.
- PCT1110 – River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Bioregion.
- PCT1334 – Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion.

Before European occupation, the majority of the subject land would have been characterised by woody PCTs, the exception being the low-lying area associated with Montgomery Creek which is likely to have historically supported natural moist tussock grassland. The subject land has been substantially modified by its current and past land use, which has primarily been Merino sheep grazing with some cattle grazing in recent years. Approximately 89% of the original woody vegetation (canopy, midstorey, and shrubstorey) was historically cleared across the subject land to promote the pastoral productivity of the land. The areas which retain some of the original canopy trees have still undergone substantial historic thinning. The prolonged period (at least several decades) of high intensity stock grazing has prevented regeneration of the overstorey and midstorey and depleted the native species diversity in the groundstorey. The resulting vegetation across the subject land is characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native grasses.

The paddock in the eastern extent of the subject land is the only portion of the study area where some canopy regeneration has been permitted to establish. It is also evident that parts of the study area have been historically sown to crops and/or pasture improved; these include the paddock in the west of the study area which has been recently cultivated and sown to Oats *Avena sativa*, and the low-lying land associated with Montgomery Creek which has a substantial cover of Clover *Trifolium* spp. and Phalaris *Phalaris aquatica*.

The study area also extends into the Pink-tailed Worm-lizard (PTWL) Conservation Area. While majority of the canopy, midstorey, and shrubstorey have been historically cleared across this area, the groundstorey has not been disturbed to the same extent as much of the study area. The 54 ha PTWL Conservation Area is known to support 47.3 ha of Pink-tailed Worm-lizard *Aprasia parapulchella* habitat, including all 24.2 ha of the very high quality habitat that occurs in Googong Township, together with the majority of the high quality habitat (6.66 ha or 58.8%) and medium quality habitat (15.26 ha or 66.7%).

Threatened ecological communities

PCT1334 is one of the PCTs identified as constituting the threatened ecological community (TEC) *White Box Yellow Box Blakely's Red Gum Woodland* (BC Act) and *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EPBC Act). This community is commonly referred to as Box-Gum Woodland.

Assessments of structure and floristic composition determined that the vegetation zones PCT1334 Zones 1, 2, 4, and 5 support vegetation which meets the criteria for this TEC under the BC Act

As mentioned previously, the development of the majority of Googong Township was subject to an EPBC Act referral (EPBC Act Ref:2011/5859) and corresponding EPBC Act approval. With respect to the subject land of this BCAR, all areas except for a small section in the south-west (known as the 'Hamson' property) were included in the EPBC Act referral. Therefore, this BCAR only includes assessment of the potential impacts of the proposed development on MNES listed pursuant to the EPBC Act for the Hamson property. Assessments of structure and floristic composition determined that none of the vegetation zones which occur in the Hamson property meet the listing criteria for the EPBC Act listed TEC.

Threatened species

Dusky Woodswallow *Artamus cyanopterus* (BC Act vulnerable), Large Bent-winged Bat *Miniopterus orianae oceanensis* (BC Act vulnerable), and Eastern False Pipistrelle *Falsistrellus tasmaniensis* (BC Act vulnerable) were recorded in the study area. While not detected during the current surveys, previous ecological studies of the study area recorded non-breeding observations of White-fronted Chat *Epthianura albifrons* (BC Act vulnerable), Scarlet Robin *Petroica boodang* (BC Act vulnerable), and Flame Robin *Petroica phoenicea* (BC Act vulnerable).

Pink-tailed Worm-lizards were found in the south-eastern corner of the study area. This area is zoned 'E2 – Environmental Conservation' and will not be impacted by the proposed development. Pink-tailed Worm-lizards are also known to occur throughout most of the PTWL Conservation Area, and additional habitat was also found in the study area along the boundary which adjoins the PTWL Conservation Area. In total, the study area is estimated to support 34.50 ha of Pink-tailed Worm-lizard habitat, 2.63 ha (7.6%) of which occurs in the subject land and will be impacted by the proposed development.

The historic activities which have occurred across much of the study area have substantially degraded the habitat value for threatened flora. As a result, no threatened flora species were recorded in the subject land or wider study area.

No Golden Sun Moths were detected across the four surveys. This result is consistent with previous Golden Sun Moth surveys in Googong Township.

No Koalas were detected in the study area. This result is consistent with previous ecological surveys in Googong Township.

Impacts

Native vegetation and threatened species habitat

The proposed development will result in the clearance of the following.

PCT999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion

- 1.26 ha of PCT999 Zone 1 – moderate diversity, native dominant remnant vegetation (BC Act native vegetation).
- 7.77 ha of PCT999 Zone 2 – low diversity, native dominant remnant vegetation (BC Act native vegetation).
- 0.08 ha of PCT999 Zone 3 – moderate diversity, native dominant derived grassland (BC Act native vegetation).
- 55.02 ha of PCT999 Zone 4 – low diversity, native dominant derived grassland (BC Act native vegetation).
- 1.01 ha of PCT999 Zone 5 – low diversity, exotic dominant remnant vegetation (BC Act native vegetation).

PCT1334 – Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion

- 5.04 ha of PCT1334 Zone 2 – low diversity, native dominant remnant vegetation (BC Act native vegetation, BC Act Box-Gum Woodland).
- 48.55 ha of PCT1334 Zone 4 – low diversity, native dominant derived grassland (BC Act native vegetation, BC Act Box-Gum Woodland).

Threatened species habitat

- 2.63 ha of Pink-tailed Worm-lizard habitat (BC Act vulnerable, EPBC Act vulnerable), located in PCT999 Zones 1 to 5 and PCT1334 Zones 2 and 4.

Hollow bearing trees

- 208 mature remnant trees, 49 of which contain at least one functional hollow.

In total, the proposed development will result in the clearance of 118.73 ha of BC Act native vegetation, 53.59 ha of which meets the criteria of BC Act Box-Gum Woodland and 2.63 ha of which supports Pink-tailed Worm-lizard habitat. The proposed development will not result in any other direct impacts on native vegetation or threatened species habitat.

The subject land contains the following vegetation with a vegetation integrity score that requires offsetting for impacts on ecosystem credits.

- PCT999 Zone 1 – vegetation integrity score of 36.0, proposed clearance of 1.26 ha.
- PCT999 Zone 2 – vegetation integrity score of 26.8, proposed clearance of 7.77 ha.
- PCT999 Zone 3 – vegetation integrity score of 28.8, proposed clearance of 0.08 ha.

- PCT999 Zone 5 – vegetation integrity score of 28.6, proposed clearance of 1.01 ha.
- PCT1334 Zone 2 – vegetation integrity score of 26.6, proposed clearance of 5.04 ha.
- PCT1334 Zone 4 – vegetation integrity score of 24.5, proposed clearance of 48.55 ha.

The subject land supports PCT1334, an ecological community which is listed as a serious and irreversible impacts (SAII) entity. Accordingly, the proposed removal of 53.59 ha could result in a SAII on a BC Act listed entity.

The proposed development will impact 2.63 ha of Pink-tailed Worm-lizard habitat. As detailed below, the impacts on Pink-tailed Worm-lizard require offsetting for impacts on species credit species.

- Pink-tailed Legless Lizard *Aprasia parapulchella* – habitat condition (vegetation integrity) loss ranging from 15.6 to 36.0, total proposed clearance of 2.63 ha.

The proposed development will not result in any other direct impacts on native vegetation or threatened species habitat and is unlikely to result in biodiversity impacts that are unforeseen or uncertain.

Exotic vegetation

The proposed development will also result in the clearance of the following.

PCT999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion

- 10.25 ha of PCT999 Zone 6 – low diversity, exotic dominant derived grassland.

PCT1110 – River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Bioregion

- 9.53 ha of PCT1110 Zone 1 – low diversity, exotic dominant grassland.

PCT1334 – Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion

- 11.54 ha of PCT1334 Zone 6 – low diversity, exotic dominant derived grassland.

These zones are clearly dominated by exotic grasses and forbs, do not meet the definition of BC Act native vegetation, and are not identified as habitat for threatened species. Therefore, these zones do not require further assessment with respect to ecosystem credits or species credits.

Assessment and Approval Requirements

Commonwealth EPBC Act

The proposed development is unlikely to have a significant impact on EPBC Act listed flora or ecological communities given the subject land does not:

- support any EPBC Act listed flora species; or
- support any EPBC Act listed ecological communities;

As detailed above, the subject land does support EPBC Act listed threatened species habitat (i.e. Pink-tailed Worm-lizard habitat). The impact of the proposed development of the subject land on Pink-tailed Worm-lizard was included in the EPBC Act referral (EPBC Act Ref:2011/5859) and corresponding EPBC Act approval for the Googong Township. As such, the impact of the proposed development will be mitigated via the implementation of the mitigation/offset measures committed to and approved for the impact of the entire Googong Township (as approved by both the former Commonwealth Department of the Environment and the former NSW Department of Planning with endorsement by the former NSW Office and Environment and Heritage). Accordingly, specific assessment of the impact of the proposed development on the Pink-tailed Worm-lizard as a standalone impact is unnecessary.

In accordance with the above, referral of the proposed action under the provisions of the EPBC Act is unwarranted and is not recommended.

NSW BC Act – Biodiversity Offset Credit calculations

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

- PCT999 Zone 1 – clearance of 1.26 ha which generates 17 ecosystem credits.
- PCT999 Zone 2 – clearance of 7.77 ha which generates 78 ecosystem credits.
- PCT999 Zone 3 – clearance of 0.08 ha which generates 1 ecosystem credits.
- PCT999 Zone 5 – clearance of 1.01 ha which generates 11 ecosystem credits.
- PCT1334 Zone 2 – clearance of 5.04 ha which generates 67 ecosystem credits.
- PCT1334 Zone 4 – clearance of 45.55 ha which generates 594 ecosystem credits.

In total, impacts associated with the proposed development will generate 107 PCT999 ecosystem credits and 661 PCT1334 ecosystem credits, as determined by the BAM Calculator on 11 March 2021.

The proposed development will involve the clearance of threatened species habitat which generates the following species credits.

- Pink-tailed Legless Lizard *Aprasia parapulchella* – clearance of 2.63 ha generates 31 species credits.

In total, impacts associated with the proposed development will generate 31 Pink-tailed Worm-lizard species credits, as determined by the BAM Calculator on 11 March 2021.

1 Introduction

Googong Township Pty Ltd (GTPL) is currently progressing with the planning and approval process to develop Googong Township Neighbourhoods 3 to 5 (the 'proposed development'), comprising Lots 10, 11, and 42 DP754881, Lots 1 and 2 DP1231713, Lot 121 DP1240191, Lot 901 DP1242930, and Lots 6 and 7 DP1246784, Googong, NSW (the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by GTPL to complete the necessary biodiversity surveys and prepare this Biodiversity Certification Assessment Report (BCAR) to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

Although general biodiversity values are identified and considered, the primary purpose of this BCAR is to present the results of Capital Ecology's application of the NSW *Biodiversity Assessment Method* (BAM) (NSW Government 2017a¹) 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).

The development of the majority of Googong Township was subject to a Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral (EPBC Act Ref:2011/5859) and corresponding EPBC Act approval. With respect to the subject land of this BCAR, all areas except for a small section in the south-west (known as the 'Hamson' property) were included in the EPBC Act referral (Figure 2). Therefore, this BCAR only includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the EPBC Act for the Hamson property. Any development of the subject land outside of the Hamson property must occur in accordance with the EPBC Act approval and associated conditions.

1.1 Study Area and Subject land

The 'study area' for this BCAR encompasses a total area of 261.43 ha (Figure 1 and Figure 2). The 'subject land' for this BCAR, encompassing a total area of 152.18 ha, relates only to the portion of the study area which will be impacted by the proposed development (Figure 3 and Figure 4).

The study area, as shown in Figure 1 and Figure 2, is bordered by:

- Neighbourhoods 1 and 2 of Googong Township to the north;
- Googong Foreshores to the east, within which is the Googong Reservoir;
- land zoned for environmental management to the south-east;
- agricultural land to the south-west; and
- Old Cooma Road to the west, beyond which lies land zoned for environmental living.

Located in the Queanbeyan-Palerang Regional Council Local Government Area (LGA), pursuant to the *Queanbeyan Local Environment Plan 2012* (Queanbeyan LEP), the study area is composed of the following land zones²:

- R1 – General Residential;

¹ NSW Government (2017a). *Biodiversity Assessment Method*. NSW Office of Environment and Heritage. Published LW 25 August 2017.

² Queanbeyan Local Environment Plan (2012). *Land Zoning Map - Sheet LZN_007*.

- R5 – Large Lot Residential;
- RE1 – Public Recreation; and
- E2 – Environmental Conservation.

Parts of the subject land are identified on the Queanbeyan LEP Terrestrial Biodiversity Map³. These areas correspond to Montgomery Creek and its unnamed tributaries which either pass through or originate in the study area.

The topography across the majority of the study area is characterised by gently undulating hills, ranging between 781 m Australian Height Datum (AHD) and 750 m AHD. The topography changes more rapidly in the direction of Googong Reservoir, falling to 730 m AHD in the south-east of the study area and to 665 m AHD in the Googong Township Pink-tailed Worm-lizard Conservation Area (PTWL Conservation Area) in the north-east.

The segment of Montgomery Creek that passes through the western half of the study area is characterised by a broad low-lying moist channel with several small ephemeral pools, a large, constructed farm dam, and numerous constructed contour banks. Seven additional ephemeral tributaries either pass through or originate in the study area (Figure 5). Six of these tributaries flow into Montgomery Creek and then on into the Queanbeyan River downstream of Googong Dam, while one, which passes through the south-east of the study area, flows into the Googong Reservoir. At the time of survey, the tributaries were dry and are only likely to convey water following substantial rain events. In total, there are 12 small to moderately sized farm dams in the study area, all of which held some water at the time of survey.

The majority of the study area has been substantially modified by its current and past land use, which has primarily been Merino sheep grazing with some cattle grazing in recent years. Approximately 72% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the study area (rising to approximately 89% when the subject land is considered in isolation) to promote the pastoral productivity of the land. The areas which retain some of the original canopy trees have still undergone substantial historic thinning. The prolonged period (at least several decades) of high intensity stock grazing has prevented regeneration of the overstorey and midstorey and depleted the native species diversity in the groundstorey. The resulting vegetation is characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native grasses. The exception to this is the section of the study area which comprises part of the PTWL Conservation Area (Figure 2 and Figure 4). While the majority of the canopy, midstorey, and shrubstorey have still been historically cleared in this area, the groundstorey has not been disturbed to the same extent as much of the study area. As detailed in Capital Ecology (2017a⁴, 2019a⁵), the 54 ha PTWL Conservation Area is known to support 47.3 ha of Pink-tailed Worm-lizard *Aprasia parapulchella* (EPBC Act and BC Act vulnerable) habitat, including all 24.2 ha of the very high quality habitat that occurs in the Googong Township, together with the majority of the

³ Queanbeyan Local Environment Plan (2012). *Terrestrial Biodiversity Map – Sheet BIO_001*.

⁴ Capital Ecology (2017a). *Googong Township Pink-tailed Worm-lizard Conservation Area - 2017 population monitoring results*. 13 November 2017, Project no. 2754.

⁵ Capital Ecology (2019a). *Pink-tailed Worm-lizard Protection and Management Plan – Version 6*. October 2019. Prepared for Googong Township Pty Ltd. Authors: A. Vincent and R. Speirs. Project no. 2832. October 2019. Prepared for Googong Township Pty Ltd. Authors: A. Vincent and R. Speirs. Project no. 2832.

high quality habitat (6.66 ha or 58.8%) and medium quality habitat (15.26 ha or 66.7%) (refer to Figure 11).

The paddock in the eastern extent of the study area is the only portion of the study area where some canopy regeneration has been permitted to establish. It is also evident that parts of the study area have been historically sown to crops and/or pasture improved; these include the paddock in the west of the study area which has been recently cultivated and sown to Oats *Avena sativa*, and the low-lying land in the west of the study area associated with Montgomery Creek which has a dominant cover of Clovers *Trifolium* spp. and Phalaris *Phalaris aquatica*.

The only built infrastructure occurs in the north of the study area and includes two buildings, several storage sheds, and one stock yard, all of which are associated with shearing. A number of well-formed unsealed roads run throughout the study area. Stock fences are generally in an aged but functional condition.

The ecological values of the Googong Township urban release area and the surrounding locality have been investigated since 2004. As such, there are a large number of reports which describe the ecological values of the study area and surrounding land. The reports of most relevance to the study area include Biosis (2014⁶), Biosis (2015a⁷), Biosis (2015b⁸), Capital Ecology (2016⁹), Capital Ecology (2017b¹⁰), and Capital Ecology (2019a). These reports agree on the key ecological values which are likely/unlikely to occur in the study area, these being the following.

- The vegetation across the majority of the study area is highly modified as it has been historically cleared and intensively grazed. In general, the vegetation is characterised by scattered remnant trees over a low diversity native or exotic groundstorey. Some areas have been historically cultivated and/or pasture improved.
- There is the potential for the threatened ecological community (TEC) *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EPBC Act and BC Act critically endangered) to occur. Due to the degraded nature of the vegetation these areas may meet the BC Act listing criteria of the TEC but are unlikely to meet the EPBC Act listing criteria of the TEC.
- There are a substantial number of mature remnant trees spread across the study area, many of which contain functional hollows.
- The study area contains Pink-tailed Worm-lizard habitat. Based on previous surveys across the Googong Township, it is likely that the suitable Pink-tailed Worm-lizard habitat is restricted to the sloped land in the east of the study area which adjoins the confirmed habitat in the Googong Township PTWL Conservation Area and Googong Foreshores.

⁶ Biosis (2014). *Googong Foreshores Interface Management Strategy – Version 3*. Prepared for Googong Township Pty Ltd. Author: R. Speirs, Biosis Pty Ltd, Canberra.

⁷ Biosis (2015a). *Flora and Fauna Assessment - Neighbourhood 1B, Googong township, NSW*. Report for Googong Township Pty Ltd. Authors: S Vertucci & R Speirs, Biosis Pty Ltd, Canberra. Project no. 19459.

⁸ Biosis (2015b). *Ecological Values and Constraints Assessment – Neighbourhoods 2, 3, 4 and 5, Googong township, NSW*. Report for Googong Township Pty Ltd. Authors: S Vertucci & R Speirs, Biosis Pty Ltd, Canberra. Project no. 19951.

⁹ Capital Ecology (2016). *Googong IWC Stage C Network West – 2015 Golden Sun Moth *Synemon plana* surveys*. Project No. 2699, 12 January 2016.

¹⁰ Capital Ecology (2017b). *Googong Neighbourhood 2 - Flora and Fauna Assessment*. March 2017. Prepared for Googong Township Pty Ltd. Authors: S. Vertucci and R. Speirs. Project No. 2713.

- A number of threatened woodland birds have been recorded in the study area, including the Scarlet Robin *Petroica boodang*, Flame Robin *Petroica phoenicea*, and White-fronted Chat *Epthianura albifrons*.
- Surveys for the Golden Sun Moth *Synemon plana* (EPBC Act critically endangered, BC Act endangered) in the surrounding areas have not detected the species. It is unlikely that Golden Sun Moths occur in the study area.
- The study area's history of prolonged high intensity stock grazing is likely to preclude the persistence of any threatened flora species.

1.2 Proposed Development

As stated in Section 1.1, the 'subject land' only relates to the portions of the 'study area' area which will be impacted by the proposed development (Figure 4). The minimum lot size¹¹ for the subject land ranges from 'D – 330 m²' to 'M – 600 m²' on land zoned 'R1 – General Residential', and 'Y – 15,000 m²' on land zoned 'R5 – Large Lot Residential'. For the proposes of this BCAR, it is assumed that the proposed development will clear all vegetation in the subject land (refer to Figure 4 and Figure 14).

As shown in Figure 2 and Figure 4, the study area for this BCAR encompasses the southern half of the 54 ha PTWL Conservation Area. The PTWL Conservation Area was established in 2013 to compensate for impacts to Pink-tailed Worm-lizard habitat as a result of the development of Googong Township. The boundary was delineated to ensure that the vast majority of Pink-tailed Worm-lizard habitat occurring in the Googong Township (including all very high quality habitat and the majority of the high quality and medium quality habitat) was protected, managed, and improved (Figure 11). The northern half of the PTWL Conservation Area was established to compensate for impacts to Pink-tailed Worm-lizard habitat that occurred as a result of the development of Googong Neighbourhood 1B. The southern half, even though it was established at the same time in 2013, was designed to compensate for the predicted future impacts to Pink-tailed Worm-lizard habitat to occur as a result of the development of Googong Neighbourhood 5. Accordingly, the southern 27.59 ha of the PTWL Conservation Area is included in the study area, and the value of this conservation measure is appropriately considered and accounted for herein.

The proposed development involves the subdivision of the subject land and its subsequent development for residential purposes. As shown in the NH3-5 Structure Plan Layout¹², included herein as Figure 3 and overlain on Figure 4, the proposed development will subdivide the subject land to create approximately 2100 new residential lots (subject to final lot mix), several Water Sensitive Urban Design (WSUD) ponds, 63.75 ha of open space and natural areas, and a 10.96 ha reserve. The proposed development also includes a management zone running along the urban interface with the Googong Foreshores (Biosis 2014), low density 'edge neighbourhoods' that aim to reduce potential edge effects and indirect impacts on the surrounding ecological values, and management of the PTWL Conservation Area (Capital Ecology 2019a).

¹¹ Queanbeyan Local Environment Plan (2012). *Lot Size Map - Sheet LSZ_007*.

¹² SpaceLab (2020). *Googong Township – NH3-5 Structure Plan Layout*. Rev C.

1.3 Version History

An earlier version of this BCAR (Capital Ecology 2019b¹³) informed a biodiversity certification application (00012842/BAAS17089/20/00012843) for the proposed development of the subject land. The Department of Planning, Industry and Environment (DPIE) undertook a preliminary review of the application and determined that more information was required before a full assessment could occur (letter of 25 February 2020 from Allison Treweek, Senior Team Leader – South East, Biodiversity and Conservation Division).

This version of the BCAR has been revised and updated in the following manner to reflect comments from DPIE on previous versions.

- The design of the development was changed to reduce impacts on remnant trees. As a result, the proposed development retains over 50% of the remnant trees that occur in the study area.
- The design of the proposed development was changed to include a 10.96 ha reserve that will be specifically managed for conservation and formally protected in perpetuity via a Conservation Agreement established under the BC Act.
- The design of the proposed development was changed to reduce impacts on other high biodiversity values (e.g. reducing impacts on Pink-tailed Worm-lizard habitat, incorporating 63.75 ha of open space and natural areas, reducing the number of large lots, and re-locating large lot building envelopes).
- The design of the proposed development was changed to avoid development on 'E2 – Environmental Conservation' zoned land.
- A discussion on the management actions occurring in the PTWL Conservation Area has been included (Section 3.1 and Section 3.3).
- A more detailed discussion on the avoidance, minimisation, and mitigation measures implemented by the proposed development has been included (Section 3.1 and Section 3.3).
- Additional information has been incorporated into the serious and irreversible impact (SAII) assessment (Section 3.4).

1.4 Commonwealth and State Assessment and Approval Processes

1.4.1 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;

¹³ Capital Ecology (2019b). *Googong Township – Neighbourhoods 3 to 5 – Biodiversity Certification Assessment Report*. Draft 03 – December 2019. Prepared for Googong Township Pty Ltd. Authors: S. Reid & R. Speirs. Project no. 2820.

- 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 Department of Agriculture, Water and the Environment (Commonwealth of Australia 2013¹⁴). 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 Commonwealth Minister for Agriculture, Water and the Environment. The Department will then consider the referred action and the Minister (or his/her 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>

1.4.2 NSW Biodiversity Conservation Act 2016

The NSW 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).

1.4.2.1 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.

¹⁴ Commonwealth of Australia (2013). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment.

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).

1.4.2.2 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, 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.

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.

1.4.3 NSW State Environmental Planning Policy (Koala Habitat Protection) 2020

State Environmental Planning Policies (SEPPs) outline policy objectives relevant to state-wide issues. One SEPP of a biodiversity conservation focus, the *State Environmental Planning Policy (Koala Habitat Protection) 2020*¹⁵ (the ‘Koala Habitat Protection SEPP’) commenced on 30 November 2020 and is of relevance to the proposed development. The Koala Habitat Protection SEPP –

Aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

- (a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and*
- (b) by encouraging the identification of areas of core koala habitat, and*
- (c) by encouraging the inclusion of areas of core koala habitat in environment protection zones.*

As detailed in the Koala Habitat Protection SEPP Frequently Asked Questions¹⁶ –

As was the case under SEPP 44, the Koala SEPP 2020 applies to development applications on land over 1 hectare (alone, or together with adjoining land in the same ownership) in the local government areas listed in the SEPP. If there is a strategic koala plan of management applying to the land, development applications must be consistent with that plan.

¹⁵ Available at <https://legacy.legislation.nsw.gov.au/EPis/2020-698.pdf>

¹⁶ Available at <https://www.planning.nsw.gov.au/-/media/Files/DPE/Factsheets-and-faqs/Policy-and-legislation/faqs-Koala-SEPP-2020-11.pdf?la=en>

If there is no strategic plan, the SEPP requires proponents and councils to undertake a two-step process to determine if the land is core koala habitat. This requires the input of a suitably qualified person and involves surveying for potential koala habitat and then core koala habitat.

If the suitably qualified person finds the land contains core koala habitat based on the definition in the SEPP, then a koala plan of management must be prepared for the land by a suitably qualified person. Council can only grant consent to development on that land if it is consistent with the approved plan.

The Koala SEPP applies in addition to any assessments required under the EPBC Act or the BC Act (i.e. BAM assessment).

1.5 Biodiversity Certification Assessment Report

As prescribed under Part 6, Division 3, Section 6.13 of the BC Act, a BCAR is –

a report prepared by an accredited person in relation to the proposed biodiversity certification of land under Part 8 that, that:

(a) assesses in accordance with the biodiversity assessment method the biodiversity values of the land proposed for biodiversity certification, and

(b) assesses in accordance with that method the impacts on biodiversity values of the actions to which the biodiversity offsets scheme applies on the land proposed for biodiversity certification, and specifies the number and class of biodiversity credits to be retired to offset those impacts as determined in accordance with that method, and

(c) that specifies other proposed conservation measures on or in respect of other land to offset those impacts on biodiversity values and their value (in terms of biodiversity credits) determined in accordance with that method.

A BCAR prepared applying the BAM by an accredited BAM Assessor must accompany any biodiversity certification application.

The BAM provides a standard method for assessing the impacts of a development/clearance proposal. This theme should carry over to the resulting BCAR 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/clearance. The size of the BCAR should reflect the complexity of the subject land's biodiversity values and the scale and nature of the proposed development/clearance.

1.5.1 Objectives and Format

Developed to reflect the format of the BAM, this BCAR 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.

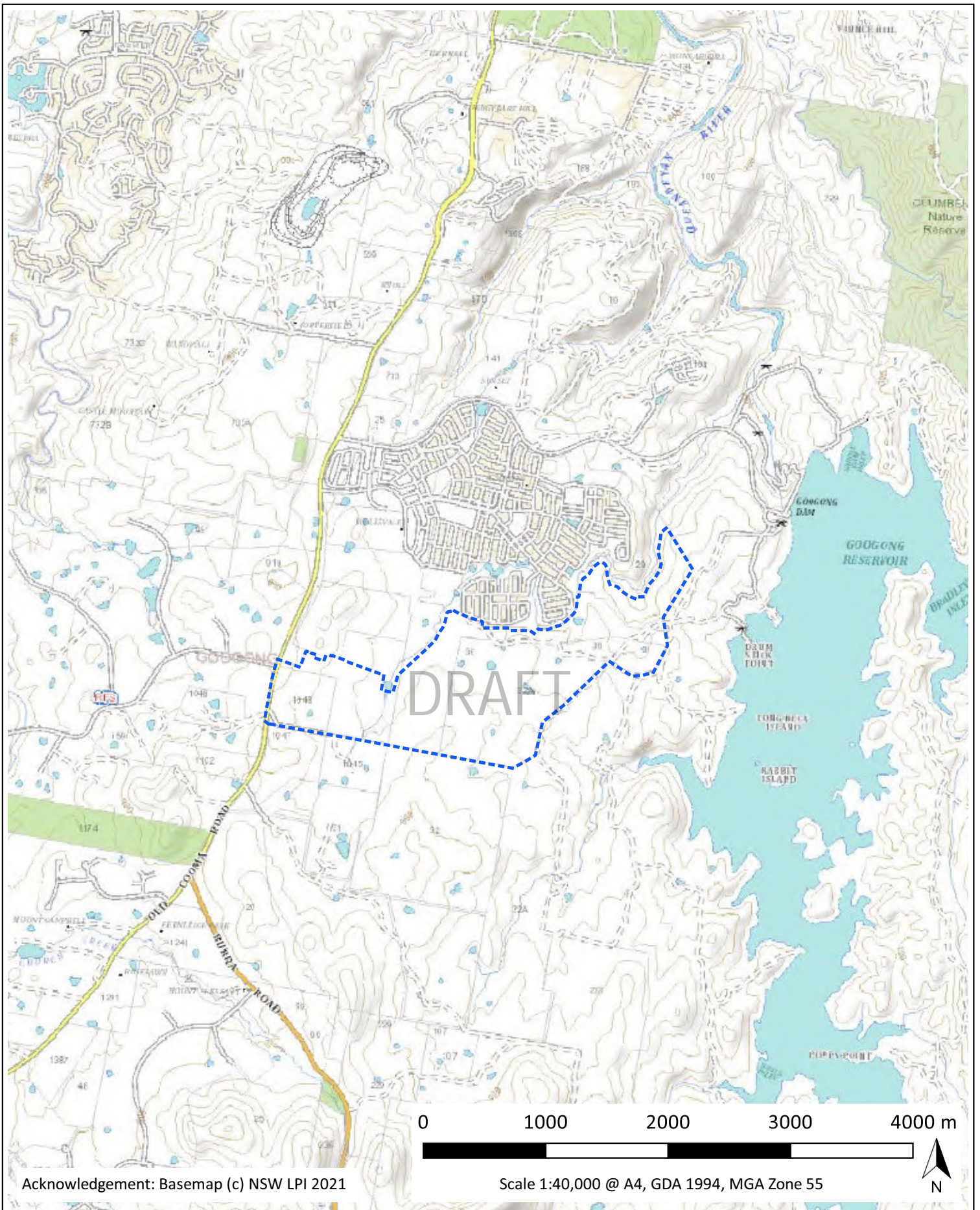
1.5.2 Technical Resources and Qualifications

This BCAR 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 manager 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, MEIANZ, Accredited BAM Assessor (No: BAAS20006)
Sam undertook field surveys, data entry, GIS mapping, and report preparation.
- Alan Vincent – Field Ecologist
BSc (Hons)
Alan undertook field surveys, data entry, and GIS mapping.
- Shannon Thompson – Field Ecologist
BSc
Shannon undertook field surveys, data entry, and GIS mapping.

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 Office of Environment and Heritage under s 132 C of the NSW National Parks and Wildlife Act 1974 (SL101623).




Acknowledgement: Basemap (c) NSW LPI 2021

Scale 1:40,000 @ A4, GDA 1994, MGA Zone 55

Figure 1. Locality Plan

Legend

 Study Area - NH3-5 - Jan 2021

Capital Ecology Project No: 2820
 Drawn by: S. Reid
 Date: 16 February 2021



Figure 2. Googong Township Neighbourhoods

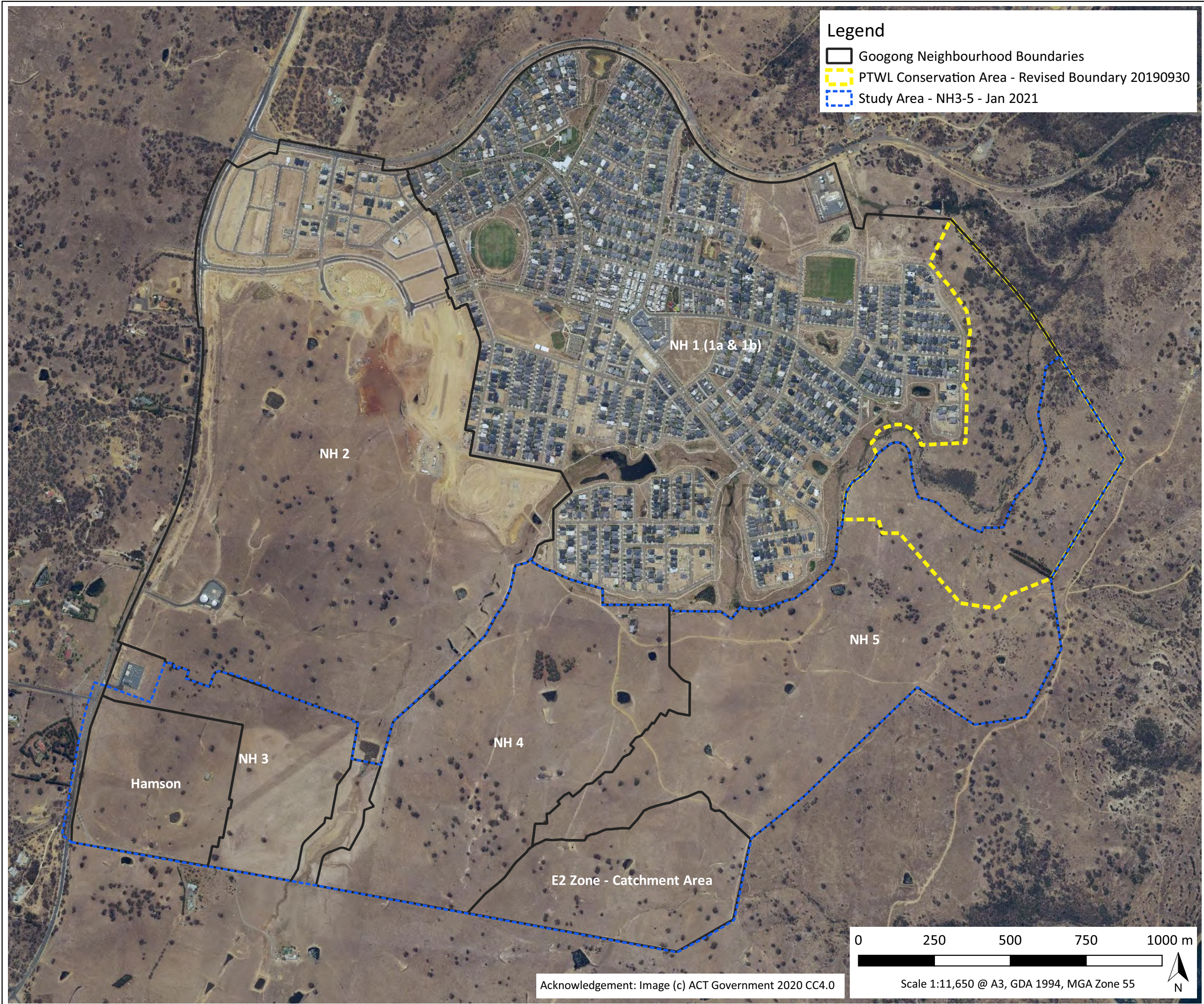
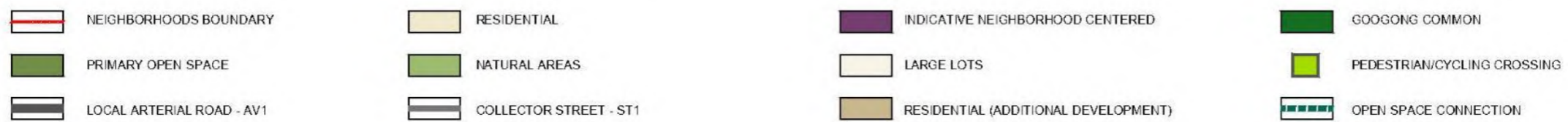
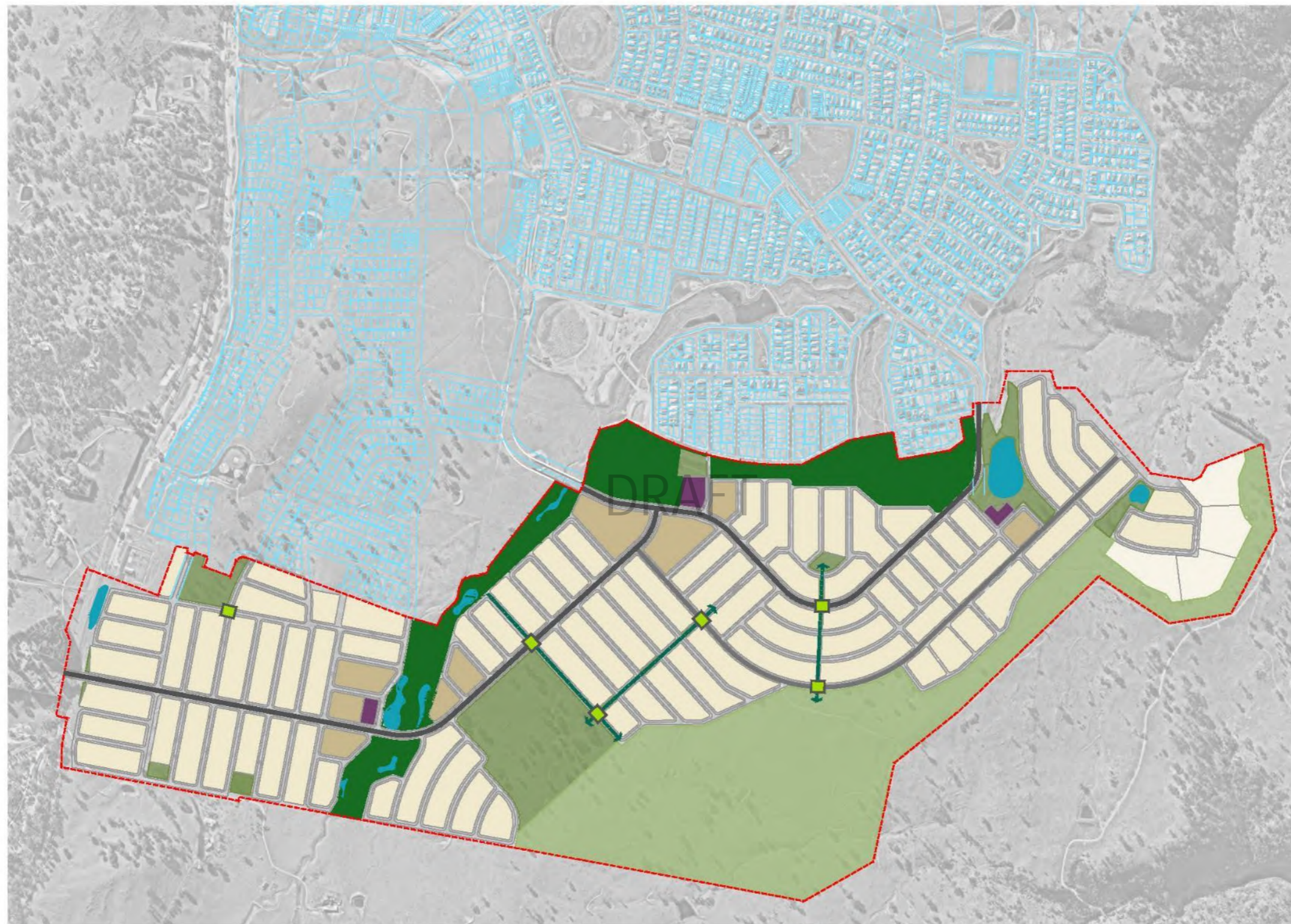


Figure 3. Proposed Development



- Legend**
- Study Area - NH3-5 - Jan 2021
 - Subdivision Layout - Jan 2021
 - Existing track (right-of-way) to adjoining property
 - Subject Land - Proposed Development Footprint - 20210128
 - Urban Open Space and Natural Areas
 - Reserve
 - Large Lot - GFIMS Managed Residential Area
 - PTWL Conservation Area - Southern Section

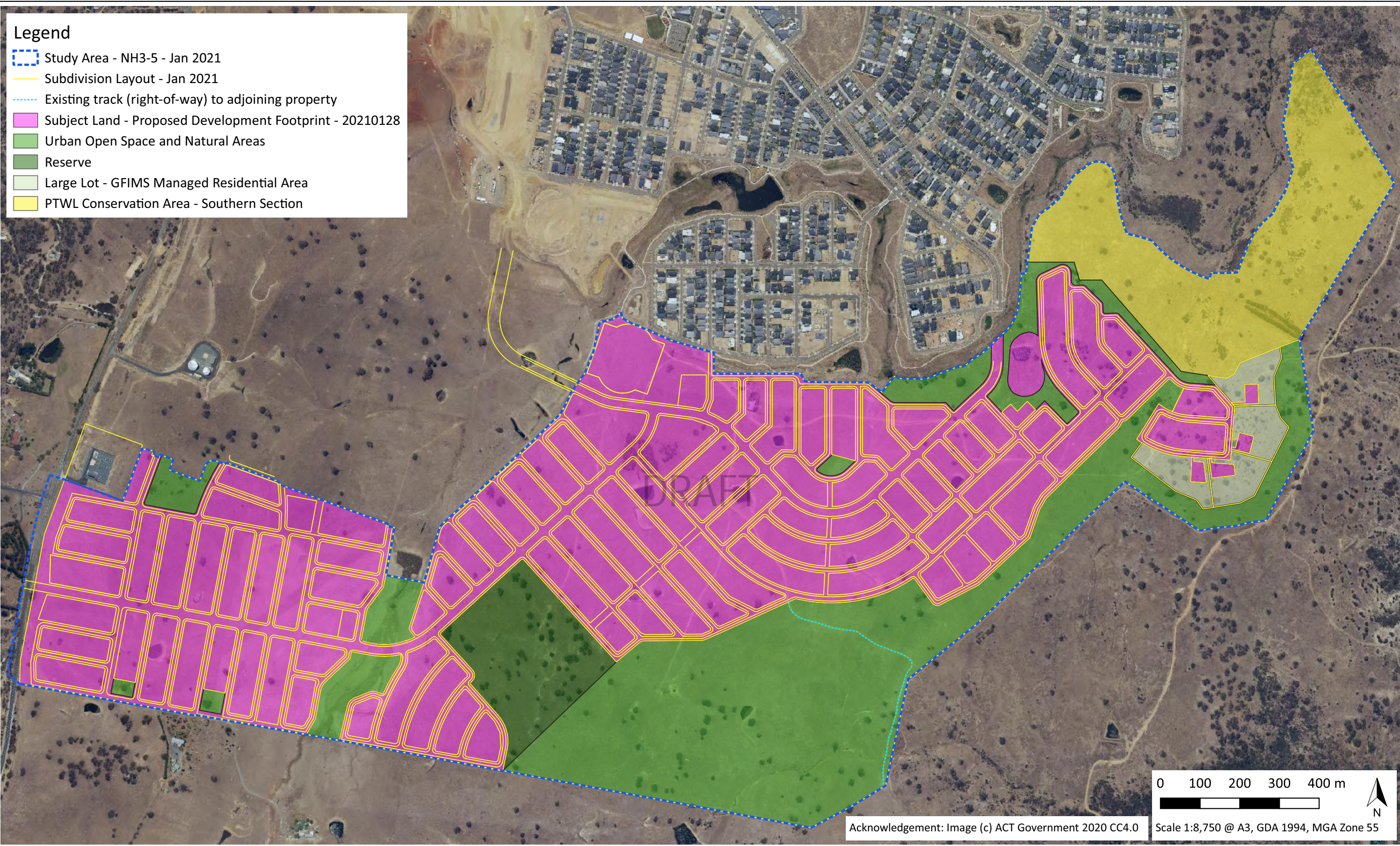


Figure 4. Subject Land - Proposed Development Areas

2 Part 1 – Biodiversity Assessment (BAM Stage 1)

Part 1 of this BCAR 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 Chapter 4 of 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 1 outlines the landscape features and overall landscape context of relevance to the subject land.

As stated in Section 1.1, the ‘subject land’ only relates to the portions of the ‘study area’ area which will be impacted by the proposed development (Figure 4).

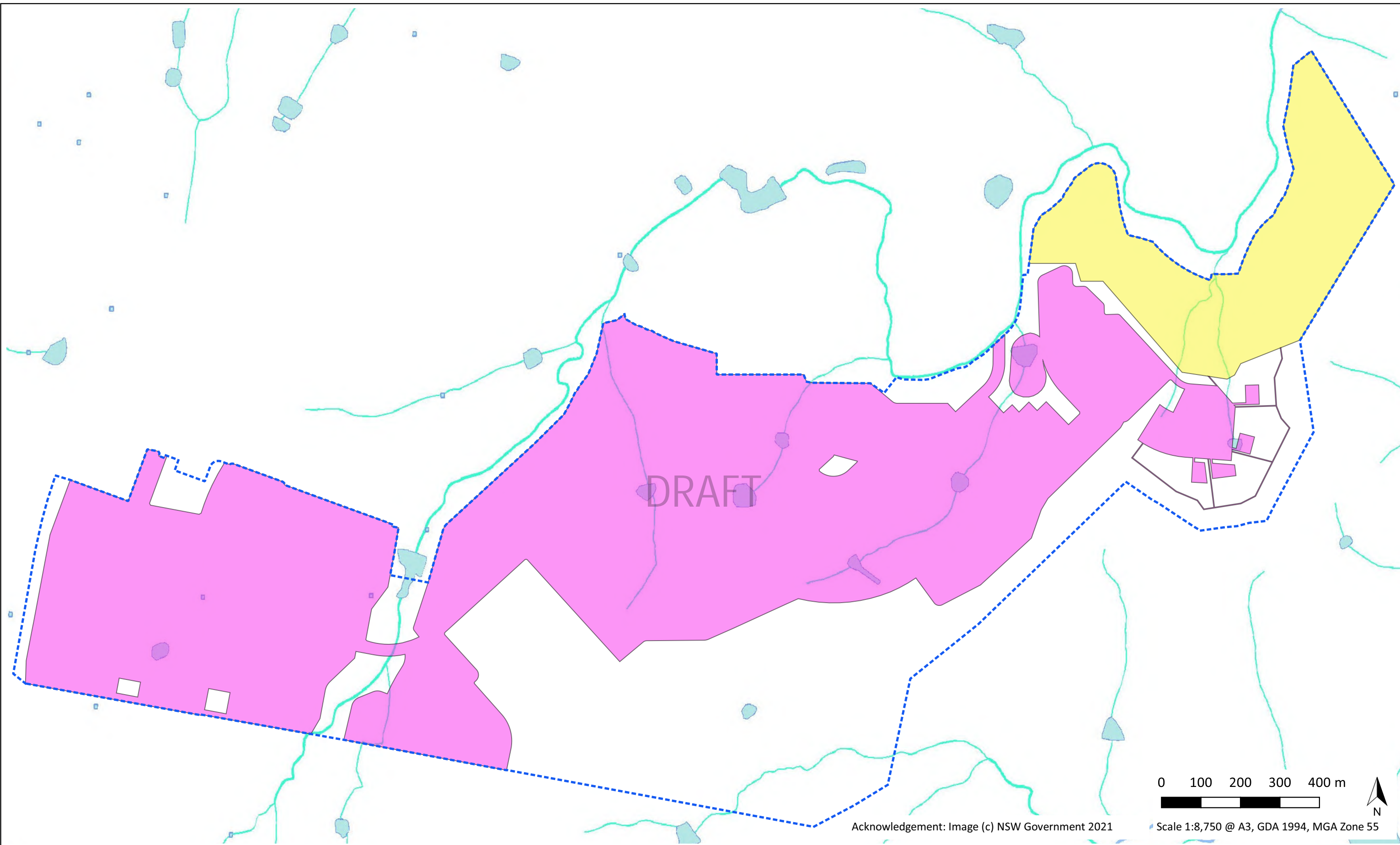
Table 1. Landscape features

| Landscape Feature | Description | Figure Reference |
|---|--|----------------------------------|
| IBRA bioregion | The subject land is located in the South Eastern Highlands IBRA bioregion. | - |
| IBRA subregion | The subject land is located in the Monaro IBRA subregion. | - |
| BioNet NSW landscapes (Mitchell landscapes) | The subject land contains one Mitchell Landscape: Molonglo Ranges . | - |
| Rivers, streams and estuaries (Strahler ¹⁷ stream order) | <p>Montgomery Creek increases from a 2nd to 3rd order stream (defined based on the NSW LPI Hydrology Map and as per Appendix 3 of the BAM) approximately halfway along the segment running through the western portion of the subject land. This segment of Montgomery Creek has been highly modified by past land uses and is now characterised by a broad low-lying moist channel with several small ephemeral pools, a large, constructed farm dam, and numerous constructed contour banks. The paddock through which the segment of Montgomery Creek flows has undergone intensive historical cultivation and pasture improvement. The characteristics of the current creek, together with information from M. Zarb (current land manager), suggest that the original creek was partly or entirely filled and levelled, likely to permit pasture across the paddock. Due to this history of pasture improvement, grazing, and ‘soil conservation’ works, the vegetation along this segment of Montgomery Creek is now characterised by exotic pasture species (notably Phalaris and Clovers) and disturbance tolerant native sedges (Tall Sedge <i>Carex appressa</i>, Austral Rush <i>Juncus australis</i>).</p> <p>Six additional 1st order tributaries pass through or originate in the subject land and join Montgomery Creek to the north. These tributaries are best described as drainage lines as they only convey water following substantial rain events and have no fringing vegetation.</p> | Figure 2 Figure 5 Figure 6 |

¹⁷ Strahler, AN (1952). *Hypsometric (area-altitude) analysis of erosional topology*. Geological Society of America Bulletin 63 (11): 1117–1142.

| Landscape Feature | Description | Figure Reference |
|-------------------------------|--|----------------------|
| | <p>There are ten small to moderately sized dams in the subject land, all of which held some water at the time of survey.</p> <p>The dams in the subject land have some fringing vegetation, however their fauna habitat value was observed to be limited at the time of survey due primary to the high degree of edge disturbance from stock. Nevertheless, these dams, together with the smaller pools along Montgomery Creek, are likely to be of some value to the common native water birds, reptiles, and amphibians which occur in the locality.</p> <p>The lack of fringing vegetation indicates that the 1st order tributaries are unlikely to provide habitat of value to aquatic fauna or be otherwise important for habitat connectivity.</p> | |
| 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 | <p>Before European occupation, the majority of the subject land would have been characterised by woody PCTs, the exception being the low-lying area associated with Montgomery Creek which is likely to have historically supported natural moist tussock grassland. The subject land has been substantially modified by its current and past land use, which has primarily been Merino sheep grazing with some cattle grazing in recent years. Approximately 89% of the original woody vegetation (canopy, midstorey, and shrubstorey) was historically cleared across the subject land to promote the pastoral productivity of the land. The areas which retain some of the original canopy trees have still undergone substantial historic thinning. The prolonged period (at least several decades) of high intensity stock grazing has prevented regeneration of the overstorey and midstorey and depleted the native species diversity in the groundstorey. The resulting vegetation across the subject land is characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native grasses. The exception to this is the section of the study area that occurs in the PTWL Conservation Area which has not been disturbed to the same extent as much of the study area. The paddock in the eastern extent of the study area is the only portion of the study area where some canopy regeneration has been permitted to establish.</p> <p>The subject land is bordered to the north by Neighbourhood 1 (largely complete) and Neighbourhood 2 (under construction) of Googong Township. The subject land is bordered by Old Cooma Road to the west. The land to the south of the subject land is privately held agricultural land, and Googong Foreshores adjoins the subject land to the east. Whilst the vegetation communities and other landscape features across the land to south and east are similar to those of the subject land, these areas are generally substantially less modified (likely due to less intense historical land uses).</p> <p>In light of the above, whilst the mature remnant trees in the subject land are likely to be of habitat value to numerous native birds and other highly mobile fauna species, they are unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature. The native grass dominated groundstorey across much of the subject land is likely to be of some</p> | Figure 6 Figure 7 |

| Landscape Feature | Description | Figure Reference |
|--|---|------------------|
| | habitat value to a variety of native birds, reptiles, and herbivorous mammals. | |
| 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) | <p>A 1,500 m buffer was applied to the subject land resulting in an overall buffer area of 1,961 ha. This buffer area contains both woody PCTs (i.e. woodland, dry sclerophyll forest) and non-woody PCTs (i.e. natural grassland). Accordingly, the following two categories of native vegetation were defined to identify the total are of native vegetation in the buffer.</p> <ol style="list-style-type: none"> 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 either: <ol style="list-style-type: none"> a. have a grassland PCT and retain at least a substantial proportionate cover (i.e. > 35%) of native groundstorey species; or b. have a woody PCT from which the woody vegetation has been cleared, yet at least a substantial proportionate cover (i.e. > 35%) of native groundstorey species remains (often referred to as derived or secondary grassland). <p>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, abnormally 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.</p> <ol style="list-style-type: none"> 1. Woody vegetation cover – 997 ha (50.8%) of the buffer area was determined to support native woody vegetation cover. 2. Non-woody vegetation cover – 415 ha (21.2%) of the buffer area was determined to support native non-woody vegetation cover. <p style="text-align: center;">↓</p> <p>Total native vegetation cover – the total area of native vegetation cover in the buffer area is 1,412 ha (72%). This falls into the >70% cover class in the BAM Calculator.</p> | Figure 6 |



Acknowledgement: Image (c) NSW Government 2021

0 100 200 300 400 m
 Scale 1:8,750 @ A3, GDA 1994, MGA Zone 55

Figure 5. Hydrology

Legend

- Study Area - NH3-5 - Jan 2021
- Subject Land - Proposed Development Footprint - 20210128
- PTWL Conservation Area - Southern Section

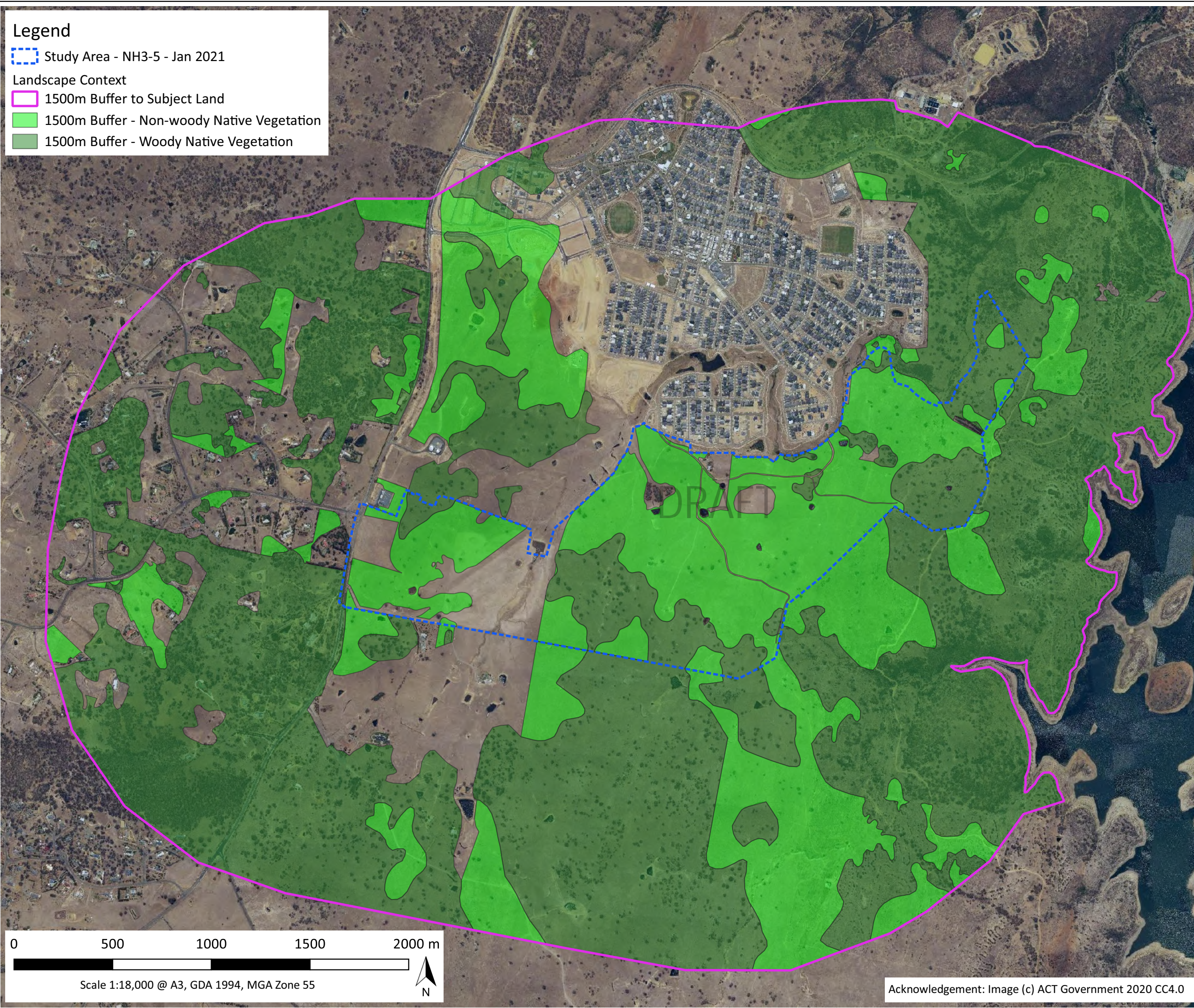
Capital Ecology Project No: 2820
 Drawn by: S. Reid
 Date: 16 February 2021



Figure 6. Site Map

Legend

- Study Area - NH3-5 - Jan 2021
- Landscape Context
 - 1500m Buffer to Subject Land
 - 1500m Buffer - Non-woody Native Vegetation
 - 1500m Buffer - Woody Native Vegetation



Capital Ecology Project No: 2820
Drawn by: S. Reid
Date: 16 February 2021



Acknowledgement: Image (c) ACT Government 2020 CC4.0

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

2.2.1 Native vegetation extent

Under 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^{18,19}, ACT Government²⁰, and previous NSW Government²¹ 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 comprises native species. However, no such threshold is defined by the BAM, and advice from the NSW Department of Planning, Industry and Environment (DPIE) 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 BCAR (and the supporting BAM assessment):

1. ‘Native vegetation’ is defined as any plant, naturally occurring or planted, which is native to NSW.
2. Exotic vegetation is defined as any plant which is not native to NSW.

¹⁸ 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.

¹⁹ Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*.

²⁰ ACT Government (2010). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*. Environment and Sustainable Development Directorate – Conservation Planning and Research.

²¹ NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

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 entirety of the study area was surveyed and mapped in accordance with the BAM. Vegetation survey dates and survey effort are detailed in Table 2. 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 EES website

<https://www.environment.nsw.gov.au/biodiversity/assessmentmethod.htm>.

It is important to note that the information and data collected during vegetation survey and mapping (Section 2.2.2.1 to 2.2.2.4) were also used to assess the subject land for the presence/absence of habitat constraints and/or microhabitats for ecosystem credits species (Section 2.3.3) and species credit species (Section 2.3.4).

Table 2. Vegetation survey dates and survey effort

| Task | Method | Date | Personnel | Survey effort |
|-----------------------|-----------------|------------|-----------|---------------|
| PCT and Zone mapping | Random meander | 25/10/2018 | 1 person | 8 hours |
| | | 31/10/2018 | 1 person | 8 hours |
| Vegetation assessment | BAM plot | 10/11/2018 | 4 people | 32 hours |
| | | 12/11/2018 | 4 people | 32 hours |
| Remnant tree survey | Tree assessment | 05/02/2019 | 2 people | 16 hours |

2.2.2.1 Plant Community Type (PCT) mapping

The on-ground boundaries of each of the Plant Community Types (PCTs) present in the study area 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 study area.

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. As illustrated in Diagram 8 from NSW Government (2018²²), each BAM Plot involved:

- a. one 20 x 20 m (400 m²) plot, used to assess the composition and structure attributes;
- b. one 20 x 50 m plot (1,000 m²) plot, used to assess the function attributes; and
- c. five 1 m² sub-plots, used to assess average little cover (and other optional groundcover components) for the plot.

All BAM plot locations were selected randomly in the vegetation zone, by marking on a map and walking or driving to the location. As stated in Section 1.1, the 'subject land' only relates to the portions of the 'study area' area which will be impacted by the proposed development (refer to Figure 4). BAM plot locations were spread throughout the study area (refer to Figure 7). The information collected during this process was subsequently used to determine the condition of the vegetation present in the subject land. This approach resulted in the assessment of a greater number of BAM plots than if the subject land were considered in isolation, the outcomes of which are a more thorough assessment of the condition of the vegetation in the subject land.

The minimum number of BAM plots completed in each vegetation zone of the study area was determined as per the minimum required plot numbers specified in Table 4 of the BAM. As shown in Figure 7, a total of 32 plots were completed across 12 vegetation zones.

As stated in Section 5.1.1.5 of the BAM:

areas that are not native vegetation (i.e. land not included in native vegetation extent) do not require further assessment in the BAM except where:

- (a) they are proposed for restoration as part of an offset (refer to Stage 3)*
- (b) they are assessed as habitat for threatened species according to Section 6.4.*

However, plots were completed in zones which did not meet the definition of BC Act 'native vegetation' (i.e. PCT999 Zone 6, PCT1110 Zone 1, and PCT1334 Zone 6, Figure 7). Surveying all zones ensured that the vegetation composition (including an accurate determination of BC Act native

²² NSW Government (2018). *Biodiversity Assessment Method Operational Manual – Stage 1*. State of New South Wales and Office of Environment and Heritage.

vegetation presence/absence) and potential threatened species habitat were accurately assessed across all of the vegetation condition types present in the subject land and study area.

It is important to highlight that only those zones which are classified as BC Act native vegetation and/or threatened species habitat are subsequently used to determine the impact of the proposed development (refer to Section 2.2.4.4 and Section 3.2).

2.2.2.4 Remnant tree survey

Excluding the PTWL Conservation Area, all mature remnant trees present in the study area were previously assessed by Biosis (2015b). These trees were reassessed during the development of this BCAR. Reassessment included confirmation of tree species and an updated assessment of their value to native fauna including the presence and characteristics of any hollows and other habitat values (e.g. nests, mistletoe etc.). Particular attention was given to observations of the presence of native fauna nesting in hollows or stick nests (see Section 2.2.3.2). Updated data for each surveyed mature remnant tree are provided in Appendix D, separated by those that will be impacted by the proposed development and those that will be retained.

The data collected during this process were subsequently used to determine the number of hollow bearing trees impacted or retained by the proposed development.

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 (refer Section 2.3.3 and Section 2.3.4). Some of these species were excluded from further consideration based on factors such as geographical constraints or the presence/absence of habitat features. Survey dates and survey effort for the remaining species considered to have the potential to occur in the subject land are detailed in Table 3. Weather conditions for survey dates are detailed in Table 4. In total, 184-person hours were spent on site during the development of this BCAR, plus an additional 120 hours of Anabat® recordings.

Table 3. Flora and fauna survey dates and survey effort

| Task | Method | Date | Personnel | Survey effort |
|----------------------------|--|------------|-----------|---------------|
| Threatened flora surveys | Random meander through potential habitat | 25/10/2018 | 1 person | 8 hours |
| | | 31/10/2018 | 1 person | 8 hours |
| | | 05/02/2019 | 2 people | 4 hours |
| | Survey of rocky areas | 11/09/2018 | 2 people | 16 hours |
| | | 19/09/2018 | 2 people | 16 hours |
| | | 25/09/2018 | 2 people | 16 hours |
| Opportunistic observations | 10/11/2018 | 4 people | 32 hours | |
| | 12/11/2018 | 4 people | 32 hours | |
| Threatened bird surveys | Random meander through potential habitat | 25/10/2018 | 1 person | 8 hours |
| | | 31/10/2018 | 1 person | 8 hours |
| | | 05/02/2019 | 2 people | 4 hours |
| | Fauna nesting survey | 05/02/2019 | 2 people | 16 hours |
| | Opportunistic observations | 10/11/2018 | 4 people | 32 hours |
| | | 12/11/2018 | 4 people | 32 hours |
| Koala survey | Tree assessment | 05/02/2019 | 2 people | 16 hours |

| Task | Method | Date | Personnel | Survey effort |
|--------------------------------|----------------------|------------|--|-------------------------|
| Pink-tailed Worm-lizard Survey | Rock turning Survey | 11/09/2018 | 2 people | 16 hours |
| | | 19/09/2018 | 2 people | 16 hours |
| | | 25/09/2018 | 2 people | 16 hours |
| Golden Sun Moth Survey | Belt Transect Survey | 31/10/2018 | 2 people | 5 hours |
| | | 12/11/2018 | 2 people | 5 hours |
| | | 19/11/2018 | 2 people | 5 hours |
| | | 01/12/2018 | 2 people | 5 hours |
| Threatened bat survey | Anabat® | 10/11/2018 | Six Anabat® locations over five nights (ten trap nights in total). | 120 hours of recordings |
| | | 11/11/2018 | | |
| | | 12/11/2018 | | |
| | | 13/11/2018 | | |
| | | 19/11/2018 | | |

Table 4. Survey weather conditions (Tuggeranong, ACT)

| Date | Temperature Min-Max | Wind @ 3pm | Cloud (8 th) | Rain |
|------------|---------------------|------------|--------------------------|------|
| 11/09/2018 | 1.6 – 21.4°C | 20 km/h | 0 | 0 mm |
| 19/09/2018 | 5.3 – 18.1°C | 13 km/h | 0 | 0 mm |
| 25/09/2018 | -0.2 – 16.8°C | 11 km/h | 0 | 0 mm |
| 25/10/2018 | N/A – 25.1°C | 13 km/h | 0 | 0 mm |
| 31/10/2018 | 5.7 – 30.8°C | 19 km/h | 0 | 0 mm |
| 10/11/2018 | 2.9 – 23.5°C | 13 km/h | 7 | 0 mm |
| 11/11/2018 | 4.6 – 26.0°C | 7 km/h | 0 | 0 mm |
| 12/11/2018 | 6.8 – 28.5°C | 11 km/h | 0 | 0 mm |
| 13/11/2018 | 12.0 – 29.4°C | 17 km/h | 6 | 0 mm |
| 19/11/2018 | 8.5 – 25.6°C | 11 km/h | 0 | 0 mm |
| 01/12/2018 | 7.6 – 29.6°C | 19 km/h | 0 | 0 mm |
| 05/02/2019 | 18.6 – 28.0°C | 22 km/h | 8 | 0 mm |

2.2.3.1 Threatened flora surveys

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.

Some threatened flora species are identified by the BAM as a species credit species (refer Section 2.3.4), which is a species for which presence/absence and habitat value cannot be reliably predicted by location, vegetation type, and vegetation condition. Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species. Therefore, random meander searches were conducted throughout the subject land and study area, targeting significant species. The targeted surveys involved full or part day surveys over three days by one to two ecologists, totalling 20 hours of effective survey effort (Table 3).

In farmland which has been pasture improved, cultivated, and/or intensively grazed for a prolonged period, threatened flora are only likely to 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 conducted concurrently with Pink-tailed Worm-lizard surveys (refer Section 2.2.3.4 and Figure 10). These targeted searches involved three full day surveys by two ecologists, totalling an additional 48 hours of effective survey effort (Table 3).

Surveys were timed to coincide with the peak flowering period for most of the significant flora species with the potential to occur in the study area.

A thorough inventory of the flora species occurring at a site on the NSW Southern Tablelands cannot be compiled from a survey undertaken at any particular time. For example, many groundstorey flora species, notably the orchids, lilies, and peas, are only readily identifiable during their short and seasonally variable flowering period. As such, an inventory of all species identified in the study area was commenced during the preliminary field inspection (11 September 2018) and supplemented across all of the subsequent surveys undertaken until the final field survey (5 February 2019). This inventory is presented in Appendix B. Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

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 2.3.4). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species.

Therefore, random meander searches were conducted throughout the subject land and study area, targeting significant species. The targeted surveys involved full or part day surveys over three days by one to two ecologists, totalling 20 hours of effective survey effort (Table 3).

In addition, as mentioned in Section 2.2.2.4, all of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were reassessed. During the assessment, trees were inspected for the presence of stick nests and signs of fauna nesting in hollows (e.g. individuals in hollows, scratch/chew marks, birds flying off nests, birds 'on station'). Particular attention was given to any signs of species credit species (refer to Table 24) nesting in the subject land.

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.

A thorough inventory of the fauna species occurring at a site on the NSW Southern Tablelands cannot be compiled from a survey undertaken at any particular time. As such, an inventory of all species identified in the study area was commenced during the preliminary field inspection (11 September 2018) and supplemented across all of the subsequent surveys undertaken until the final field survey (5 February 2019). This inventory are presented in Appendix C. Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

2.2.3.3 Koala survey

As mentioned in Section 2.2.2.4, all of the mature remnant trees (i.e. >20 cm DBH) present in the subject land and study area were reassessed. During the assessment, trees were also surveyed for signs of Koala *Phascolarctos cinereus* occupation (e.g. presence of individuals, characteristic scratch marks, etc).

2.2.3.4 Pink-tailed Worm-lizard survey

Targeted surveys were carried out on Tuesday 11 September 2018, Wednesday 19 September 2018, and Tuesday 25 September (Figure 10), all of which were sunny days with minimum temperatures of 1.6 °C, 5.3 °C, and -0.2 °C and maximum temperatures of 21.4 °C, 18.1 °C, and 16.8 °C, respectively (Bureau of Meteorology records for nearest weather station, Tuggeranong, ACT). As search success appears to be greatest following substantial rain, the surveys were timed to occur following the 24.6 mm of rain received across the locality on Friday 7 September 2018. These conditions were considered appropriate for Pink-tailed Worm-lizard survey. Approximately 48 person-hours were spent during the survey (two ecologists over three days for approximately eight hours each day). Please note that the survey tracks presented in Figure 10 only show the path of one of the two ecologists. In general, the two ecologists involved in the survey were separated by 10 – 50 m. Therefore, in order to better reflect survey coverage, a buffer of 25 m has been applied to the recorded survey tracks. The PTWL Conservation Area was not included because the extent and condition of habitat is already known as the area is regularly monitored in accordance with the Pink-tailed Worm-lizard Protection and Management Plan (Figure 11, Capital Ecology 2017a, 2019a).

Each patch of potential Pink-tailed Worm-lizard habitat, identified by the presence of loose surface rock, was surveyed for Pink-tailed Worm-lizard individuals or sloughed skins. The survey involved the following.

- Searches for Pink-tailed Worm-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 1999²³), or until a Pink-tailed Worm-lizard or sloughed skin 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.

When found, each Pink-tailed Worm-lizard was 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 Guidelines²⁴.

2.2.3.5 Golden Sun Moth surveys

A program of four targeted Golden Sun Moth surveys was undertaken in accordance with the survey guidelines detailed in Commonwealth of Australia (2009)²⁵. As illustrated in Figure 12, each survey

²³ Jones, S.R. (1999). *Conservation biology of the pink-tailed worm lizard (Aprasia parapulchella)*. PhD thesis Applied Ecology research group, University of Canberra.

²⁴ Department of Sustainability Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's threatened reptiles*. Commonwealth of Australia, Canberra.

²⁵ Commonwealth of Australia (2009). *Background Paper to EPBC Act Policy Statement 3.12 - Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana)*. Commonwealth Department of Water, Heritage and the Arts.

involved two ecologists walking belt transects (approx. 50 m to 100 m apart) throughout potential habitat in the study area. Belt transects were chosen as the most suitable method for the surveys given the size and shape of the study area.

As recommended in Commonwealth of Australia (2009), four surveys were undertaken with at least four days between each survey. On all survey days moths were confirmed to be flying in the nearby ACT/NSW region (via pre-survey checks of known habitat in nearby areas 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 Table 5. In summary, the targeted surveys were undertaken during good to optimal survey conditions on days when moderate to high numbers of Golden Sun Moths were confirmed to be flying.

A GPS track was recorded for each survey and these are illustrated in Figure 12. As shown on Figure 12, effort was made to vary the alignment of the transects between surveys in order to achieve the best possible coverage of the study area. Whilst the surveys primarily focused on recording observed male flights, the ecologists also searched for female moths and pupal cases, particularly in the areas considered to have the highest potential for Golden Sun Moth occurrence.

Table 5. Golden Sun Moth survey conditions

| | | | | |
|---|------------------|-------------|--------------------|---|
| Date: 31/10/2018 (Survey 1) | | | | Observer/s: RS, AV |
| Survey Site: Neighbourhood 3 to 5, Googong, NSW. | | | | |
| Time | Air Temp. | Wind | Cloud cover | Other weather information |
| Start: 1045 | 26.0 | Light | 0% | Dry soil, no recent rain. Generally light breeze. Good survey conditions. |
| Finish: 1330 | 29.0 | Mod. | 0% | |
| General site notes: Males confirmed flying around Woolshed Creek (ACT). | | | | |
| Date: 12/11/2018 (Survey 2) | | | | Observer/s: SR, ST |
| Survey Site: Neighbourhood 3 to 5, Googong, NSW. | | | | |
| Time | Air Temp. | Wind | Cloud cover | Other weather information |
| Start: 1100 | 21.5 | Light | 5% | Thin cloud. Perfect survey conditions. |
| Finish: 1315 | 26.0 | Light | 10% | |
| General site notes: A large number of males confirmed flying in Jerrabomberra East Grasslands (ACT). | | | | |
| Date: 19/11/2018 (Survey 3) | | | | Observer/s: ST, AV |
| Survey Site: Neighbourhood 3 to 5, Googong, NSW. | | | | |
| Time | Air Temp. | Wind | Cloud cover | Other weather information |
| Start: 1120 | 19.6 | Light | 0% | Good survey conditions. |
| Finish: 1320 | 22.6 | Light | 0% | |
| General site notes: A large number of males confirmed flying in Murrumbateman (NSW) and a property adjacent to Mulligan's Flat Nature Reserve (NSW). | | | | |
| Date: 1/12/2018 (Survey 4) | | | | Observer/s: ST, AV |
| Survey Site: Neighbourhood 3 to 5, Googong, NSW. | | | | |
| Time | Air Temp. | Wind | Cloud cover | Other weather information |
| Start: 1100 | 22.2 | Mod. | 0% | Good survey conditions. |
| Finish: 1220 | 24.1 | Mod. | 0% | |
| General site notes: Males confirmed flying in Mitchell (ACT) and Wallaroo (NSW). | | | | |

2.2.3.6 Anabat® threatened bat surveys

Two Anabat® detectors were deployed over five nights (10-13 November 2018 and 19 November 2018), the locations of which are illustrated in Figure 12. Locations were chosen to survey across a variety of the habitat types present in the study area. The weather conditions during the survey period are detailed in Table 4. The data from the Anabat® surveys were provided to Fly By Night Bat Surveys Pty Ltd for expert analysis and identification of the species recorded.

2.2.4 Vegetation survey and mapping results

2.2.4.1 Plant Community Type (PCT) mapping

Before European occupation, the majority of the subject land and study area would have been characterised by woody PCTs, the exception being the low-lying area associated with Montgomery Creek which is likely to have historically supported natural moist tussock grassland (PCT1110). The woody PCTs would have comprised open grassy woodland (PCT1334) extending upslope from the ecotone with the moist tussock grassland and across much of the gently undulating land, merging with dry sclerophyll forest on the higher elevated areas with thinner soils (PCT999).

The three PCTs occurring in the subject land and study area are shown in Figure 7 and detailed in Table 6.

Table 6. PCTs recorded in the subject land and study area

| PCT | PCT name | PCT description | Occurrence in subject land / study area | TEC status Commonwealth / NSW | PCT % cleared |
|------|--|---|---|---|---------------|
| 999* | Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Open forest or woodland, which occurs on lower slopes and valleys mainly in the Tinderry Range area but also Lower Snowy/Byadbo area. Occurs in the Kybeyan-Gourock, Monaro, and Murrumbateman subregions. | This PCT was mapped on the hill-slopes and higher elevated areas of the subject land and study area. | Not listed | 15% |
| 1110 | River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Bioregion | Dense tall tussock grassland mainly occurring in drainage lines, on river flats, and on lower footslopes, often on alluvium. If trees and shrubs are present, then they only as scattered individuals on community margins. Widespread throughout the South Eastern Highlands and NSW South Western Slopes. | This PCT was mapped as a broad band associated with the segment of Montgomery Creek as it runs through the subject land and study area. | Critically Endangered (Commonwealth) when occurring in a condition consistent with the listing criteria of the TEC. Not listed (NSW) | 95% |
| 1334 | Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern | This PCT occurs on valley flats, midslopes, and occasionally on crests. It is found in the Murrumbidgee River valley south of Royalla, the upper Shoalhaven River valley south of Bungonia, | This PCT was mapped across much of the gently undulating areas of the | Critically Endangered (Commonwealth and NSW) when occurring in a condition consistent with | 92% |

| PCT | PCT name | PCT description | Occurrence in subject land / study area | TEC status Commonwealth / NSW | PCT % cleared |
|-----|---------------------|--|---|----------------------------------|---------------|
| | Highlands Bioregion | east of Queanbeyan, and south of Bungendore. It is characterised by an open woodland with a grassy groundlayer and sparse shrubstorey and midstorey. Dominant overstorey species include Yellow Box and Apple Box. | subject land and study area. | the listing criteria of the TEC. | |

As previously noted, the subject land and study area have been substantially modified by their current and past land use, which has primarily been Merino sheep grazing with some cattle grazing in recent years. The original woody vegetation (canopy, midstorey and shrubstorey) was historically cleared across much of the subject land and study area to promote the pastoral productivity of the land. The relatively small areas which retain some of the original canopy trees have still undergone substantial historic thinning. The prolonged period (at least several decades) of high intensity stock grazing has prevented regeneration of the overstorey and midstorey and depleted the native species diversity in the groundstorey. The resulting vegetation is characterised by an absent or low-density canopy of old eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native grasses across the majority of the study area. The paddock in the eastern extent of the study area is the only portion of the study area where some canopy regeneration has been permitted to establish.

*Note. PCT999 has been allocated to the dry sclerophyll forest in the subject land and study area despite there currently being few Norton's Box *E. nortonii* and Broad-leaved Peppermint *E. dives* present. Indeed, as shown in Figure 7 and described in Table 7 to Table 12, Red Box *E. polyanthemos* and Inland Scribbly Gum *E. rossii* are now at least equally represented across much of the areas mapped as PCT999, despite these species not being listed as characteristic species of the PCT. In this regard, PCT999 was chosen as the most appropriate PCT for the dry sclerophyll forest due to the following.

- The vegetation in the subject land and study area has undergone a higher degree of modification than most of the locality. As such, the considerably more intact vegetation occurring in the same landscape position on adjoining and nearby properties (including Googong Foreshores, PTWL Conservation Area, Beatty Hill, and Mt Pleasant), was inspected to develop a better picture of the likely characteristics of the historical vegetation of the subject land and study area. At each of these reference sites Norton's Box is the dominant species, or a co-dominant species generally with Red Box and/or Inland Scribbly Gum. Broad-leaved Peppermint was observed to be the dominant species or a co-dominant species on the cooler, more protected south-eastern aspects of undulating hills.
- Red Box tends to grow into a large and stately tree when thinning decreases the natural competition from other trees in more intact woodland and dry forest communities. The Red Box trees in the subject land and study area are examples of this. The timber of Red Box is also of moderate value for fuel (i.e. firewood), fence posts, and other construction. Conversely, Norton's Box will only ever grow into a stunted tree and its timber has no commercial or agricultural value, thus it was often considered to be a worthless tree by early pastoralists and was rarely chosen for retention as a paddock tree.

- Further to the above point, it is noted that the history of high intensity sheep grazing has entirely prevented tree regeneration across most of the subject land and study area. In this scenario, it is likely that while many of the Red Box grew into large and old trees, most of the Norton's Box would have eventually died and been pushed up and burnt.
- There is no PCT option for the Monaro IBRA Subregion, or an adjoining subregion, which is a dry sclerophyll forest with Red Box as a dominant or co-dominant species. Accordingly, with due consideration of the role that the PCT plays in the BAM Calculator for the determination of candidate threatened flora and fauna species, PCT999 was chosen as it aligns with the correct geographic location (i.e. IBRA Subregion) and the correct vegetation community structural elements 'vegetation class' and 'vegetation formation'.

2.2.4.2 Vegetation zones

As illustrated in Figure 7 and detailed in Table 7 to Table 12, PCT999 was determined to comprise the following six discernible vegetation zones.

- PCT999 Zone 1 – Mature canopy, native dominant understorey with moderate diversity;
- PCT999 Zone 2 – Mature canopy, native dominant understorey with low diversity;
- PCT999 Zone 3 – No canopy, native dominant understorey with moderate diversity;
- PCT999 Zone 4 – No canopy, native dominant understorey with low diversity;
- PCT999 Zone 5 – Mature canopy, exotic dominant understorey with low diversity; and
- PCT999 Zone 6 – No canopy, exotic dominant understorey with low diversity.

As illustrated in Figure 7 and detailed in Table 13, PCT1110 was determined to comprise the following single discernible vegetation zone.

- PCT1110 Zone 1 – No canopy, exotic dominant understorey with low diversity.

As illustrated in Figure 7 and detailed in Table 14 to Table 18, PCT1334 was determined to comprise the following five discernible vegetation zones.

- PCT1334 Zone 1 – Mature canopy, native dominant understorey with moderate diversity;
- PCT1334 Zone 2 – Mature canopy, native dominant understorey with low diversity;
- PCT1334 Zone 4 – No canopy, native dominant understorey with low diversity;
- PCT1334 Zone 5 – Mature canopy, exotic dominant understorey with low diversity; and
- PCT1334 Zone 6 – No canopy, exotic dominant understorey with low diversity.

Note: for consistency, zone characteristics and classification were defined in the same manner for the two woody PCTs (i.e. PCT999 and PCT1334). No patches of PCT1334 Zones 3 are present in the study area.

As detailed in Figure 7 to Table 18, only a subset of the vegetation zones of each PCT meet the definition of BC Act 'native vegetation' (i.e. PCT999 Zones 1 to 5, PCT1334 Zones 1 to 5). As described in Section 2.2.2 and Section 2.2.4.4, these zones are assessed to determine vegetation integrity scores and the impact associated with the proposed development.

The remaining vegetation zones (PCT999 Zone 6, PCT1110 Zone 1, and PCT1334 Zone 6) have a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and do not

contain a sufficient cover of native trees and/or shrubs. As per Chapter 5 of the BAM these zones do not require assessment to determine a vegetation integrity score unless they are determined to be threatened species habitat. As detailed in Table 24 and Section 2.3.4.2, these vegetation zones are not identified as habitat for threatened species and therefore do not require assessment to determine a vegetation integrity score.

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Table 7. PCT999 Zone 1 results summary

| PCT999 Zone 1 | |
|--------------------------------------|--|
| Description | <u>Southern Tableland Dry Sclerophyll Forest – Moderate Diversity</u> Canopy with the components of the climax community, but there is evidence of historic thinning and the midstorey and shrubstorey are largely absent. Moderate diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew <i>Austrostipa scabra</i> and Wallaby Grasses <i>Rytidosperma</i> spp. Low density of significant weed species. Grazed at the time of survey by sheep and Eastern Grey Kangaroos <i>Macropus giganteus</i> . |
| Area – subject land | 1.26 ha. |
| BAM plots assessed | 2. |
| Overstorey Species | Co-dominant = <i>E. nortonii</i> and <i>E. polyanthemos</i> . |
| Overstorey Cover | 5% - 17%. |
| Overstorey Regeneration | Very few small saplings. |
| Perennial Groundlayer | 85% - 96% native. |
| Native non-grass understorey species | 7 - 15. |
| Significant Weeds | Briar Rose <i>Rosa rubiginosa</i> and Blackberry <i>Rubus fruticosus</i> . |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | Yes. |



Table 8. PCT999 Zone 2 results summary

| PCT999 Zone 2 | |
|--------------------------------------|---|
| Description | <u>Southern Tableland Dry Sclerophyll Forest – Low Diversity</u> Canopy with the components of the climax community, but there is evidence of historic thinning and the midstorey and shrubstorey are largely absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew and Wallaby Grasses. Low to moderate density of significant weed species. Grazed at the time of survey by sheep and Eastern Grey Kangaroos. |
| Area – subject land | 7.77 ha. |
| BAM plots assessed | 4. |
| Overstorey Species | Co-dominant = <i>E. nortonii</i> and <i>E. polyanthemos</i> . Associate = <i>E. melliodora</i> , <i>E. blakelyi</i> and <i>E. rossii</i> . |
| Overstorey Cover | 0% - 20%. |
| Overstorey Regeneration | Very few small saplings. |
| Perennial Groundlayer | 64% - 95% native. |
| Native non-grass understorey species | 1 - 4. |
| Significant Weeds | Briar Rose and Blackberry. |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | Yes. |

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Table 9. PCT999 Zone 3 results summary

| PCT999 Zone 3 | |
|--------------------------------------|--|
| Description | <u>Southern Tableland Dry Sclerophyll Forest – Moderate Diversity Derived Grassland</u> Overstorey and midstorey are absent. Moderate diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew, Wallaby Grasses, and Redleg Grass <i>Bothriochloa macra</i> . Grazed at the time of survey by sheep and Eastern Grey Kangaroos. |
| Area – subject land | 0.08 ha. |
| BAM plots assessed | 1. |
| Overstorey Species | None. |
| Overstorey Cover | 0%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 96% native. |
| Native non-grass understorey species | 16. |
| Significant Weeds | None. |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | Yes. |



Table 10. PCT999 Zone 4 results summary

| PCT999 Zone 4 | |
|--------------------------------------|--|
| Description | <u>Southern Tableland Dry Sclerophyll Forest – Low Diversity Derived Grassland</u> Overstorey and midstorey are absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew, Wallaby Grasses, Redleg Grass, and Windmill Grass <i>Chloris truncata</i> . Grazed at the time of survey primarily by sheep and cattle. |
| Area – subject land | 55.02 ha. |
| BAM plots assessed | 5. |
| Overstorey Species | None. |
| Overstorey Cover | 0%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 72% - 97% native. |
| Native non-grass understorey species | 2 - 6. |
| Significant Weeds | Blackberry, Serrated Tussock <i>Nassella trichotoma</i> , Bathurst Burr <i>Xanthium spinosum</i> . |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | Yes. |



Table 11. PCT999 Zone 5 results summary

| PCT999 Zone 5 | |
|--------------------------------------|---|
| Description | <p><u>Southern Tableland Dry Sclerophyll Forest – Low Diversity Exotic Groundstorey</u></p> <p>Canopy comprises relatively young and stunted Red Box trees, likely resulting from a past period when regeneration was permitted in the paddock for a substantial period. Midstorey and shrubstorey are largely absent. Low diversity exotic groundlayer dominated by exotic grasses such as Barley Grass <i>Hordeum</i> sp. and Perennial Ryegrass <i>Lolium perenne</i>. Some disturbance tolerant native grasses also present, notably Corkscrew and Weeping Grass <i>Microlaena stipoides</i>. Low to moderate density of significant weed species. Grazed at the time of survey by sheep, cattle, and Eastern Grey Kangaroos.</p> |
| Area – subject land | 1.01 ha. |
| BAM plots assessed | 1. |
| Overstorey Species | Dominant = <i>E. polyanthemos</i> . |
| Overstorey Cover | 35%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 43% native. |
| Native non-grass understorey species | 2. |
| Significant Weeds | Briar Rose. |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | Yes. |

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Table 12. PCT999 Zone 6 results summary

| PCT999 Zone 6 | |
|--------------------------------------|--|
| Description | <u>Exotic Pasture</u> Overstorey and midstorey entirely absent. Low diversity exotic groundlayer dominated by exotic perennial grasses, annual grasses and forbs. Evidence of historic pasture improvement. Currently grazed by sheep and cattle. |
| Area – subject land | 10.25 ha. |
| BAM plots assessed | 3. |
| Overstorey Species | None. |
| Overstorey Cover | 0%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 5% - 41% native. |
| Native non-grass understorey species | 1 - 3. |
| Significant Weeds | Saffron Thistle <i>Carthamus lanatus</i> . |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | No. |



Table 13. PCT1110 Zone 1 results summary

| PCT1110 Zone 1 | |
|--------------------------------------|--|
| Description | <u>Exotic Pasture</u> Broad band associated with the segment of Montgomery Creek as it runs through the subject land. Historically pasture improved which has resulted in a low diversity exotic groundlayer dominated by Perennial Ryegrass, Phalaris, Clovers, and other exotic forbs. The native species Tall Sedge and Austral Rush occur at varying density, primarily in depressions. Currently grazed by sheep and cattle. |
| Area – subject land | 9.53 ha. |
| BAM plots assessed | 3. |
| Overstorey Species | None. |
| Overstorey Cover | 0%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 30% - 37% native. |
| Native non-grass understorey species | 0 - 2. |
| Significant Weeds | Blackberry. |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | No. |



Table 14. PCT1334 Zone 1 results summary

| PCT1334 Zone 1 | |
|--------------------------------------|---|
| Description | <u>Southern Tableland Grassy Woodland – Moderate Diversity</u> Vegetation retained within the road reserve and therefore not grazed. Canopy comprises components of the climax community. Some scattered midstorey trees and shrubs. Moderate diversity groundlayer dominated by perennial native grasses. |
| Area – subject land | 0 ha. |
| BAM plots assessed | 1. |
| Overstorey Species | Dominant = <i>E. melliodora</i> . Associate = <i>E. nortonii</i> and <i>E. rossii</i> . |
| Overstorey Cover | 26%. |
| Overstorey Regeneration | Few saplings of overstorey species. |
| Perennial Groundlayer | 88% native. |
| Native non-grass understorey species | 19. |
| Significant Weeds | St John’s Wort, Briar Rose and African Love Grass <i>Eragrostis curvula</i> . |
| EPBC Act and/or BC Act listed TEC | Yes (EPBC Act and BC Act). |
| BC Act Native Vegetation | Yes. |



Table 15. PCT1334 Zone 2 results summary

| PCT1334 Zone 2 | |
|--------------------------------------|--|
| Description | <u>Southern Tableland Grassy Woodland – Low Diversity</u> Canopy with the components of the climax community, but there is evidence of historic thinning and the midstorey and shrubstorey are largely absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew and Wallaby Grasses. Low to moderate density of significant weed species. Grazed at the time of survey by sheep and Eastern Grey Kangaroos. |
| Area – subject land | 5.04 ha. |
| BAM plots assessed | 3. |
| Overstorey Species | Co-dominant = <i>E. melliodora</i> and <i>E. blakelyi</i> . Associate = <i>E. polyanthemos</i> and <i>E. bridgesiana</i> . |
| Overstorey Cover | 0% - 25%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 72% - 93% native. |
| Native non-grass understorey species | 1 - 3. |
| Significant Weeds | Briar Rose and St John’s Wort <i>Hypericum perforatum</i> . |
| EPBC Act and/or BC Act listed TEC | Yes (BC Act). |
| BC Act Native Vegetation | Yes. |

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Table 16. PCT1334 Zone 4 results summary

| PCT1334 Zone 4 | |
|--------------------------------------|--|
| Description | <u>Southern Tableland Grassy Woodland – Low Diversity Derived Grassland</u> Overstorey and midstorey are absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew, Wallaby Grasses, Redleg Grass, and Windmill Grass. Grazed at the time of survey primarily by sheep and cattle. |
| Area – subject land | 48.55 ha. |
| BAM plots assessed | 5. |
| Overstorey Species | None. |
| Overstorey Cover | 0%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 66% - 91% native. |
| Native non-grass understorey species | 0 - 11. |
| Significant Weeds | Saffron Thistle, Briar Rose, and Bathurst Burr. |
| EPBC Act and/or BC Act listed TEC | Yes (BC Act). |
| BC Act Native Vegetation | Yes. |



Table 17. PCT1334 Zone 5 results summary

| PCT1334 Zone 5 | |
|--------------------------------------|---|
| Description | <u>Southern Tableland Grassy Woodland – Low Diversity Exotic Groundstorey</u> Vegetation retained within the road reserve and therefore not grazed. Canopy comprises components of the climax community. Some scattered midstorey trees and shrubs, notably Silver Wattle <i>Acacia dealbata</i> . Low diversity exotic groundlayer dominated by perennial exotic grasses, primarily Phalaris. |
| Area – subject land | 0 ha. |
| BAM plots assessed | 1. |
| Overstorey Species | Dominant = <i>E. melliodora</i> . Associate = <i>E. mannifera</i> and <i>E. rossii</i> . |
| Overstorey Cover | 18%. |
| Overstorey Regeneration | Few saplings of overstorey species. |
| Perennial Groundlayer | 10% native. |
| Native non-grass understorey species | 1. |
| Significant Weeds | Serrated Tussock and African Love Grass. |
| EPBC Act and/or BC Act listed TEC | Yes (BC Act). |
| BC Act Native Vegetation | Yes. |



Table 18. PCT1334 Zone 6 results summary

| PCT1334 Zone 6 | |
|--------------------------------------|--|
| Description | <u>Exotic Pasture</u> Overstorey and midstorey entirely absent. Low diversity exotic groundlayer dominated by exotic perennial grasses, annual grasses and forbs. Evidence of historic pasture improvement. Currently grazed by sheep and cattle. |
| Area – subject land | 11.54 ha. |
| BAM plots assessed | 3. |
| Overstorey Species | None. |
| Overstorey Cover | 0%. |
| Overstorey Regeneration | None. |
| Perennial Groundlayer | 1% - 34% native. |
| Native non-grass understorey species | 1 - 3. |
| Significant Weeds | Saffron Thistle, Serrated Tussock, African Love Grass. |
| EPBC Act and/or BC Act listed TEC | No. |
| BC Act Native Vegetation | No. |



2.2.4.3 Patch size

As defined in the BAM, patch size is -

an area of intact 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 100m from the next area of moderate to good condition native vegetation (or $\leq 30m$ for non-woody ecosystems).*

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.

Where intact vegetation is defined as –

vegetation where all tree, shrub, grass and/or forb structural growth form groups expected for a plant community type are present

With respect to the above, the only vegetation zone in the subject land which meets the definition of intact vegetation is PCT999 Zone 1. The intact native vegetation outside of the subject land extends far to the north and south. When vegetation from adjoining land is considered, the patch size for PCT999 Zone 1 is estimated to fall within the >100 ha class as defined by the BAM.

As detailed below, none of the remaining vegetation zones in the subject land meet the definition of intact vegetation as they lack some or all of the structural growth form groups expected of the PCT.

- PCT999 Zone 2 lacks a midstorey, shrubstorey, and regeneration of the overstorey.
- PCT999 Zone 3 lacks an overstorey, midstorey, and regeneration of the overstorey.
- PCT999 Zone 4 lacks an overstorey, midstorey, shrubstorey, and regeneration of the overstorey.
- PCT999 Zone 5 lacks a shrubstorey, regeneration of the overstorey, and a native groundstorey.
- PCT999 Zone 6 lacks an overstorey, midstorey, shrubstorey, regeneration of the overstorey, and a native groundstorey.
- PCT1110 Zone 1 lacks a native groundstorey.
- PCT1334 Zone 2 lacks a midstorey, shrubstorey, and regeneration of the overstorey.
- PCT1334 Zone 4 lacks an overstorey, midstorey, shrubstorey, and regeneration of the overstorey.
- PCT1334 Zone 5 lacks a shrubstorey and native groundstorey.
- PCT1334 Zone 6 lacks an overstorey, midstorey, shrubstorey, regeneration of the overstorey, and a native groundstorey.

2.2.4.4 Vegetation integrity scores

As stated in Section 1.1, the 'subject land' only relates to the portions of the 'study area' area which will be impacted by the proposed development (Figure 4). Zones which meet the definition of BC Act

‘native vegetation’ and which occur in the subject land are used to determine vegetation integrity scores and the impact associated with the proposed development (refer to Figure 8). Zones which do not meet the definition of 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.

As detailed in Table 7 to Table 18, PCT999 Zones 1 to 5 and PCT1334 Zones 1 to 5 meet the definition of BC Act ‘native vegetation’. No areas of PCT1334 Zone 1 or Zone 5 occur in the subject land; as such these zones do not require assessment to determine a vegetation integrity score. The remaining vegetation zones (PCT999 Zone 6, PCT1110 Zone 1, and PCT1334 Zone 6) have a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and do not contain a sufficient cover of native trees and/or shrubs. As detailed in Table 24 and Section 2.3.4.2, these vegetation zones are not identified as habitat for threatened species. Therefore, as per Chapter 5 of the BAM, PCT999 Zone 6, PCT1110 Zone 1, and PCT1334 Zone 6 do not require assessment to determine a vegetation integrity score.

Table 19 presents the results of the BAM plot assessments and details the composition, structure, function, and resulting vegetation integrity score for those zones which occur in the subject land and meet the definition of BC Act ‘native vegetation’.

Table 19. Vegetation integrity scores

| | PCT999 Zone 1 | PCT999 Zone 2 | PCT999 Zone 3 | PCT999 Zone 4 | PCT999 Zone 5 | PCT1334 Zone 2 | PCT1334 Zone 4 |
|---|---------------|---------------|---------------|---------------|---------------|----------------|----------------|
| PCT | 999 | 999 | 999 | 999 | 999 | 1334 | 1334 |
| Zone (condition class) | 1 | 2 | 3 | 4 | 5 | 2 | 4 |
| Native Canopy | Yes | Yes | - | - | Yes | Yes | - |
| Groundstorey | Native | Native | Native | Native | Exotic | Native | Native |
| Native Diversity | Mod. | Low | Mod. | Low | Low | Low | Low |
| Patch size (ha) | > 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| Area (ha) in the subject land | 1.26 | 7.77 | 0.08 | 55.02 | 1.01 | 5.04 | 48.55 |
| BAM plots assessed in the study area | 2 | 4 | 1 | 5 | 1 | 3 | 5 |
| Composition condition score | 56.2 | 23.0 | 58.7 | 29.6 | 17.6 | 20.0 | 23.9 |
| Structure condition score | 39.9 | 37.0 | 30.3 | 29.6 | 70.1 | 50.7 | 50.6 |
| Function condition score | 20.8 | 22.6 | 13.4 | 4.3 | 18.9 | 18.5 | 12.1 |
| Current vegetation integrity score | 36.0 | 26.8 | 28.8 | 15.6 | 28.6 | 26.6 | 24.5 |

Legend

Study Area - NH3-5 - Jan 2021

PCT999 Dry Sclerophyll Forest

PCT999 Zone1 - Canopy - Native Dom - ModHigh Diversity

PCT999 Zone2 - Canopy - Native Dom - Low Diversity

PCT999 Zone3 - Native Dom - ModHigh Diversity

PCT999 Zone4 - Native Dom - Low Diversity

PCT999 Zone5 - Exotic Dom - Canopy - Low Diversity

PCT999 Zone6 - Exotic Dom - Low Diversity

PCT1110 Moist Tussock Grassland

PCT1110 Zone1 - Exotic Dom - Low Diversity

PCT1334 Yellow Box Grassy Woodland

PCT1334 Zone1 - Canopy - Native Dom - ModHigh Diversity

PCT1334 Zone2 - Canopy - Native Dom - Low Diversity

PCT1334 Zone4 - Native Dom - Low Diversity

PCT1334 Zone5 - Canopy - Exotic Dom - Low Diversity

PCT1334 Zone6 - Exotic Dom - Low Diversity

BAM Plots

BAM Plot - 400m2

BAM Plot - 1000m2

Remnant Tree Assessment

Dead Trees

Eucalyptus blakelyi

Eucalyptus bridgesiana

Eucalyptus dives

Eucalyptus melliodora

Eucalyptus nortonii

Eucalyptus polyanthemus

Eucalyptus rossii

Eucalyptus rubida

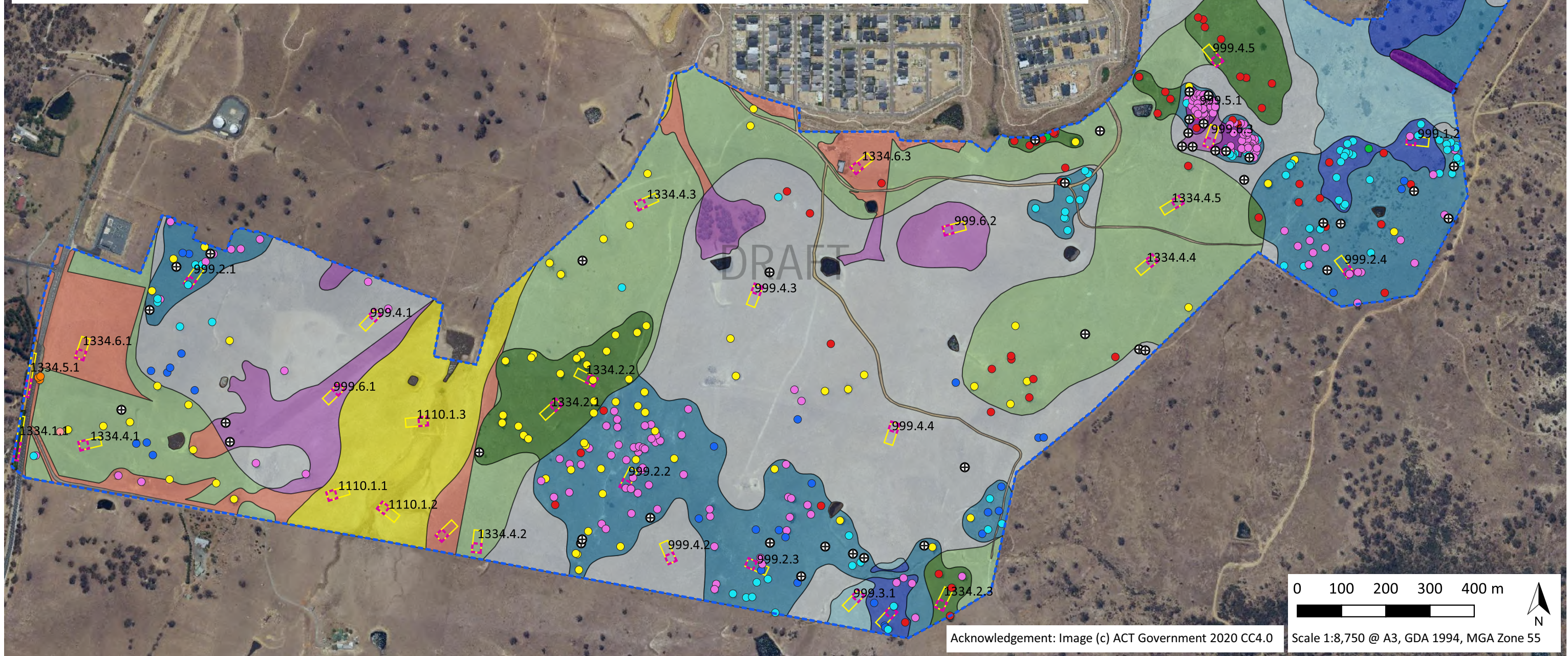


Figure 7. BAM Vegetation Survey and Mapping

Legend

- Study Area - NH3-5 - Jan 2021
- BC Act Native Vegetation



Figure 8. BC Act Native Vegetation

2.2.5 Threatened Ecological Communities

2.2.5.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

As mentioned in Section 1.1, the development of the majority of Googong Township was subject to an EPBC Act referral (EPBC Act Ref:2011/5859) and corresponding EPBC Act approval. With respect to the subject land of this BCAR, all areas except for a small section in the south-west (known as the 'Hamson' property) were included in the EPBC Act referral (Figure 2). Therefore, this BCAR only includes assessment of the potential impacts of the proposed development on MNES listed pursuant to the EPBC Act for the Hamson property. Any development of the subject land outside of the Hamson property must occur in accordance with the EPBC Act approval and associated conditions.

Two EPBC Act listed threatened ecological communities have the potential to occur in the locality, both listed as critically endangered under the EPBC Act: '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' (Box-Gum Woodland). Based on the recorded vegetation types, plant species, landscape position, and the vegetation on adjoining and nearby areas, only Box-Gum Woodland is considered to have the potential to occur on the Hamson property.

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.

Historical presence in the subject land – Confirmed – The entire portion of the Hamson property mapped as PCT1334 (i.e. PCT1334 Zone 4 and PCT1334 Zone 6) would have once supported the climax community of this TEC.

Assessments of structure and floristic composition were undertaken in each of the two condition categories (Vegetation Zones) of PCT1334 present on the Hamson property. The purpose of these assessments was to determine whether the patches of each Vegetation Zone support characteristics sufficient to meet the listing criteria for the EPBC Act listed TEC. The assessment process follows that provided in the Commonwealth *EPBC Act Policy Statement 3.5 – White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* (Commonwealth of Australia 2006²⁶). The results of this assessment are provided in Table 20. As detailed in Table 20, none of the vegetation on the Hamson property meets the listing criteria for the EPBC Act listed TEC.

In light of the above, the Hamson property does not support either of the EPBC Act listed threatened ecological communities with the potential to occur in the locality.

²⁶ Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands. Environment Protection and Biodiversity Conservation Act 1999.* Commonwealth Department of Environment and Heritage.

Table 20. 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 | |
|---|---|---|
| | PCT1334 Zone 4 | PCT1334 Zone 6 |
| 1. <i>Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?</i> | Yes Yellow Box is expected to have been historically dominant or co-dominant throughout this zone. | Yes Yellow Box is expected to have been historically dominant or co-dominant throughout this zone. |
| 2. <i>Does the patch have a predominantly native understorey?</i> | Yes The understorey was recorded as 66% to 91% native species cover. | No The understorey was recorded as ranging from 1% to 34% native species cover. |
| 3. <i>Is the patch 0.1 ha (1000 m²) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.</i> | No Patches are greater than 0.1 ha in size. However, 2 to 12 native non-grass understorey species were recorded across five plots, with an average of 5 native non-grass understorey species per plot. | N/A Refer to Criterion 2. |
| <i>Or</i> | | |
| <i>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 of the dominant overstorey eucalypts?</i> | No PCT1334 Zone 4 is low diversity native pasture with no canopy cover and no regeneration of the overstorey. | N/A Refer to Criterion 2. |
| <i>Does the patch meet the criteria for the listed TEC?</i> | No | No |

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 2020, gazetted 17 July 2020²⁷).

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.

²⁷ NSW Threatened Species Scientific Committee (2020). *Final Determination: White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland*. Gazetted 17 July 2020.

3.1.4. *The condition of remnants ranges from relatively good to highly degraded, such as paddock remnants with weedy understoreys and only a few hardy natives left. Some remnants of 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 highly modified/degraded, 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 PCT1334 would have once supported the climax community of this TEC.

PCT1334 Zone 1 is characterised by a native overstorey with a moderate diversity native understorey, PCT1334 Zone 2 by a native overstorey with a low diversity native understorey, and PCT1334 Zone 5 by a native overstorey with a low diversity exotic understorey. PCT1334 Zone 4 and Zone 6 lack an overstorey but have either a low diversity native understorey (Zone 4) or low diversity exotic understorey (Zone 6).

PCT1334 Zones 1, 2, and 5 support vegetation which meets the criteria for this TEC in moderate to high condition, and PCT1334 Zone 4 supports vegetation which meets the criteria for this TEC in low condition.

PCT1334 Zone 6 lacks a native overstorey and has a groundstorey that is highly modified and dominated by perennial exotic grasses and herbaceous weeds. As such, PCT1334 Zone 6 does not support vegetation which meets the criteria for this TEC under the BC Act.

As such, the portions of the subject land that support BC Act Box-Gum Woodland are defined by the extent of PCT1334 Zones 1, 2, 4, and 5.

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 in 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 2019²⁸).

*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*

²⁸ 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.

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*, *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 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 does 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 PCT 1334 Zones 1, 2, 4, and 5. PCT1334 Zones 1 and 5 do not occur in the subject land and so will not be impacted by the proposed development. No part of the 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 21 lists the 11 significant weeds which occur in the subject land and study area. Briar Rose and Blackberry are the main high threat weeds that are currently widespread.

Table 21. High threat weeds

| Species Name | Common Name | Status |
|--------------------------|-----------------|--------|
| Trees | | |
| <i>Pinus radiata</i> | Radiata Pine | - |
| <i>Salix</i> sp. | Willow | LM/AP |
| Forb | | |
| <i>Carthamus lanatus</i> | Saffron Thistle | - |
| <i>Cirsium vulgare</i> | Spear Thistle | - |

| Species Name | Common Name | Status |
|-----------------------------------|-------------------|-------------|
| <i>Echium plantagineum</i> | Paterson's Curse | - |
| <i>Hypericum perforatum</i> | St John's Wort | LM |
| <i>Onopordum acanthium</i> | Scotch Thistle | - |
| <i>Rosa rubiginosa</i> | Briar Rose | - |
| <i>Rubus fruticosus aggregate</i> | Blackberry | WoNS, LM/AP |
| Grass | | |
| <i>Eragrostis curvula</i> | African Lovegrass | AP |
| <i>Nassella trichotoma</i> | Serrated Tussock | WoNS, C |

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 species. The fauna habitat features of the subject land are described in Table 22. It is important to note that the information presented in Table 22 is also used to assess the presence/absence of habitat constraints and/or microhabitats for ecosystem credits species (Section 2.3.3) and species credit species (Section 2.3.4).

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Table 22. Fauna habitat features

| Habitat Feature | Description | Relevant Native Fauna Species/Assemblages |
|--|--|--|
| Remnant eucalypts | Historic clearing has removed approximately 89% of the native overstorey across the subject land. The remaining small patches of woodland have been historically thinned. However, the subject land still contains 208 mature remnant trees, 49 (24%) of which contain at least one functional hollow (Appendix D, Figure 7). | All remnant trees are likely to provide foraging resources for a variety of birds and marsupials when in flower, including threatened species. The 49 mature hollow bearing remnant trees are likely to provide a nesting resource for birds, bats and marsupials, including threatened species. |
| Other native vegetation (i.e. native shrubs, grasses, and forbs) | The midstorey and shrubstorey are almost entirely absent throughout the subject land. The majority of the subject land supports native dominant grassy vegetation in the form of grassy woodland and derived grassland. The value of these areas to native fauna, particularly threatened species, depends largely on the degree of modification. | The absent midstorey and shrubstorey are likely to limit the habitat value of the subject land for some of the region's threatened and rare woodland birds, which generally prefer to inhabit woodland where such features are more intact. 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. |

| Habitat Feature | Description | Relevant Native Fauna Species/Assemblages |
|----------------------------------|---|---|
| Exotic pasture | Parts of the subject land support highly modified pasture dominated by exotic grasses and forbs. | The exotic dominant pasture would provide a limited grazing resources for common birds, reptiles, and herbivorous mammals. Open areas are likely to provide a hunting resource for raptors and other predatory birds. |
| Surface rocks and rocky outcrops | Loose surface rock and embedded rocky outcrops are scattered across a substantial portion of the subject land. | Across the majority of the subject land, the loose surface rock is likely to provide refuge and foraging habitat for common herpetofauna and invertebrates. As described in Section 2.3.4.2 and shown in Figure 10, patches of loose surface rock in the north-east of the subject land support the threatened Pink-tailed Worm-lizard. |
| Creeks, streams, dams | <p>The segment of Montgomery Creek occurring in the subject land has been highly modified by past land uses and is now characterised by a broad low-lying moist channel with several small ephemeral pools, a large, constructed farm dam, and numerous constructed contour banks.</p> <p>Six additional ephemeral tributaries either pass through or originate in the subject land and join Montgomery Creek to the north. These tributaries are best described as drainage lines as they only convey water following substantial rain events and have no fringing vegetation. There are 10 small to moderately sized dams in the subject land, all of which held some water at the time of survey. The dams have some fringing vegetation; however, their fauna habitat value was observed to be limited at the time of survey due primary to the high degree of edge disturbance from stock.</p> | <p>Due to the high degree of disturbance, the segment of Montgomery Creek and various tributaries are unlikely to provide habitat of value to aquatic flora or fauna.</p> <p>The dams are also unlikely to provide habitat of value to aquatic flora or fauna. They may be of some limited value to common native water birds (e.g. Australian Wood Duck <i>Chenonetta jubata</i>) and reptiles (e.g. Eastern Long-necked Turtle <i>Chelodina longicollis</i>).</p> |

2.3.2 Threatened Biodiversity Data Collection

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 Threatened Biodiversity Data Collection (TBDC), BioNet (e.g. the profile of a threatened species), and through the BAM Calculator. 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 2.3.3) and species credit species (species credit species).

In addition, 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 Agriculture, Water and the Environment's online EPBC Act Protected Matters Search Tool (PMST) on 17 February 2021; and
- ecological point data from the NSW Wildlife Atlas (BioNet), downloaded on 10 September 2018 and updated on 17 February 2021, 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 9).

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

2.3.2.3 Likelihood of Occurrence Assessment

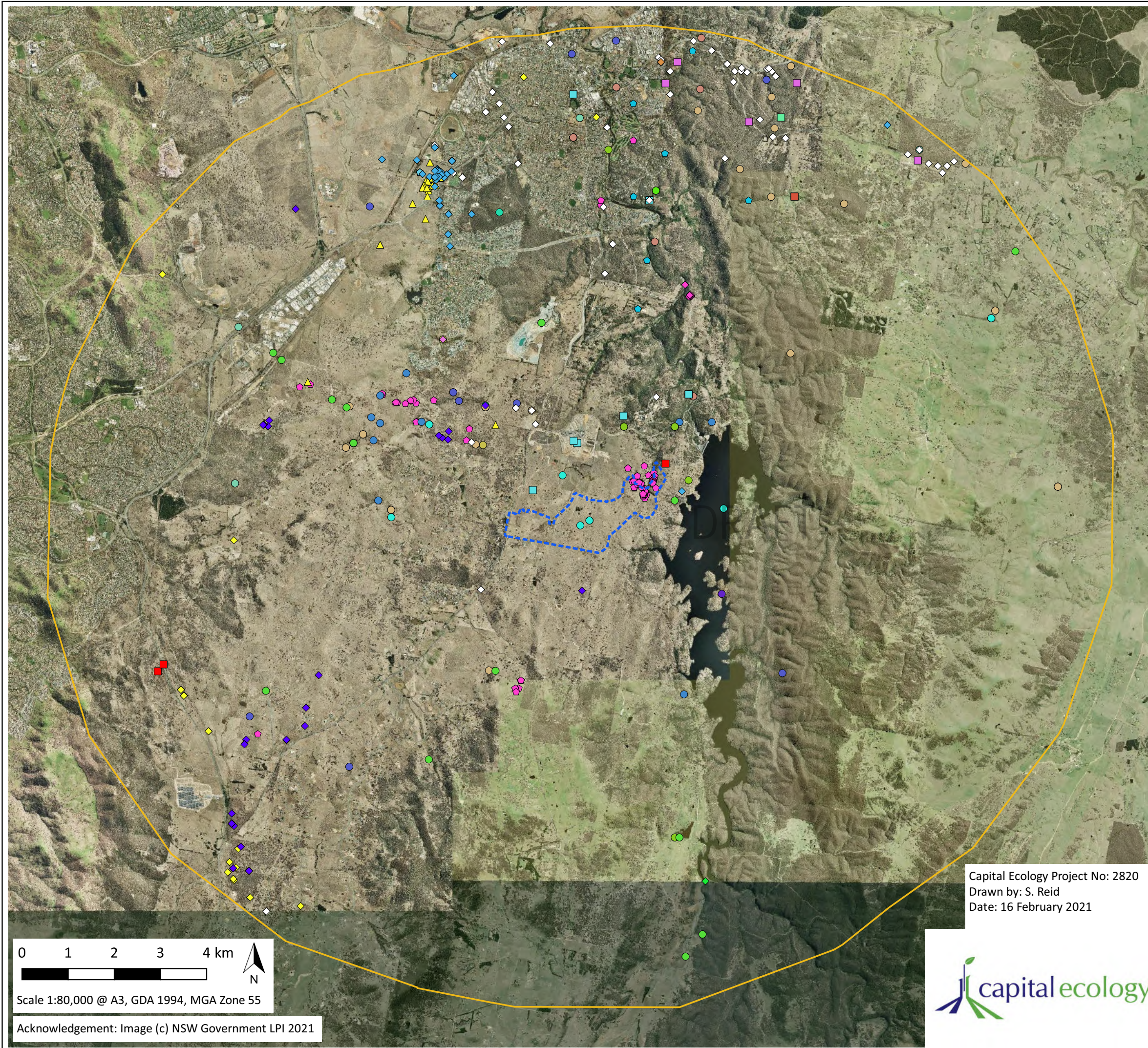
The Likelihood of Occurrence Assessment for threatened flora and fauna species is a categorisation used to determine the likelihood that the subject species occurs in the subject land. The results of the Likelihood of Occurrence Assessment are based on the findings of desktop studies, field surveys, expert opinion, and consideration of the species' currently recognised distribution and preferred habitat.

Threatened species and populations included in the Likelihood of Occurrence Assessment include all of those identified during the database and literature review as potentially occurring in the locality. Some BC Act listed threatened species have been included that have not been previously recorded in the locality yet are considered by Capital Ecology to have the potential to occur.

The likelihood of a species occurring in the subject land is categorised as either negligible, low, moderate or high. A species that has been identified in the subject land during the surveys for this study or by other confirmed records is labelled as confirmed.

The completed Likelihood of Occurrence Assessment is provided as Appendix F. Species assigned a moderate or higher likelihood of occurrence are considered in more detail in Section 2.3.4 as species credit species under the BAM (or as additional species if they are not flagged as species credit species).

Figure 9. NSW Wildlife Atlas Threatened Species Search



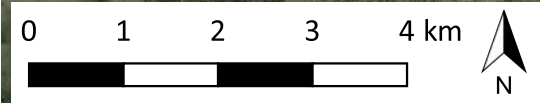
Legend

- Study Area - NH3-5 - Jan 2021
- 10km Buffer to Subject Land

NSW Wildlife Atlas Threatened Species (10 km)

- Australasian Bittern
- Black-chinned Honeyeater (eastern subspecies)
- Brown Treecreeper (eastern subspecies)
- Diamond Firetail
- Dusky Woodswallow
- Flame Robin
- Gang-gang Cockatoo
- Glossy Black-Cockatoo
- Hooded Robin (south-eastern form)
- Little Eagle
- Little Lorikeet
- Olive Whistler
- Painted Honeyeater
- Scarlet Robin
- Speckled Warbler
- Spotted Harrier
- Superb Parrot
- Varied Sittella
- White-bellied Sea-Eagle
- White-fronted Chat
- ◆ Black Gum
- ◆ Button Wrinklewort
- ◆ Hoary Sunray
- ◆ Michelago Parrot-pea
- ◆ Pale Pomaderris
- ◆ Silky Swainson-pea
- ◆ Small Purple-pea
- ◆ Thick Lip Spider Orchid
- Eastern Bentwing-bat
- Eastern False Pipistrelle
- Koala
- Southern Myotis
- Spotted-tailed Quoll
- ▲ Golden Sun Moth
- ▲ Grassland Earless Dragon
- ▲ Green and Golden Bell Frog
- ▲ Pink-tailed Legless Lizard
- ▲ Rosenberg's Goanna
- ▲ Southern Bell Frog

Capital Ecology Project No: 2820
 Drawn by: S. Reid
 Date: 16 February 2021



Scale 1:80,000 @ A3, GDA 1994, MGA Zone 55

Acknowledgement: Image (c) NSW Government LPI 2021



2.3.3 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 23. 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 Section 2.1). The likelihood of these species occurring in the subject land is determined based on 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 23. 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 |
|---|-----------------------------|------------------------------------|---|-----------------------------|
| <i>Anthochaera phrygia</i> Regent Honeyeater (Foraging) | Critically Endangered | Critically Endangered | Yes – assumed | - |
| <i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow | Vulnerable | - | Yes – confirmed Observed in the subject land during field surveys. | - |
| <i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging) | Vulnerable | - | Yes – assumed | - |
| <i>Chthonicola sagittata</i> Speckled Warbler | Vulnerable | - | Yes – assumed | - |
| <i>Circus assimilis</i> Spotted Harrier | Vulnerable | - | Yes – assumed | - |
| <i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies) | Vulnerable | - | Yes – assumed | - |
| <i>Daphoenositta chrysoptera</i> Varied Sittella | Vulnerable | - | Yes – assumed | - |

| Species | NSW (BC Act) listing status | National (EPBC Act) listing status | Presence | Justification for exclusion |
|--|-----------------------------|------------------------------------|--|-----------------------------|
| <i>Dasyurus maculatus</i> Spotted-tailed Quoll | Vulnerable | Endangered | Yes – assumed | - |
| <i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle | Vulnerable | - | Yes – assumed Presence recorded as ‘possible’ via Anabat® survey. | - |
| <i>Glossopsitta pusilla</i> Little Lorikeet | Vulnerable | - | Yes – assumed | - |
| <i>Hieraaetus morphnoides</i> Little Eagle (Foraging) | Vulnerable | - | Yes – assumed | - |
| <i>Lathamus discolor</i> Swift Parrot (Foraging) | Endangered | Critically Endangered | Yes – assumed | - |
| <i>Lophoictinia isura</i> Square-tailed Kite (Foraging) | Vulnerable | - | Yes – assumed | - |
| <i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form) | Vulnerable | - | Yes – assumed | - |
| <i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging) | Vulnerable | - | Yes – confirmed Presence recorded in the subject land via Anabat® survey. | - |
| <i>Neophema pulchella</i> Turquoise Parrot | Vulnerable | - | Yes – assumed | - |
| <i>Ninox connivens</i> Barking Owl (Foraging) | Vulnerable | - | Yes – assumed | - |

| Species | NSW (BC Act) listing status | National (EPBC Act) listing status | Presence | Justification for exclusion |
|--|-----------------------------|------------------------------------|---------------|-----------------------------|
| <i>Ninox strenua</i> Powerful Owl (Foraging) | Vulnerable | - | Yes – assumed | - |
| <i>Petroica boodang</i> Scarlet Robin | Vulnerable | - | Yes – assumed | - |
| <i>Petroica phoenicea</i> Flame Robin | Vulnerable | - | Yes – assumed | - |
| <i>Phascolarctos cinereus</i> Koala (Foraging) | Vulnerable | Vulnerable | Yes – assumed | - |
| <i>Stagonopleura guttata</i> Diamond Firetail | Vulnerable | - | Yes – assumed | - |
| <i>Varanus rosenbergi</i> Rosenberg's Goanna | Vulnerable | - | Yes – assumed | - |

2.3.4 Habitat suitability for species credit species

2.3.4.1 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 24. 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 Section 2.1). The likelihood of these species occurring in the subject land is determined based 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 2.3.4.2.

Table 24. 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 |
|---|-----------------------------|------------------------------------|--|---|--|
| <i>Anthochaera phrygia</i> 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 mapped areas' as a breeding habitat constraint for this species. | No – habitat constraint, habitat degraded | The subject land and wider study area are not identified as an 'important area' for Regent Honeyeater on the 'BAM – Important Areas' map ²⁹ . In addition, field surveys did not record any Box-Ironbark woodland or riparian forests of River Sheoak. The subject land lacks a high canopy cover as approximately 89% of the original woody vegetation has been historically cleared. As such, the subject land lacks the required breeding microhabitat features and has been degraded to the extent that the species is unlikely to utilise the subject land for breeding. In addition, the Regent Honeyeater has not been recorded within 10 km of the subject land and surveys performed for this BCAR and for other ecological studies ³⁰ of the immediate surrounds have not recorded this species. <u>Conclusion – the subject land lacks the breeding habitat constraints required for this species.</u> |
| <i>Aprasia parapulchella</i> 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 2.3.4.2, this species was recorded in the north-eastern corner of the subject land. <u>Conclusion – the subject land supports habitat for this species.</u> |
| <i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding) | Vulnerable | - | 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. Nests are located in hollows of eucalypts that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. The TBDC lists 'Eucalypt tree species with hollows greater than 9 cm diameter' as a breeding habitat constraint for this species. | No – surveyed, microhabitat features | The study area does not support tall mountain forests or woodlands, heavily timbered or mature wet sclerophyll forests, or old growth forest or woodland. In addition, approximately 89% of the overstorey in the subject land has been cleared. Furthermore, surveys were conducted across the subject land and wider study area, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in hollows. No Gang-gang Cockatoos were recorded and no sign of Gang-gang Cockatoos nesting in tree hollows was detected. Finally, targeted bird surveys performed for other ecological studies ³¹ of the immediate surrounds have not recorded this species nesting in the locality. <u>Conclusion – the species is considered unlikely to breed in the subject land.</u> |

²⁹ https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas

³⁰ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

³¹ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

| Species | NSW (BC Act) listing status | National (EPBC Act) listing status | Habitat requirements | Presence | Justification for exclusion |
|--|-----------------------------|------------------------------------|---|--|--|
| <i>Cercartetus nanus</i> 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 ' <i>declining shrub diversity in forests and woodlands due to overgrazing by stock and rabbits</i> ', ' <i>predation from cats, dogs and foxes</i> ', and ' <i>loss of nest sites due to removal of firewood</i> ' as some of the key threats to the species. | No – microhabitat features, habitat degraded | Field surveys of the vegetation in the subject land did not record any banksias or bottlebrushes (Appendix B). Approximately 89% of the subject land has been historically cleared for agriculture. As a result, the remaining mature trees are largely isolated and there is very little fallen timber (refer Appendix A) or holes in the ground which could be used by the species for shelter. As such, the subject land lacks the primary microhabitat features required for this species. The habitat is therefore degraded to the extent that the species is unlikely to utilise the subject land. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |
| <i>Eucalyptus pulverulenta</i> Silver-leafed Gum | Vulnerable | Vulnerable | This species grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum <i>E. mannifera</i> , Red Stringybark <i>E. macrorhynca</i> , Broad-leafed Peppermint <i>E. dives</i> , Silvertop Ash <i>E. sieberi</i> and Apple Box <i>E. bridgesiana</i> . The BAM Calculator lists ' <i>South of Tinderry Range</i> ' as a geographic limitation for this species. | No – geographic limitation | The subject land does not occur south of the Tinderry Range. This geographic limitation removes this species from further consideration. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |
| <i>Hieraetus morphnoides</i> Little Eagle (Breeding) | Vulnerable | - | This species occupies open eucalypts forest, woodland, or open woodland. Sheoak or <i>Acacia</i> 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 ' <i>Nest trees - live (occasionally dead) large old trees within vegetation</i> ' as a breeding habitat constraint for this species. | No – surveyed | Surveys did not record this species in the subject land and no appropriately sized stick nests were observed despite all remnant trees being surveyed. In addition, surveys performed for other ecological studies ³² of the immediate surrounds have not recorded this species nesting in the wider Googong Township. <u>Conclusion – the species is considered unlikely to breed in the subject land</u> |
| <i>Lathamus discolor</i> 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 <i>Eucalyptus globulus</i> . The TBDC lists ' <i>as per mapped areas</i> ' as a breeding habitat constraint for this species. | No – habitat constraint | The subject land and wider study area are not identified as an 'important area' for Swift Parrot on the 'BAM – Important Areas' map ³³ . <u>Conclusion – the subject land lacks the breeding habitat constraints required for this species</u> |
| <i>Lophoictinia isura</i> 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 ' <i>nest trees</i> ' as a breeding habitat constraint. The TBDC general notes state ' <i>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.</i> ' | No – microhabitat features, habitat degraded | Approximately 89% of the original woody vegetation has been historically cleared across the subject land. As a result, no timbered watercourses occur in the subject land and the subject land lacks the primary breeding microhabitat features required for this species. The habitat is therefore degraded to the extent that the species is unlikely to utilise the subject land. In addition, the Square-tailed Kite has not been recorded within 10 km of the subject land and surveys performed for this BCAR and for other ecological studies ³⁴ of the immediate surrounds have not recorded this species. <u>Conclusion – the species is considered unlikely to breed in the subject land</u> |
| <i>Miniopterus orianae oceanensis</i> 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, ' <i>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.</i> ' | No – microhabitat features | The subject land and wider study area do not contain potential breeding habitat (i.e. caves, tunnels, mines, culverts, etc.). <u>Conclusion – the subject land lacks the breeding habitat constraints required for this species.</u> |

³² Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

³³ https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas

³⁴ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

| Species | NSW (BC Act) listing status | National (EPBC Act) listing status | Habitat requirements | Presence | Justification for exclusion |
|---|-----------------------------|------------------------------------|---|--|--|
| <i>Myotis macropus</i> Southern Myotis | Vulnerable | - | The Southern Myotis occurs 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, hollow-bearing trees, man-made structures (bridges, culverts etc) 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/stretchers 3 m wide or greater ³⁵), where it catches aquatic insects and small fish with their large hind claws, and also catches flying insects. The TBDC lists 'hollow bearing trees within 200 m of riparian zone', 'bridges, caves or artificial structures within 200 m of riparian zone', and 'waterbodies; this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site' as habitat constrains for this species. | No – habitat constraint, surveyed | The subject land does not contain potential breeding habitat (i.e. hollow bearing trees within 200 m of medium to large permanent creeks, rivers, lakes, or other waterways with pools/stretchers 3 m wide or greater). In addition, as detailed in Section 2.3.4.2, targeted bat surveys did not detect the species. <u>Conclusion – the subject land lacks the breeding habitat constraints required for this species.</u> |
| <i>Ninox connivens</i> Barking Owl (Breeding) | 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 breeding habitat constraint for this species. | No – microhabitat features | Approximately 89% of the overstorey in the subject land has been cleared. In addition, surveys were conducted across the subject land and wider study area, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in hollows. No males were observed 'on station', no females were observed roosting outside hollows, and no sign of Barking Owl nesting in tree hollows was detected. Finally, the species has not been recorded within 10 km of the subject land and targeted bird surveys performed for other ecological studies ³⁶ of the immediate surrounds have not recorded any sign that this species breeds in the subject land or surrounding Googong Township. <u>Conclusion – the species is considered unlikely to breed in the subject land</u> |
| <i>Ninox strenua</i> Powerful Owl (Breeding) | 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 breeding habitat constraint. | No – microhabitat features | Approximately 89% of the overstorey in the subject land has been cleared. In addition, the species has not been recorded within 10 km of the subject land and surveys performed for other ecological studies ³⁷ of the immediate surrounds have not recorded any sign that this species breeds in the subject land or surrounding Googong Township. <u>Conclusion – the species is considered unlikely to breed in the subject land</u> |
| <i>Petaurus norfolcensis</i> 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 – microhabitat features, habitat degraded | Approximately 89% of the subject land has been historically cleared. As a result, the spacing between remnant trees is large and canopy cover is very low. The midstorey and shrubstorey are almost entirely absent. As such, the subject land lacks the primary microhabitat features required for this species. The habitat is therefore degraded to the extent that the species is unlikely to utilise the subject land. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |

³⁵ 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.

³⁶ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

³⁷ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

| Species | NSW (BC Act) listing status | National (EPBC Act) listing status | Habitat requirements | Presence | Justification for exclusion |
|--|-----------------------------|------------------------------------|---|--|---|
| <i>Petroica rodinogaster</i> Pink Robin | Vulnerable | - | This species inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. It catches prey by the perch-and-pounce method, foraging more on the ground than the more flycatcher-like Rose Robin. The species breeds between October and January. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen and is lined with fur and plant down. It is situated in an upright or oblique fork, from 30 cm to 6 m above the ground, in deep undergrowth. | No – microhabitat features, habitat degraded | The subject land does not support rainforest. Approximately 89% of the original woody vegetation has been historically cleared across the subject land. As a result, no densely vegetated gullies occur in the subject land. The subject land lacks the primary microhabitat features required for this species. The habitat is therefore degraded to the extent that the species is unlikely to utilise the subject land. In addition, the Pink Robin has not been recorded within 10 km of the subject land and surveys performed for this BCAR and for other ecological studies ³⁸ of the immediate surrounds have not recorded this species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |
| <i>Phascogale tapoatafa</i> 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 – microhabitat features, habitat degraded | The subject land does not support heath, swamps, rainforest, or wet sclerophyll forest. Approximately 89% of the original woody vegetation (overstorey, midstorey, and shrubstorey) has been historically cleared across the subject land. The dry sclerophyll areas which retain an overstorey have undergone substantial modification and lack a number of the expected structural growth forms for the PCT. The subject land therefore lacks the primary microhabitat features required for this species. The habitat is therefore degraded to the extent that the species is unlikely to utilise the subject land. In addition, the Brush-tailed Phascogale has not been recorded within 10 km of the subject land. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |
| <i>Phascolarctos cinereus</i> Koala (Breeding) | Vulnerable | Vulnerable | 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 'areas identified via survey as important habitat' as a habitat constraint for breeding for this species. 'Important habitat' is defined in TBDC by the density of Koalas and quality of habitat as determined by on-site survey. | No – habitat constraint | Approximately 89% of the subject land has been historically cleared. As a result, the remaining mature remnant trees are scattered and isolated. The midstorey and shrubstorey are largely absent. A survey for Koala (e.g. presence of individuals, scratches, etc.) did not detect any sign that the species is currently, or has recently, been present in the subject land. Other ecological studies ³⁹ of the immediate surrounds have not recorded the Koala. The lack of Koala records in the study area and locality indicates that the subject land could not be classified as 'important habitat' for breeding. <u>Conclusion – the species is considered unlikely to breed in the subject land.</u> |
| <i>Rutidosis leptorrhynchoides</i> 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 is conspicuous when present. Targeted and opportunistic threatened flora surveys did not detect this species and other ecological studies ⁴⁰ of the immediate surrounds have not recorded this species. In addition, the subject land has been intensively grazed over a prolonged period. Button Wrinklewort is therefore unlikely to occur in the subject land as it is susceptible to grazing. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |

³⁸ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

³⁹ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

⁴⁰ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

| Species | NSW (BC Act) listing status | National (EPBC Act) listing status | Habitat requirements | Presence | Justification for exclusion |
|--|-----------------------------|------------------------------------|---|--|--|
| <i>Swainsona recta</i> 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 <i>E. blakelyi</i> , Yellow Box <i>E. melliodora</i> , Candlebark Gum <i>E. rubida</i> , and Long-leaf Box <i>E. goniocalyx</i> . It grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i> , Poa tussocks <i>Poa</i> spp. and Speargrasses <i>Aurolastipa</i> 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). | No – habitat degraded | This species is highly intolerant of grazing, and the subject land and wider study area have been grazed over an extended period. In addition, targeted and opportunistic threatened flora surveys did not detect this species and other ecological studies ⁴¹ of the immediate surrounds have not recorded this species. It is likely that the habitat in the subject land has been degraded to the extent that the species is unlikely to occur. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |
| <i>Swainsona sericea</i> Silky Swainson-pea | Vulnerable | - | This species is found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> 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 <i>Callitris</i> 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. | No – habitat degraded | This species is highly intolerant of grazing, and the subject land and wider study area have been grazed over an extended period. In addition, targeted and opportunistic threatened flora surveys did not detect this species and other ecological studies ⁴² of the immediate surrounds have not recorded this species. It is likely that the habitat in the subject land has been degraded to the extent that the species is unlikely to occur. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |
| <i>Synemon plana</i> Golden Sun Moth | Endangered | Critically Endangered | The species occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which the groundlayer is dominated by Wallaby grasses <i>Rhytidosperra</i> 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 <i>Aurolastipa</i> spp. or Kangaroo Grass <i>Themeda australis</i> . The TBDC lists 'Wallaby grass <i>Rytidosperma</i> sp., Chilean needlegrass <i>Nassella nessiana</i> or Serrated Tussock <i>N. trichotoma</i> ' as a habitat constraint, and the BAM Calculator lists 'Not east of Lake George Escarpment or Great Dividing Range' as a geographic limitation. 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 | As detailed in Section 2.3.4.2, targeted surveys did not record this species in the subject land. |
| <i>Zieria citriodora</i> Lemon Zieria | Endangered | Vulnerable | The species is known from two sites in NSW - Numerella and Kybean Trig - east of Cooma. Lemon Zieria grows in low woodland of <i>E. mannifera</i> - <i>E. macrorhyncha</i> - <i>E. dives</i> with a shrub understorey. | No – microhabitat features, habitat degraded | The subject land is over 80 km from Numerella and 100 km from Kybean. In addition, approximately 89% of the original woody vegetation (overstorey, midstorey, and shrubstorey) has been historically cleared across the subject land, the species was not detected during the surveys conducted for this BDAR or by previous ecological surveys ⁴³ of study area, and it has not been recorded within 10 km of the subject land. The species is therefore considered unlikely to occur in the subject land. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u> |

⁴¹ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

⁴² Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

⁴³ Biosis (2014), Biosis (2015a), Biosis (2015b), Capital Ecology (2016), Capital Ecology (2017b), and Capital Ecology (2019a).

2.3.4.2 BAM targeted survey results

As described in Table 24, 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.

Threatened flora

A total of 141 flora species were recorded in the study area across all surveys, comprising 90 native species and 51 exotic species (Appendix B). No threatened flora species were recorded.

In light of the above, field surveys confirmed that none of the relevant threatened flora species credit species occur in the subject land.

Threatened birds

A total of 50 fauna species were recorded in the study area across all surveys, comprising 44 native species and 6 exotic species (Appendix C).

Dusky Woodswallow *Artamus cyanopterus* (BC Act vulnerable) were observed foraging in PCT999 Zone 2 on 19 September 2018 and in PCT999 Zone 6 on 25 October 2018 (Figure 12). While not detected during the current surveys, Biosis (2015b) recorded non-breeding observations of White-fronted Chat *Epthianura albifrons* (BC Act vulnerable), Scarlet Robin *Petroica boodang* (BC Act vulnerable), and Flame Robin *Petroica phoenicea* (BC Act vulnerable).

All of the above species are assumed to be present in the subject land as ecosystem credit species (Table 23). Importantly, none of the threatened candidate species credit species identified in Table 24 were observed nesting/breeding in the subject land.

In light of the above, it is concluded that the subject land does not currently support breeding habitat for the relevant bird species credit species.

Pink-tailed Worm-lizard

Across the three days of survey, four live Pink-tailed Worm-lizards and two sloughed skins were detected (Plate 1, Figure 10). All live recorded Pink-tailed Worm-lizard adults (≥ 12 cm total length). In addition to many scorpions, spiders, centipedes and other common invertebrates, a number of non-target herpetofauna species were recorded during the survey and are listed in Appendix C.

As shown in Figure 10, Pink-tailed Worm-lizard were found in the south-eastern corner of the study area. This area is zoned 'E2 – Environmental Conservation' and will not be impacted by the proposed development. Pink-tailed Worm-lizard were also found along the north-eastern corner of the subject land and study area that is connected to the known Pink-tailed Worm-lizard habitat in the PTWL Conservation Area (Capital Ecology 2019a).

As shown in Figure 10 and Figure 11, Pink-tailed Worm-lizard habitat in the PTWL Conservation Area was based on Capital Ecology (2019a), with the remainder of the Pink-tailed Worm-lizard habitat in the subject land and study area estimated based on the location of recorded individuals and/or on the presence of habitat containing appropriate Pink-tailed Worm-lizard habitat features (refer Plate 2). In total, the entire study area is estimated to support 34.50 ha of Pink-tailed Worm-lizard habitat, with the majority (31.87 ha or 92.4%) occurring in the PTWL Conservation Area, E2 zoned land, large lots, or open space (Figure 10). The remaining 2.63 ha (7.6%) which occurs in the subject land will be directly impacted by the proposed development.



Plate 1. Adult Pink-tailed Worm-lizard recorded during surveys.



Plate 2. Pink-tailed Worm-lizard habitat in the 'E2 – Environmental Conservation' zoned land.

Golden Sun Moth

As shown in Figure 12, no Golden Sun Moths were detected across the four surveys. This result is consistent with previous Golden Sun Moth surveys in Googong Township (Capital Ecology 2016, 2017).

In light of the above, it is concluded that the subject land does not support the Golden Sun Moth.

Threatened bats

As detailed in the report provided by Fly By Night Bat Surveys Pty Ltd (received on 28 December 2018, Appendix E), insectivorous bats were recorded at each survey location on each survey night

(Figure 12). A total of 803 passes were analysed and the following eight species were identified with confidence:

- White-striped Mastiff Bat *Austronomus australis*;
- Gould's Wattled Bat *Chalinolobus gouldii*;
- Chocolate Wattled Bat *Chalinolobus morio*;
- Southern Freetail Bat *Mormopterus planiceps*;
- unidentified Long-eared Bat *Nyctophilus* sp.;
- Large Forest Bat *Vespadelus darlingtonia*;
- Southern Forest Bat *Vespadelus regulus*; and
- Little Forest Bat *Vespadelus vulturinus*.

The occurrence of the following additional species is considered 'probable' based on the calls recorded:

- Large Bent-winged Bat *Miniopterus orianae oceanensis* (BC Act vulnerable);
- Eastern Freetail Bat *Mormopterus ridei*; and

The occurrence of the following additional species is considered 'possible' based on the calls recorded

- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (BC Act vulnerable);

None of the above species are listed pursuant to the EPBC Act, however the Large Bent-winged Bat and Eastern False Pipistrelle are listed as vulnerable pursuant to the BC Act. The Large Bent-winged Bat is identified as an ecosystem credit species (foraging) and species credit species (breeding). As detailed in Table 24, the subject land does not support potential Large Bent-winged Bat roosting and/or breeding habitat (caves, mines, water tunnels, etc.).

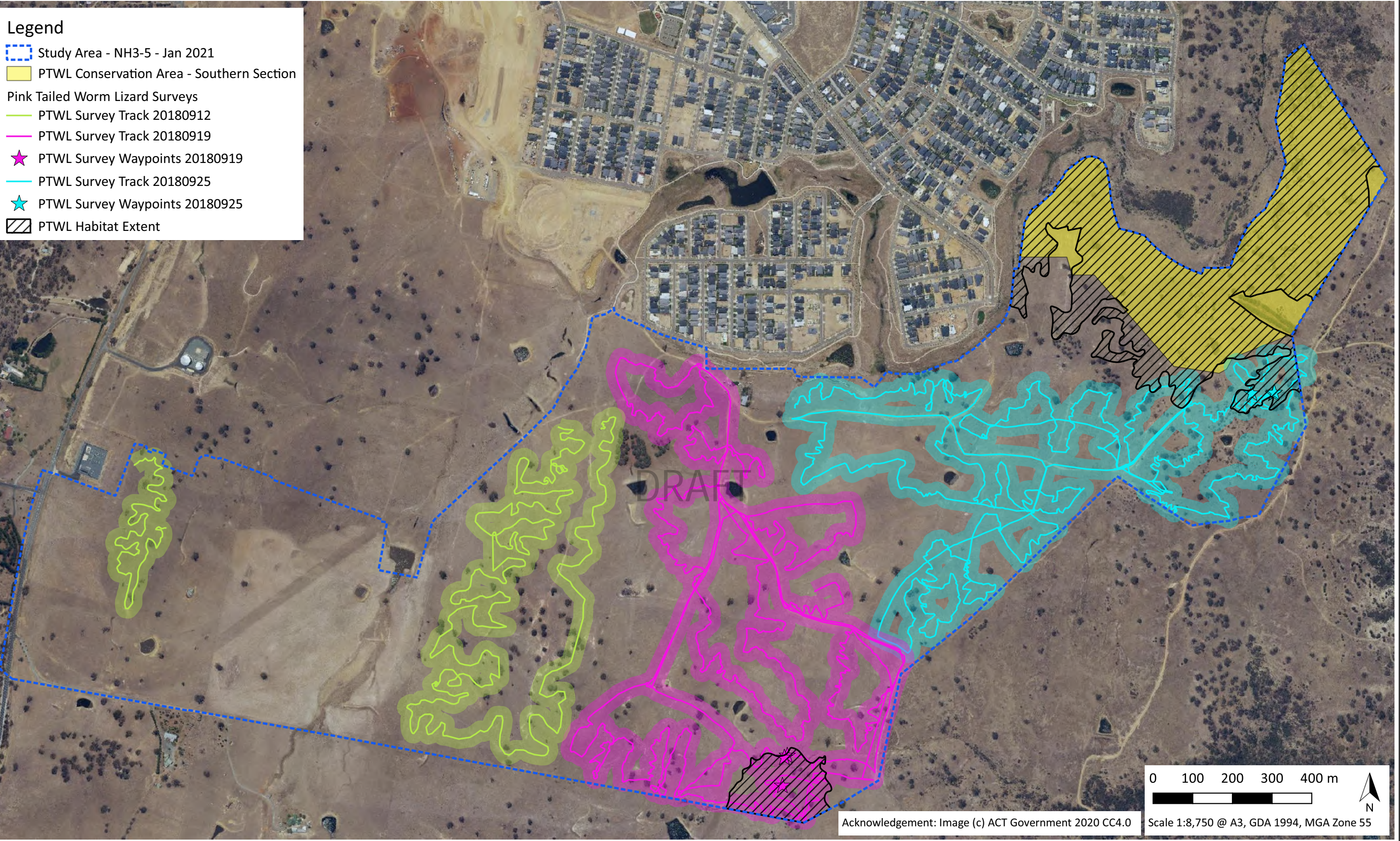








Figure 10. BAM Targeted Surveys – Pink-tailed Worm-lizard

Legend

-  Googong Neighbourhood Boundaries
-  PTWL Conservation Area - Revised Boundary 20190930

PTWL Habitat Quality (as per 2019 PTWL-P&MP V6)

-  Very High
-  High
-  Medium
-  Low

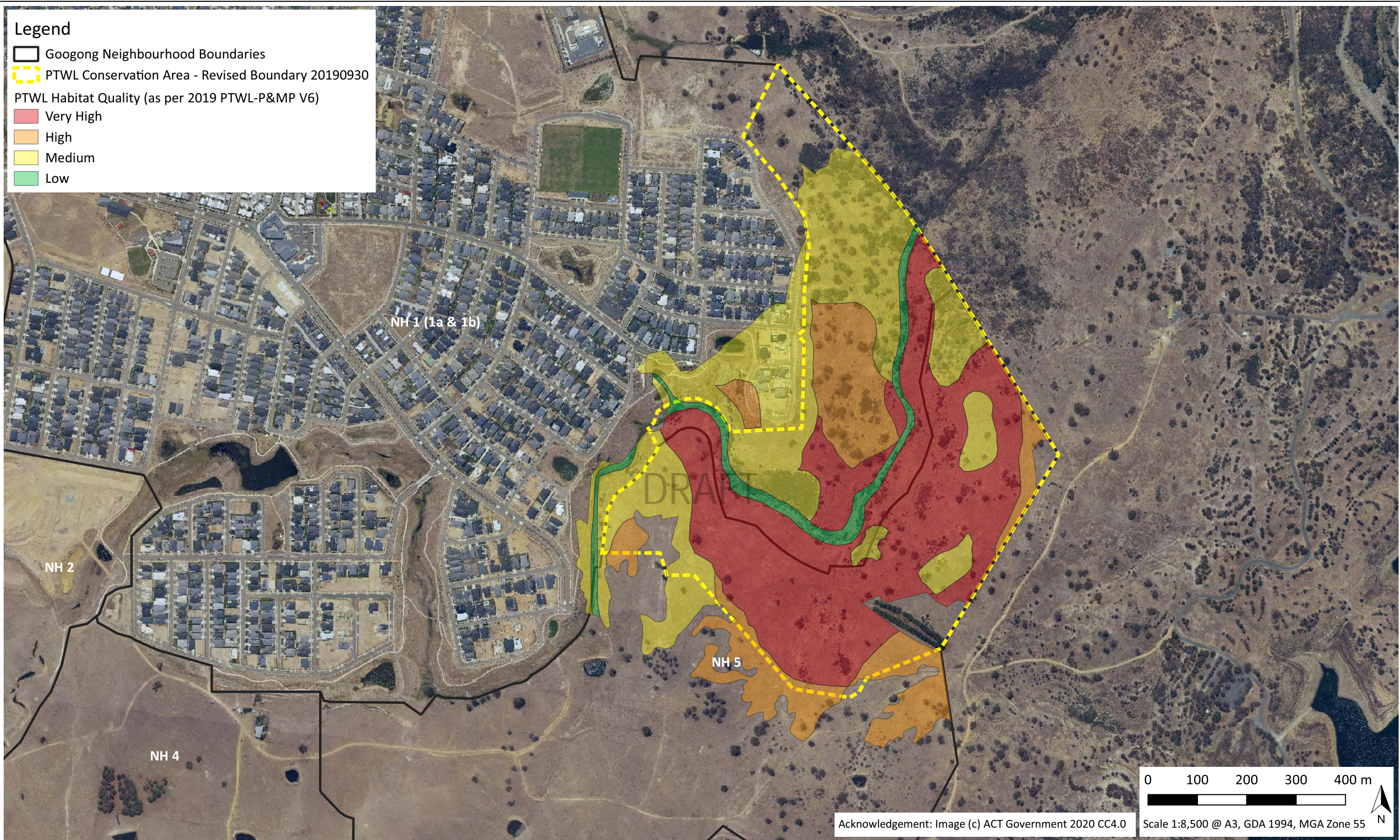


Figure 11. Pink-tailed Worm-lizard Conservation Area

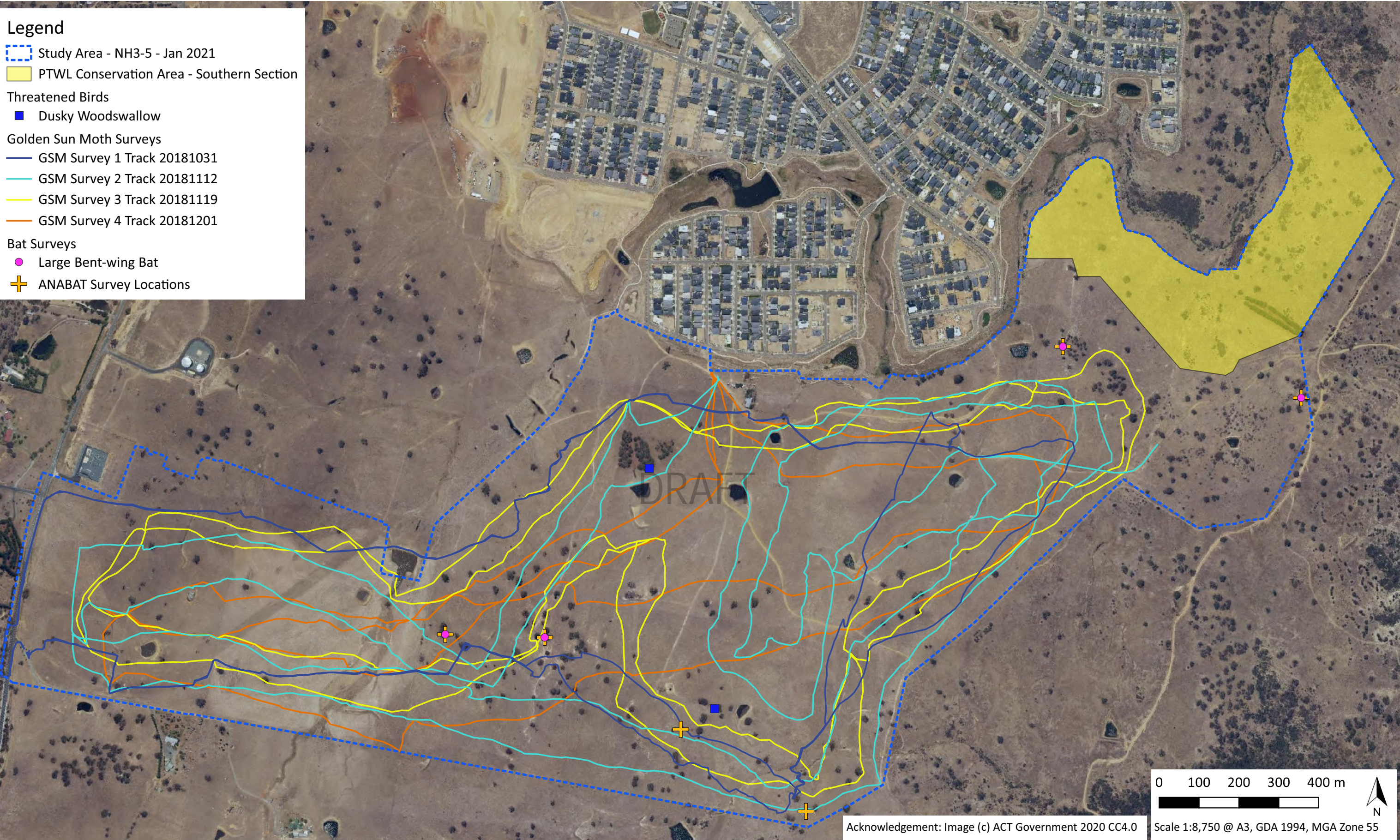


Figure 12. BAM Targeted Surveys – Golden Sun Moth and other fauna

3 Part 2 – Impact Assessment (BAM Stage 2)

Part 2 of this BCAR 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 Chapter 8 of the BAM, a proponent 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 following sections outline the measures that have been incorporated into the project design or will be implemented during construction and/or occupation of the proposed development to avoid and minimise impacts on biodiversity values.

3.1.1 Avoiding and minimising impacts on native vegetation and habitat

3.1.1.1 Location

Locating the project where there are no biodiversity values and in areas where the native vegetation or threatened species habitat is in the poorest condition

The development of Googong Township has been under consideration since the early 2000s. The location of Googong Township was informed by a variety of studies, including Johnstone Centre (2004⁴⁴). As stated in Johnstone Centre (2004), following site surveys and consideration of the values present in locality, the location of Googong Township was chosen as the native vegetation and threatened species habitat it supported were found to be in a lower condition when compared to the surrounding properties. The surrounding properties were found to support high quality remnant woodland (including Box-Gum Woodland), Natural Temperate Grassland, threatened fauna habitat (including habitat for threatened woodland birds, Golden Sun Moth, Pink-tailed Worm-lizard, and Rosenberg's Monitor *Varanus rosenbergi*), potential threatened flora habitat, and areas considered important for maintaining local and regional habitat connectivity. For example, "Wandiyali", the property directly to the west across Old Cooma Road, was originally proposed to be part of Googong Township but was excluded and instead established as a BioBanking site due to the significant biodiversity values it supports. In contrast to these areas of high conservation significance, the future location of the Googong Township was identified by Johnstone Centre (2004) as supporting substantial expanses of moderately to highly disturbed agricultural land considered unlikely to be of value to threatened flora and fauna.

Within Googong Township itself, the location of the urban development area was chosen to avoid impacts to significant ecological values, in particular the Pink-tailed Worm-lizard. As a result, the PTWL Conservation Area was established in 2013. As shown in Figure 11, the boundary of the PTWL Conservation Area was delineated to ensure that the vast majority of Pink-tailed Worm-lizard habitat occurring in the Googong Township (including all very high quality habitat and the majority of the high quality and medium quality habitat) is protected in perpetuity and appropriately managed to improve habitat condition and ensure the on-going viability of this threatened species in the locality.

Finally, the location and design of the proposed development for this BCAR was informed by previous ecological investigations of the study area and surrounding land (e.g. Biosis 2014, 2015a,

⁴⁴ Johnston Centre (2004). *Environmental Assessment. Googong Urban Investigation Area*. Authors: Leigh A. Thompson and Bruce J.D. Mullins. Environmental Consultancy Report No. 66, May 2004.

2015b, Capital Ecology 2016, 2017b, 2019a) and by the surveys performed for this BCAR. As a result, the proposed development footprint (i.e. the subject land) has been located in the parts of the study area which have been historically cleared and substantially disturbed by intensive grazing. In addition, as shown in Figure 13, the design of the proposed development has been changed to reduce impacts on high biodiversity values (e.g. reducing impacts on Pink-tailed Worm-lizard habitat and remnant trees by incorporating 63.75 ha of open space and natural areas, creating a 10.96 ha reserve managed for conservation, reducing the number of large lots, and re-locating large lot building envelopes).

The proposed development therefore largely avoids the parts of the study area which contain high quality vegetation and/or which support potentially important threatened species habitat. This is highlighted by the fact that the proposed development avoids impacts to 92.4% of the Pink-tailed Worm-lizard habitat, 81% of the higher condition vegetation zones (i.e. PCT999/PCT1334 Zones 1, 2, and 3), and over 50% of the remnant trees.

When the above points are considered together, the proposed development has been located to avoid and minimise impacts to the significant ecological values of the locality, Googong Township, and study area.

Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained

As mentioned previously, the location of Googong Township was chosen as the area was found to support substantial expanses of moderately to highly disturbed agricultural land deemed unlikely to be of value to threatened flora and fauna. This is particularly true considering that approximately 72% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the study area (rising to approximately 89% when the subject land is considered in isolation) to promote the pastoral productivity of the land. As a result, whilst the mature remnant trees in the subject land are likely to be of habitat value to numerous native birds and other highly mobile fauna species, they are unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature.

In addition, as mentioned previously, the location of the urban development area was chosen to avoid impacts to Pink-tailed Worm-lizard (refer to Figure 10 and Figure 11). By avoiding and protecting Pink-tailed Worm-lizard habitat, the proposed development ensures that the habitat connectivity of the local population is not compromised.

Finally, as the proposed development is located adjacent to the existing and approved neighbourhoods of Googong Township, the potential impact on habitat and landscape connectivity is further reduced in comparison to a site surrounded entirely by farmland.

When the above points are considered together, the location of the proposed development ensures that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is unlikely to be impacted.

3.1.1.2 Design

As described in detail below, many of the potential impacts associated with the proposed development have been avoided and minimised through design. As per Chapter 8 of the BAM, the following principles have been enacted to avoid and minimise impacts to native vegetation and habitat.

Reducing the clearing footprint of the project

The design of the proposed development was informed by previous ecological investigations of the study area and surrounding land (e.g. Biosis 2014, 2015a, 2015b, Capital Ecology 2016, 2017b, 2019a) and by the surveys performed for this BCAR. As a result, the design of the proposed development footprint (i.e. the subject land) has been changed to reduce impacts on high biodiversity values. For example, in comparison to earlier versions of the proposed development, the number of large lots has been reduced from 17 to 4, the shape of the large lots has been modified, and the locations of building envelopes have been moved. As shown in Figure 13, these changes to the design of the proposed developed were done to minimise impacts to the significant ecological values of the study area, and as a result, have retained 2.21 ha of Pink-tailed Worm-lizard habitat and 24 remnant trees (six of which contain hollows). As detailed in Section 3.3, a s.88B covenant will be placed over each large lot (total combined area = 5.38 ha) to ensure that the retained vegetation and habitat is managed in accordance with the *Googong Foreshores Interface Management Strategy*⁴⁵ (known as the ‘GFIMS’, see Section 3.3 and below for further information).

Finally, the proposed development includes 63.75 ha of open space and natural areas and a 10.96 ha reserve. As shown in Appendix D, Table 25, and Figure 13, this combined 74.71 ha will retain and protect 4.32 ha of Pink-tailed Worm-lizard habitat, 216 remnant trees (61 of which contain a hollow), and provide a buffer and managed interface to the Googong Foreshores (see Section 3.3). As detailed in Section 3.3, the 10.96 ha reserved will be specifically managed for conservation and formally protected in perpetuity via a Conservation Agreement established under the BC Act.

Considered together and as shown in Figure 13, the proposed development has been designed to avoid impacts to 80.09 ha (63.75 ha of open space / natural areas, the 10.96 ha reserve, and 5.38 ha retained in large lots) that supports 6.53 ha of Pink-tailed Worm-lizard habitat and 240 remnant trees (67 of which contain hollows).

Table 25. Remnant tree avoidance measures

| Location | Avoidance Measure | Impact of Measure |
|----------|--|---|
| 1 | Reserve | Located to retain a clump of 67 remnant trees, 18 of which contain hollows. |
| 2 | NH3 Neighbourhood Park | Located to retain a clump of 11 remnant trees, nine of which are alive and 3 of which contain hollows. At 1.45 ha the NH3 park has been made larger than the 1 ha minimum requirement. |
| 3 | Local Park 10 | Located to retain 1 remnant tree. |
| 4 | Local Park 11 | Located to retain 1 remnant, hollow bearing tree. |
| 5 | NH5 Neighbourhood Park | Located to retain a clump of 5 trees. |
| 6 | NH5 Common and PTWL Conservation Area boundary. | Located to retain a clump of 20 trees, 3 of which contain hollows. |
| 7 | Building envelopes on eight large lots located to avoid trees. | Building envelopes have been located to avoid all 29 remnant trees, 6 of which contain hollows. Retention of these trees will be mandated on title. |
| 8 | E2 zoned land now allocated as natural areas. | Natural areas which were originally planned to be included in the rear of large lots will now retain 36 trees, 16 of which contain hollows. The protection and management of this area will occur in accordance with the GFIMS. |

⁴⁵ Biosis (2014). *Googong Foreshores Interface Management Strategy – Version 3*. Prepared for Googong Township Pty Ltd. Author: R. Speirs, Biosis Pty Ltd, Canberra.

| Location | Avoidance Measure | Impact of Measure |
|----------|-------------------------------|---|
| 9 | Remainder of E2 zoned land | Natural areas which will retain 68 remnant trees, 20 of which contain hollows |
| 10 | Old Cooma Road (road reserve) | Design altered to retain 3 remnant trees, 1 of which contains a hollow. |

Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories

As the proposed development is located adjacent to the existing and approved neighbourhoods of the Googong Township, biodiversity impacts will be reduced as many of the activities related to construction, infrastructure, bushfire protection, flood planning, servicing constraints etc. will be located within the existing and approved neighbourhoods of the Googong Township. In addition, the proposed development will be coordinated and managed with that of the existing and approved neighbourhoods of the Googong Township, which is likely to lead to the appropriate management and protection of the retained biodiversity values of the area.

Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat

As mentioned previously, the PTWL Conservation Area was established in 2013 to compensate for impacts to Pink-tailed Worm-lizard habitat as a result of the development of Googong Township. As shown in Figure 11, the boundary was delineated to ensure that the vast majority of Pink-tailed Worm-lizard habitat occurring in the Googong Township (including all very high quality habitat and the majority of the high quality and medium quality habitat) is protected in perpetuity and appropriately managed to improve habitat condition and ensure the on-going viability of this threatened species in the locality. To achieve these aims, the PTWL Conservation Area is managed according to the *Googong Township Pink-tailed Worm-lizard Protection and Management Plan* (known as the 'PTWL P&MP', Capital Ecology 2019a). The PTWL P&MP is described in greater detail in Section 3.3. In summary, The PTWL P&MP sets out all of the actions required to manage the vegetation and habitat in the PTWL Conservation Area, including (but not limited to) the following.

- The PTWL Conservation Area concept including the conservation principles, design and location, and management zones.
- The initial works and management actions to be undertaken by GTPL. This included weed removal, habitat improvement (importation of habitat rocks), Pink-tailed Worm-lizard salvage and translocation, re-establishment and encouragement of native grasses, fencing, and CEMPs.
- The monitoring and management of the PTWL Conservation Area to be undertaken by GTPL and Queanbeyan-Palerang Regional Council. This includes weed monitoring and management, monitoring of native grass re-establishment success, monitoring of Pink-tailed Worm-lizard abundance and distribution, management of herbivores and feral predators, prevention of domestic animal impacts upon Pink-tailed Worm-lizard, public education and community engagement, and legal mechanisms to protect the PTWL Conservation Area in perpetuity.

In addition, as mentioned previously, the proposed development will retain 80.09 ha that supports 6.53 ha of Pink-tailed Worm-lizard habitat and 240 remnant trees (67 of which contain hollows). The

E2 zoned land and retained vegetation/habitat in large lots fall within the designated 'GFIMS Area' and as such will be managed in accordance with the GFIMS (Figure 13). The GFIMS Area borders the Googong Foreshores and provides a managed buffer of least 150 m to the adjacent significant ecological values. The GFIMS is described in greater detail in Section 3.3. In summary, this document sets out all of the actions required to manage the GFIMS Area, including (but not limited to) the following.

- Details pertaining to the GFIMS Area 'concept' (principles, benefits, key potential impacts, spatial design and location, management areas and schedule for establishment).
- A description of the restoration (weed removal and revegetation) measures that will be undertaken within the GFIMS Area.
- Details pertaining to the protection and maintenance measures that will be implemented to protect the values of both the GFIMS Area and Googong Foreshores.
- The framework for the Environmental Education Program that will be developed by GTPL to educate residents of Googong Township and the broader public regarding the importance of protecting the Googong Reservoir catchment and the significant natural and cultural heritage values of the Googong Foreshores and the GFIMS Area.
- Details pertaining to the implementation, annual monitoring and review of this GFIMS, and the associated adaptive management of the GFIMS Area.

The 10.96 ha reserve will be specifically managed for conservation and formally protected in perpetuity via a Conservation Agreement established under the BC Act. The purpose of the reserve will be to protect, manage, and enhance the conservation values that it supports, whilst permitting the construction of limited recreational and educational facilities and associated uses. In particular, active management actions will be directed towards protecting remnant trees, encouraging natural regeneration, and improving the condition of the groundstorey vegetation. To that end, a reserve management plan endorsed by Council and the Biodiversity Conservation Trust will be developed for the area.

In combination, the PTWL P&MP, GFIMS, and reserve management plan outline in detail the actions required to protect, restore, rehabilitate, maintain, and manage the majority of the retained native vegetation and habitat in the study area.

3.1.2 Avoiding and minimising prescribed impacts on native vegetation and habitat

As described in Section 8.2 of 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.

Potential 'prescribed biodiversity impacts' due to the proposed development were identified during the development of this BCAR. As described in the following sections, none of the potential impacts are determined to be a 'prescribed biodiversity impact' due to the fact that they do not impact threatened species habitat or threatened ecological communities in addition to that described in Section 3.2.

Notwithstanding this, the avoidance and minimisation measures detailed in Section 3.1.1 and the mitigation measures detailed in Section 3.3.1 will reduce the impact of the proposed development on the below potential 'prescribed biodiversity impacts'.

3.1.2.1 Rocks

As detailed in Section 2.3.1 and Section 2.3.4.2, the subject land contains substantial patches of loose surface rock, the removal of which is identified as a potential prescribed biodiversity impact, especially with respect to the species identified by the BAM Calculator (i.e. the Pink-tailed Worm-lizard). Accordingly, as detailed in Section 2.2.3.4 and 2.3.4.2, an extensive rock turning survey was performed across the subject land and study area in order to determine the value of the loose surface rock to native fauna, with particular consideration given to the flagged threatened species.

With respect to the subject land only, Pink-tailed Worm-lizard habitat was identified in the north-eastern corner of the subject land which adjoins the PTWL Conservation Area (Figure 10). These areas of Pink-tailed Worm-lizard habitat were previously known to exist (Capital Ecology 2019a) and were included in the EPBC Act referral (EPBC Act Ref:2011/5859) and corresponding EPBC Act approval for Googong Township. Impacts to these areas of Pink-tailed Worm-lizard habitat were addressed in the corresponding conditions of approval.

No threatened fauna were detected under rocks across the remainder of the subject land and only a small number of common herpetofauna and invertebrates were found. It is therefore unlikely that the removal of loose surface rock across the remainder of the subject land will have a prescribed biodiversity impact on a threatened species or ecological community.

In addition, as mentioned in Section 3.3.1, the impact associated with removal of rock across the subject land will be partly mitigated by collecting surface rock across portions of the subject land and relocating that rock to the E2 zone land directly to the north-west of the identified Pink-tailed Worm-lizard habitat (Figure 10). The purpose of this activity will be to create and/or improve habitat for fauna, thereby helping to mitigate the impacts associated with the removal of surface rock.

3.1.2.2 Non-native vegetation

As detailed in Section 2.2.4 and Figure 7, the study area contains substantial patches of non-native vegetation, the removal of which is identified as a potential prescribed biodiversity impact. As detailed in Section 2.2.4, Section 2.2.5, and Table 22 to Table 24, the areas of non-native vegetation do not classify as a threatened ecological community and are not identified as threatened species habitat.

It is therefore unlikely that the removal of non-native vegetation will have a prescribed biodiversity impact on a threatened species or ecological community.

3.1.2.3 Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range AND movement of threatened species that maintains their life cycle

As mentioned previously, the location of Googong Township was chosen as the area was found to support substantial expanses of moderately to highly disturbed agricultural land that was considered unlikely to be of value to threatened flora and fauna. This is particularly true considering that approximately 72% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the study area (rising to approximately 89% when the subject land is considered in isolation) to promote the pastoral productivity of the land. As a result, whilst the mature remnant trees in the study area are likely to be of habitat value to numerous native birds and other highly mobile fauna species, they are unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature.

In addition, as mentioned previously, the location of the urban development area was chosen to avoid impacts to Pink-tailed Worm-lizard (refer to Figure 10 and Figure 11). By avoiding and protecting Pink-tailed Worm-lizard habitat, the proposed development ensures that the habitat connectivity of the local population is not compromised.

It is therefore unlikely that the proposed development will have a prescribed impact on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range or on the movement of threatened species that maintains their life cycle.

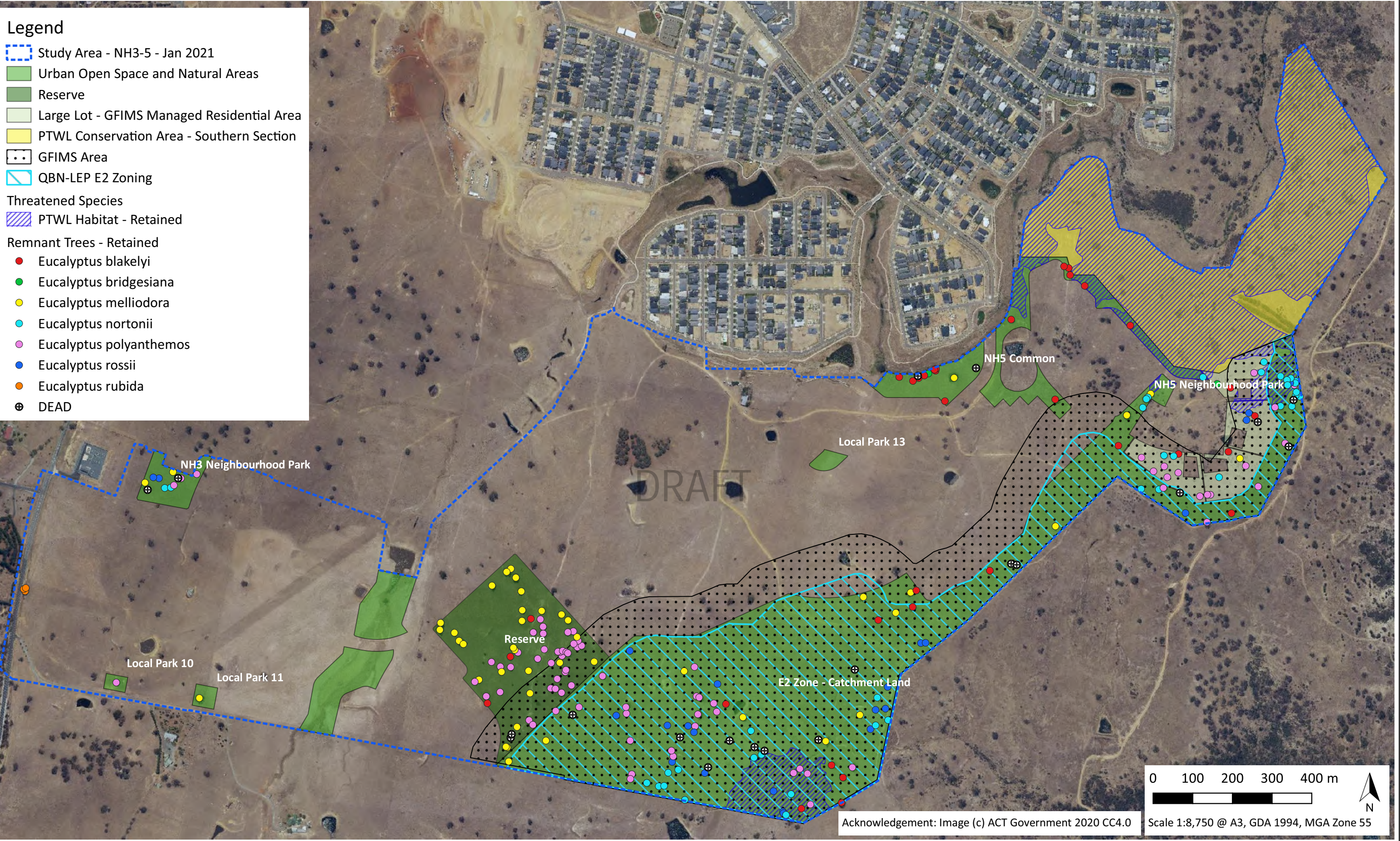


Figure 13. Avoidance, minimisation, and mitigation measures

3.2 Residual Biodiversity Impacts of Proposed Development

3.2.1 Direct impacts on native vegetation and habitat

3.2.1.1 Native vegetation and threatened species habitat

As shown in Figure 14, the proposed development will result in the clearance of the following.

PCT999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion

- 1.26 ha of PCT999 Zone 1 – moderate diversity, native dominant remnant vegetation (BC Act native vegetation).
- 7.77 ha of PCT999 Zone 2 – low diversity, native dominant remnant vegetation (BC Act native vegetation).
- 0.08 ha of PCT999 Zone 3 – moderate diversity, native dominant derived grassland (BC Act native vegetation).
- 55.02 ha of PCT999 Zone 4 – low diversity, native dominant derived grassland (BC Act native vegetation).
- 1.01 ha of PCT999 Zone 5 – low diversity, exotic dominant remnant vegetation (BC Act native vegetation).

PCT1334 – Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion

- 5.04 ha of PCT1334 Zone 2 – low diversity, native dominant remnant vegetation (BC Act native vegetation, BC Act Box-Gum Woodland).
- 48.55 ha of PCT1334 Zone 4 – low diversity, native dominant derived grassland (BC Act native vegetation, BC Act Box-Gum Woodland).

Threatened species habitat

- 2.63 ha of Pink-tailed Worm-lizard habitat (BC Act vulnerable, EPBC Act vulnerable), located in PCT999 Zones 1 to 5 and PCT1334 Zones 2 and 4.

Hollow bearing trees

- 208 mature remnant trees, 49 of which contain at least one functional hollow.

In total, the proposed development will result in the clearance of 118.73 ha of BC Act native vegetation, 53.59 ha of which meets the criteria of BC Act Box-Gum Woodland and 2.63 ha of which supports Pink-tailed Worm-lizard habitat. The proposed development will not result in any other direct impacts on native vegetation or threatened species habitat.

3.2.1.2 Exotic vegetation

As shown in Figure 14, the proposed development will also result in the clearance of:

PCT999 – Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion

- 10.25 ha of PCT999 Zone 6 – low diversity, exotic dominant derived grassland.

PCT1110 – River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Bioregion

- 9.53 ha of PCT1110 Zone 1 – low diversity, exotic dominant grassland.

PCT1334 – Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion

- 11.54 ha of PCT1334 Zone 6 – low diversity, exotic dominant derived grassland.

These zones are clearly dominated by exotic grasses and forbs, do not meet the definition of BC Act native vegetation, and are not identified as habitat for threatened species. Therefore, as per Chapter 10.4 of the BAM, these zones do not require further assessment with respect to ecosystem credits or species credits.

3.2.2 Indirect impacts on native vegetation and habitat

The proposed development has the potential to indirectly impact native vegetation and habitat adjacent to the subject land (i.e. the residual land within the study area and the vegetation/habitat immediately adjacent to the study area). Potential indirect impacts are listed below.

- Increased sedimentation of receiving waterways (i.e. Montgomery Creek and then the Queanbeyan River) during construction.
- Increased noise, light, vibration, and dust during construction.
- Weed introduction and/or spread during construction and occupation.
- Incidental damage or removal of retained native vegetation and habitat during construction and occupation.
- Increase in pest animal populations as a result of increased human activity during occupation.
- Edge effects due to increased human activity during occupation.

The above potential indirect impacts could occur during the construction and/or occupation of the subject land and are likely to reduce the extent and/or condition of the surrounding native vegetation and habitat. This may occur in the short-term during the construction phase of the proposed development and in the long-term during the occupation phase of the proposed development. By impacting native vegetation and habitat, indirect impacts also have the potential to impact the following threatened species and ecological communities.

- The threatened species listed in Table 23 and Pink-tailed Worm-lizard.
- White Box – Yellow Box – Blakely's Red Gum Woodland (BC Act Box-Gum Woodland).

However, the proposed development reduces the likelihood of indirect impacts by enacting the following principles detailed in Section 3.1.1 to avoid and minimise impacts to native vegetation and habitat.

- Locating the project in areas that are of negligible biodiversity value and where the native vegetation or threatened species habitat is in the poorest condition.

- Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.
- Reducing the clearing footprint of the project.
- Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories.
- Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat.

In addition, potential indirect impacts will be minimised and mitigated during construction and occupation by the measures outlined in Section 3.3.1. These measures include:

- control potential sedimentation of receiving waterways during construction;
- control noise, light, vibration, and dust spill during construction;
- control weed introduction and/or spread during construction and occupation;
- control incidental damage and removal of retained native vegetation and habitat during construction and occupation;
- control pest animal populations as a result of increased human activity during occupation; and
- reduce the impact of edge effects due to increased human activity during occupation.

In combination, the above measures are considered sufficient to reduce the risk of indirect impacts to an acceptably low level. As such, the proposed development is unlikely to result in any significant indirect impacts on native vegetation or habitat.

3.2.3 Prescribed biodiversity impacts

As detailed in Section 3.1.2, the proposed development is unlikely to result in any prescribed biodiversity impacts.

Legend

Study Area - NH3-5 - Jan 2021

Threatened Species Impact

PTWL Habitat Impact Areas

Vegetation Impacts

PCT999 Dry Sclerophyll Forest

PCT999 Zone1 - Canopy - Native Dom - ModHigh Diversity

PCT999 Zone2 - Canopy - Native Dom - Low Diversity

PCT999 Zone3 - Native Dom - ModHigh Diversity

PCT999 Zone4 - Native Dom - Low Diversity

PCT999 Zone5 - Exotic Dom - Canopy - Low Diversity

PCT999 Zone6 - Exotic Dom - Low Diversity

PCT1110 Moist Tussock Grassland

PCT1110 Zone1 - Exotic Dom - Low Diversity

PCT1334 Yellow Box Grassy Woodland

PCT1334 Zone2 - Canopy - Native Dom - Low Diversity

PCT1334 Zone4 - Native Dom - Low Diversity

PCT1334 Zone6 - Exotic Dom - Low Diversity

Remnant Tree Impact

Eucalyptus blakelyi

Eucalyptus dives

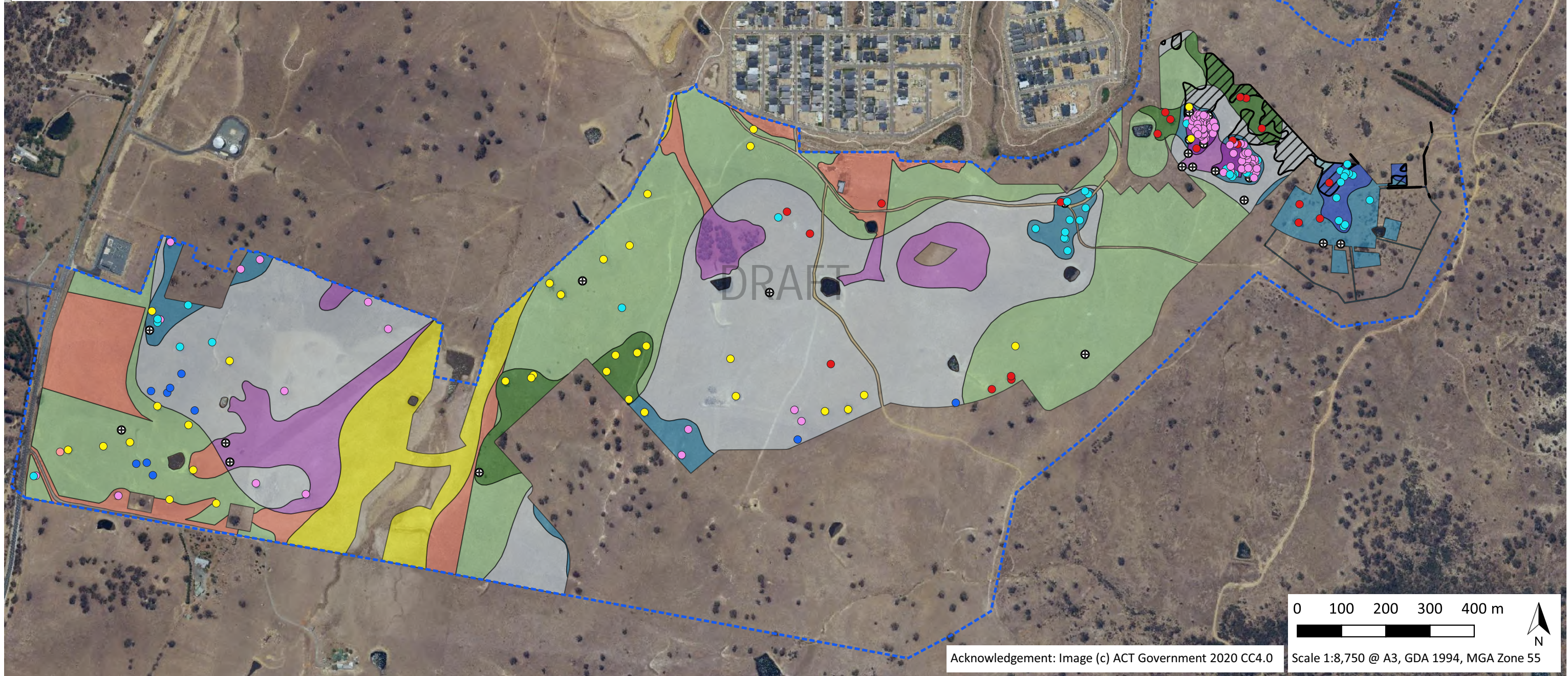
Eucalyptus melliodora

Eucalyptus nortonii

Eucalyptus polyanthemos

Eucalyptus rossii

DEAD



Acknowledgement: Image (c) ACT Government 2020 CC4.0

0 100 200 300 400 m
 Scale 1:8,750 @ A3, GDA 1994, MGA Zone 55

Figure 14. Direct Biodiversity Impacts of Proposed Development

3.3 Mitigation of Residual Impacts on Biodiversity Values

3.3.1 Mitigating residual impacts on native vegetation and habitat

The following mitigation techniques will be implemented to address the residual direct and indirect impacts on native vegetation and habitat during the construction and occupation of the subject land. In combination, these mitigation measures are considered sufficient to reduce the risk of residual impacts to an acceptably low level.

3.3.1.1 Construction

A Construction Environmental Management Plan (CEMP) will be developed to guide the proposed development from before construction commences and until construction is completed. At a minimum, the CEMP will include:

- appropriate definition of clearing boundaries;
- protective fencing and buffer zones around sensitive values;
- clearing procedures;
- weed management procedures during construction;
- sediment and erosion controls to prevent site run-off during construction;
- flow controls;
- pollution and waste management;
- water treatment standards before release;
- avoidance of riparian habitat areas;
- noise, light, vibration, and dust control;
- traffic and access controls;
- appropriate surface remediation post-construction and rehabilitation activities; and
- monitoring, reporting, and compliance requirements.

All trees to be retained will be protected and managed in accordance with the CEMP and GFIMS.

Trees to be cleared will be removed in accordance with the CEMP. At a minimum this will include pre-clearance surveys, clearing outside of the breeding season of most locally occurring native fauna (i.e. August to December), and fauna rescue procedures.

Where appropriate, cleared trees will be recovered for the purpose of fauna habitat enhancement in open space, natural areas (i.e. the E2 zoned land), and/or WSUD ponds.

Prior to the commencement of works associated with the proposed development, surface rock will be collected across portions of the subject land. The collected surface rock will be relocated to the E2 zoned land area directly to the north-west of the identified Pink-tailed Worm-lizard habitat (Figure 10). The purpose of this process will be to create habitat for Pink-tailed Worm-lizard and thereby help mitigate impacts to the species as a result of the proposed development. The rock collection and relocation will occur in a manner similar to that outlined in the PTWL P&MP.

3.3.1.2 Construction and Occupation

Weeds will be managed in accordance with the CEMP, GFIMS, PTWL P&MP, and reserve management plan. While not recorded during the field surveys undertaken for this BCAR, Fireweed *Senecia madagascariensis* and Chilean Needlegrass *Nassella neesiana* are known to occur in Googong Township. These weeds present a significant risk to adjacent high-value ecological values (e.g. the PTWL Conservation Area, Googong Foreshores) during construction as they are highly invasive and have the ability to impact grasslands and grassy understories. However, the weed control measures implemented in accordance with the CEMP, GFIMS, PTWL P&MP, and reserve management plan adequately address and mitigate the risk posed by these two high-threat weeds.

Native vegetation and habitat (including habitat features such as surface rock and woody debris) to be retained in E2 zoned land, 10.96 ha reserve, and large lots will be protected in accordance with the CEMP, GFIMS, and reserve management plan.

Water Sensitive Urban Design (WSUD) measures will be implemented to manage surface run-off and changes to hydrology. At a minimum, WSUD will include the following.

- Stormwater flows and the increased run-off from the urban development area will be maintained to acceptable levels and retarded before discharge. This will be based on geotechnical, surface water, and groundwater assessments.
- Urban runoff will be treated to reduce urban pollutants to acceptable levels before discharge.
- Suitable wetland habitat for water birds will be provided by WSUD pond systems established within the development area. Where appropriate, cleared trees will be recovered for the purpose of fauna habitat enhancement.

Googong Foreshores Interface Management Strategy (GFIMS)

The proposed development directly adjoins Googong Foreshores along sections of its eastern and southern boundary. If not managed effectively, impacts associated with the development and occupation of the subject land have the potential to significantly impact upon the values and functions of the Googong Foreshores. One of the primary measures to mitigate this potential impact is the GFIMS. With respect to the proposed development, the 'GFIMS Area' (the area to which the GFIMS applies) encompass all land within 150 metres of the boundary between the proposed development and Googong Foreshores, and also includes all of the E2 zoned land (Figure 13). The overarching purpose of the GFIMS Area is to provide a buffer zone between the proposed development and Googong Foreshores, within which appropriate management will be undertaken to prevent the development and occupation of the subject land from impacting upon water quality within the Googong Reservoir, listed threatened species, ecological communities, and the environment on Commonwealth land.

The GFIMS sets out all of the actions required to manage the GFIMS Area, including (but not limited to) the following.

- Details pertaining to the GFIMS Area 'concept' (principles, benefits, key potential impacts, spatial design and location, management areas and schedule for establishment).
- A description of the restoration measures that will be undertaken within the GFIMS Area. This includes initial weed removal and revegetation planting.

- Details pertaining to the protection and maintenance measures that will be implemented to protect the values of both the GFIMS Area and Googong Foreshores during both construction and occupation of the Googong Township. This includes:
 - access provision and management during construction and occupation;
 - weed hygiene measures during construction and occupation;
 - feral animal control during occupation;
 - domestic animal control during occupation;
 - environmental education program during occupation;
 - contractor and construction worker induction during construction; and
 - environmental management checklists during construction;
 - erosion and sediment control during construction.
- The framework for the Environmental Education Program that will be developed by GTPL to educate residents of Googong Township and the broader public regarding the importance of protecting the Googong Reservoir catchment and the significant natural and cultural heritage values of the Googong Foreshores and the GFIMS Area. This includes:
 - pre-purchase information;
 - welcome information pack;
 - signage;
 - Googong website; and
 - public events.
- Details pertaining to the implementation, annual monitoring, and review of this GFIMS, and the associated adaptive management of the GFIMS Area. This includes:
 - legal mechanisms and ongoing implementation, including that a s.88B instrument is to be registered requiring the owners of the GFIMS Area to maintain it pursuant to the terms of this GFIMS;
 - monitoring and reporting on the implementation of the GFIMS on an annual basis to specifically assess whether the establishment, restoration, protection, or maintenance measures identified the GFIMS are effective in achieving the purpose of the GFIMS;
 - performance indicators and compliance;
 - non-conformance and corrective actions;
 - adaptive management and GFIMS review. Adaptive management will be based on the annual monitoring and reporting on the implementation of the GFIMS and will help refine the GFIMS and guide future implementation; and
 - monitoring and reporting schedule.

The GFIMS Area is divided into the following four broad Management Areas.

- **MA 1 – PTWL Conservation Area** – comprising all land encompassed by the GFIMS Area overlapped by the approved PTWL Conservation Area.
- **MA 2 – Googong Reservoir Catchment Area** – comprising all E2 - Environmental Conservation zoned land occurring within the Googong reservoir catchment.
- **MA 3 – Googong Foreshores Boundary Buffer Area** – comprising all E2 - Environmental Conservation zoned land not occurring within MA 1 – PTWL Conservation Area or MA 2 – Googong Reservoir Catchment Area.
- **MA 4 – Managed Residential Area** – comprising all R1 - General Residential and R5 - Large Lot Residential zoned land occurring within the GFIMS Area.

The management actions vary depending on the Management Area and include the following.

- Establishment and fencing of the boundary (MA 1, MA 2, MA 3, MA 4).
- Construction of infrastructure to promote compatible low-impact anthropological activities (mountain biking, bush walking, bird watching etc) (MA 2).
- Weed removal, monitoring, and management (MA 1, MA 2, MA 3, MA 4).
- Importation of habitat rocks (MA 1).
- Translocation of Pink-tailed Worm-lizards (MA 1).
- Monitoring of Pink-tailed Worm-lizard abundance and distribution (MA 1).
- Re-establishment and encouragement of native grasses (MA 1) or native vegetation (groundstorey, midstorey, and canopy) (MA 2).
- Planting of only indigenous plant species (MA 3, MA 4).
- Monitoring of native grass re-establishment (MA 1) or native vegetation (MA 2).
- Implementation of cat prohibition enforced via the provisions of the NSW *Companion Animals Act 1998* (MA 1, MA 2 [applying to publicly owned land only]).
- Management of biomass via native herbivore grazing and active intervention if required (MA 1, MA 2, MA 3, MA 4).

Googong Township Pink-tailed Worm-lizard Protection and Management Plan (PTWL P&MP)

The 54 ha PTWL Conservation Area was established in 2013 to compensate for impacts to Pink-tailed Worm-lizard habitat as a result of the urban development of Googong Township. As shown in Figure 11, the boundary was delineated to ensure that the vast majority of Pink-tailed Worm-lizard habitat occurring in the Googong Township (including all very high quality habitat and the majority of the high quality and medium quality habitat) is protected in perpetuity and appropriately managed to improve habitat condition and ensure the on-going viability of this threatened species in the locality. To achieve these aims, the PTWL Conservation Area is managed according to the PTWL P&MP. The

PTWL P&MP sets out all of the actions required to manage the vegetation and habitat in the PTWL Conservation Area, including (but not limited to) the following.

- The PTWL Conservation Area concept including the conservation principles, design and location, and management zones. This includes:
 - Including all areas of 'Very High' quality habitat and the majority of the areas of 'High' and 'Medium' quality habitat within the PTWL Conservation Area;
 - providing a balanced outcome of urban development and a consolidated, contiguous PTWL Conservation Area that reduces habitat fragmentation and improves habitat quality for the species in the long term;
 - optimising the habitat connectivity of the PTWL Conservation Area to the adjoining Googong Foreshores; and
 - implementing an ongoing management regime that will effectively manage the PTWL Conservation Area for the conservation of the PTWL, whilst remaining fiscally responsible and practicable to implement and manage.
- The initial works and management actions to be undertaken by GTPL. This included:
 - establishment of the PTWL Conservation Area boundary and fencing;
 - weed removal;
 - habitat improvement (importation of habitat rocks);
 - Pink-tailed Worm-lizard salvage and translocation;
 - re-establishment and encouragement of native grasses; and
 - additional management measures during construction within or adjacent to the PTWL Conservation Area.
- The monitoring and management of the PTWL Conservation Area to be undertaken by GTPL and Queanbeyan-Palerang Regional Council. This includes
 - weed monitoring and management;
 - monitoring of native grass re-establishment success;
 - monitoring of Pink-tailed Worm-lizard abundance and distribution;
 - management of herbivores and feral predators;
 - prevention of domestic animal impacts upon Pink-tailed Worm-lizard;
 - public education and community engagement; and
 - legal mechanisms to protect the PTWL Conservation Area in perpetuity.

The PTWL-P&MP is subject to review at least every five years. Reviews will be undertaken to provide for adaptive management and to ensure that the objectives of the PTWL Conservation Area are being suitably achieved.

Reserve management plan

The 10.96 ha reserve will be specifically managed for conservation and formally protected in perpetuity via a Conservation Agreement established under the BC Act. The purpose of the reserve will be to protect, manage, and enhance the conservation values that it supports, whilst permitting the construction of limited recreational and educational facilities and associated uses. In particular, active management actions will be directed towards protecting remnant trees, encouraging natural regeneration, and improving the condition of the groundstorey vegetation. To that end, a reserve management plan endorsed by Council and the Biodiversity Conservation Trust will be developed for the area. At a minimum, the reserve management plan will include the following measures.

- Retention and protection of remnant native vegetation, regrowth, dead timber, and rocks.
- Encouragement of natural regeneration of native vegetation.
- An integrated weed management plan, including weed control, monitoring, and inspection of existing and new weeds.
- Management of human disturbance, including fencing, signage, and restrictions on permitted activities.
- Monitoring and record keeping requirements.
- Adaptive management, including a review of management plans every 4 to 6 years. This process considers the effectiveness of the matters contained in the current plan.

3.3.1.3 Occupation

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As shown in Figure 13, low density large lots are located adjacent to the Googong Foreshores to provide an additional buffer and transition zone from the urban areas. These lots support a number of remnant trees, loose surface rock, rocky outcrops, and Pink-tailed Worm-lizard habitat that will not be directly impacted by the proposed development. A s.88B covenant will be placed over each large lot to ensure that the retained vegetation and habitat is protected and managed in accordance with the GFIMS.

The design and management of the open space areas and road verges in the proposed development will be carried out in accordance with SpaceLab (2020). Any future landscaping for the proposed development (subdivision and creation of lots) in areas of the subject land outside of the newly created lots will use a mix of native plant species and exotic species. Where practicable within open space areas, all strata will be re-established (i.e. groundcover, midstorey shrubs, and canopy trees) to create fauna habitat complexity. This will discourage urban adapted species and encourage small woodland birds to visit the subject land. Landscaping guidelines for public open space will stipulate that remnant mature trees will be retained and protected to the greatest extent practicable.

3.3.2 Mitigating residual prescribed biodiversity impacts

As detailed in Section 3.1.2, the proposed development is unlikely to result in any prescribed biodiversity impacts and therefore dedicated mitigation measures are not required.

Notwithstanding this, the avoidance and minimisation measures detailed in Section 3.1.1 and the mitigation measures detailed in Section 3.3.1 will reduce the impact of the proposed development on the potential 'prescribed biodiversity impacts' identified in Section 3.1.2.

3.3.3 Adaptive management for uncertain impacts

As per Chapter 9.4 of 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. As per Chapter 9.4.2 of the BAM, the following impacts are identified as uncertain impacts.

- Impacts related to damage to karst, caves, crevices, cliffs and other geological features of significance.
- Impacts related to subsidence and upsidence resulting from underground mining.
- Impacts related to wind turbine strikes.
- Impacts related to vehicle strikes

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

- the subject land does not support karst, caves, crevices, cliffs and 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 substantively increase the incidence of vehicle strikes.

As such, an adaptive management strategy is not required for the proposed development. Notwithstanding this, as detailed in Section 3.3.1, both the GFIMS, PTWL P&MP, and reserve management plan include adaptive management strategies. As such, the adaptive management approach outlined in those two documents will act to address any potential unforeseen biodiversity impacts.

3.4 Serious and irreversible impacts

The guidance to assist a decisionmaker to determine a serious and irreversible impact (NSW Government 2017b⁴⁶) provides a list of threatened species and ecological communities which are likely to be the subject of serious and irreversible impacts (SAIL). The potential for a project to impact these SAIL entities must be assessed in the BCAR.

The subject land does not contain habitat of potential significance to any threatened flora or fauna species listed as a SAIL entity. However, the subject land does support the following ecological community which is listed as a SAIL entity.

- PCT1334 – Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion ('BC Act Box-Gum Woodland').

The proposed development will result in the removal of a total of 53.59 ha of BC Act listed Box-Gum Woodland (i.e. 5.04 ha of PCT1334 Zone 2 and 48.55 ha of PCT1334 Zone 4).

The DPIE Biodiversity Conservation Division (BCD) have advised that a decision has been made not to develop entity specific thresholds for SAIL. Instead, decisions will be made on a case-by-case basis. Accordingly, the below additional information is provided to support the decision maker to determine if the proposed removal of 53.59 ha of BC Act listed Box-Gum Woodland constitutes a SAIL.

3.4.1 Box-Gum Woodland

The following information is presented according to the requirements outlined in Section 10.2 of the BAM and has been informed by the following databases and documents.

- *Species Impact Statement Ellerton Drive Extension* (NGH Environmental 2014⁴⁷).
- NSW Government Saving Our Species (SOS) profile⁴⁸, project report⁴⁹, and Googong-Burra Region priority management information⁵⁰.
- *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 2020).
- NSW Government Office of Environment & Heritage White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland profile⁵¹.
- *ACT native woodland conservation strategy and action plans* (ACT Government 2019⁵²).

⁴⁶ NSW Government (2017b). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. State of New South Wales and Office of Environment and Heritage

⁴⁷ NGH Environmental (2014). *Species Impact Statement Ellerton Drive Extension*. June 2014, Final v1.2.

⁴⁸ <https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10837>

⁴⁹ <https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=988&ReportProfileID=10837>

⁵⁰ <https://www.environment.nsw.gov.au/savingourspeciesapp/ManagementSite.aspx?SiteID=3052>

⁵¹ <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837>

⁵² ACT Government (2019). *ACT native woodland conservation strategy and action plans*. Environment, Planning and Sustainable Development.

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice*⁵³.
- *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 2010⁵⁴).

a. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI

The proposed development enacts the following principles detailed in Section 3.1.1 to avoid and minimise impacts to native vegetation, including areas of BC Act Box-Gum Woodland.

- Locating the project in areas of negligible biodiversity value and in areas where the native vegetation or threatened species habitat is in the poorest condition.
- Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.
- Reducing the clearing footprint of the project.
- Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories.
- Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat.

As a result of these measures, the proposed development will impact 53.59 ha of BC Act Box-Gum Woodland. Of that, 5.04 ha (9%) supports vegetation which meets the criteria for this TEC in moderate condition (i.e. PCT1334 Zone 2) and 48.55 ha (91%) in low condition (i.e. PCT1334 Zone 4). The remaining 11.54 ha of PCT1334 (i.e. PCT1334 Zone 6) have been disturbed to the extent that it no longer meets the listing criteria for BC Act Box-Gum Woodland. As such, the vast majority of the impact to BC Act Box-Gum Woodland is located in areas that support moderately to highly modified vegetation.

In addition, potential indirect impacts will be minimised and mitigated during operation by the measures outlined in Section 3.3.1. These measures include the following.

- A CEMP to guide the proposed development from before construction commences and until construction is completed.
- All trees to be retained will be protected and managed in accordance with the CEMP, GFIMS, and reserve management plan. Trees to be cleared will be removed in accordance with the CEMP. At a minimum this will include pre-clearance surveys,

⁵³ Department of the Environment and Heritage (2006). *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice*, available at <https://www.environment.gov.au/epbc/publications/white-box-yellow-box-blakelys-red-gum-grassy-woodlands-and-derived-native-grasslands>

⁵⁴ DECCW (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

clearing outside of the breeding season of most locally occurring native fauna (i.e. August to December), and fauna rescue procedures.

- Weeds will be managed in accordance with the CEMP, GFIMS, PTWL P&MP, and reserve management plan.
- Native vegetation and habitat (including habitat features such as surface rock and woody debris) to be retained in E2 zoned land, the 10.96 ha reserve, and large lots will be protected in accordance with the CEMP, GFIMS, and reserve management plan.
- The PTWL Conservation Area will be managed according to the PTWL P&MP.
- Indirect impacts upon the ecological values of the Googong Foreshores will be minimised through the implementation of the GFIMS and PTWL P&MP.
- Water Sensitive Urban Design (WSUD) measures will be implemented to manage surface run-off and changes to hydrology.

b. *the area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone*

The proposed development will directly impact (i.e. remove) a total of 53.59 ha of BC Act listed Box-Gum Woodland, comprising the following two vegetation conditions zones.

- 5.04 ha of PCT1334 Zone 2. Vegetation Integrity Score of 26.6. As described in Table 15, this zone is characterised as *'Canopy with the components of the climax community, but there is evidence of historic thinning and the midstorey and shrubstorey are largely absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew and Wallaby Grasses. Low to moderate density of significant weed species. Grazed at the time of survey by sheep and Eastern Grey Kangaroos.'*
- 48.55 ha of PCT1334 Zone 4. Vegetation Integrity Score of 24.5. As described in Table 16, this zone is characterised as *'Overstorey and midstorey are absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Corkscrew, Wallaby Grasses, Redleg Grass, and Windmill Grass. Grazed at the time of survey primarily by sheep and cattle.'*

c. *a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact*

As described above, the DPIE-BCD have advised that a decision has been made not to develop entity specific thresholds for SAIL. Instead, decisions will be made on a case-by-case basis.

d. *the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint*

The DPIE-BCD recommended in their comments on the BDAR for a nearby project (Jumping Creek, NSW) that data provided for the Ellerton Drive Extension Species Impact Statement (NGH Environmental 2014⁵⁵) may assist in developing the SAIL assessment. As the study area for the

⁵⁵ NGH Environmental (2014). *Species Impact Statement Ellerton Drive Extension*. June 2014, Final v1.2.

Ellerton Drive Extension Species Impact Statement is within 5 km of the study area for this BCAR, the data is also considered appropriate for the current SAI assessment.

With respect to the condition and extent of Box-Gum Woodland, the following pertinent data is presented in NGH Environmental (2014).

- Former (pre-1750) extent = 223,300 ha.
- Current extent = 12,200 ha (95% cleared).
- Total area formally reserved = 310 ha (< 0.01% of former extent). Box-Gum Woodland is therefore under-represented in the conservation reserve system.
- There is 3,121 ha of Box-Gum Woodland in the 'locality', at least half of which (1,546 ha) is in a moderate to good condition. The 'locality' in NGH Environmental (2014) was defined by a 10 km buffer to the study area (approximately 32,000 ha in size). As such:
 - 9.75% (i.e. 3,121 ha) of the area within the 10 km buffer supported Box-Gum Woodland (likely to meet the definition of BC Act Box-Gum Woodland).
 - 4.83% (i.e. 1,546 ha) of the area within the 10 km buffer supported moderate to good condition Box-Gum Woodland (likely to meet the definition of EPBC Act and BC Act Box-Gum Woodland).
- Fallding (2002) estimates that there is more than 106,000 ha of Box-Gum Woodland within the NSW Southern Tablelands and ACT region. This does not include areas of secondary grassland that may also comprise the community.
- Keith (2006) estimates that there is 140,000 to 230,000 ha of Box-Gum Woodland within the South Eastern Highlands Bioregion.

Using the above information, the following estimations of the extent and overall condition of the potential TEC can be determined.

- Extent and overall condition within 1,000 ha. It is estimated that there is approximately 97.5 ha of BC Act Box-Gum Woodland, 48.3 ha of which is in moderate to good condition. The proposed impact of 53.59 ha therefore represents 55.0% of the BC Act Box-Gum Woodland within the 1,000 ha surrounding the subject land.
- Extent and overall condition within 10,000 ha. It is estimated that there is approximately 975 ha of BC Act Box-Gum Woodland, 483 ha of which is in moderate to good condition. The proposed impact of 53.59 ha therefore represents 5.5% of the BC Act Box-Gum Woodland within the 10,000 ha surrounding the subject land.

e. an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration

As detailed in (d) above, the South Eastern Highlands is estimated to support between 106,000 ha and 230,000 ha of Box-Gum Woodland. The South Eastern Highlands is 8,376,018 ha in size. As such, approximately 1.27% (i.e. 106,000 ha) to 2.75% (i.e. 230,000 ha) of the South Eastern Highlands supports Box-Gum Woodland.

The subject land is within the Monaro IBRA subregion. The Monaro IBRA subregion is 1,267,650 ha in size. Assuming that Box-Gum Woodland is spread evenly across the South Eastern Highlands, the Monaro IBRA subregion therefore supports:

- between 16,099.16 ha and 34,860.38 ha of Box-Gum Woodland before the impact of the proposed development has been taken into consideration; and
- between 16,045.57 ha and 34,806.79 ha of Box-Gum Woodland after the impact of the proposed development has been taken into consideration.

This proposed development therefore removes an estimated 0.15% to 0.33% of the Box-Gum Woodland in the Monaro IBRA subregion.

f. *an estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion*

As detailed in (e) above, an estimated total of 310 ha of Box-Gum Woodland is in areas formally reserved. However, this estimate does not include the ACT (which falls within the Murrumbateman IBRA subregion). As detailed in ACT Government (2019), approximately 4,507 ha of Box-Gum Woodland (comprising Blakely's Red Gum – Yellow Box (\pm White Box) tall grassy woodland and Yellow Box – Apple Box tall grassy woodland) is in the reserve system or otherwise conserved in the ACT.

g. *the development, clearing or biodiversity certification proposal's impact on:*

i. *abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns*

The direct impact of the proposed development will not extend beyond the subject land. Construction and occupation of the subject land will occur in accordance with the GFIMS, PTWL P&MP, and reserve management plan. Appropriate weed monitoring and control will occur to manage the potential impacts of high threat weeds. Similarly, appropriate site-based sediment and erosion controls will be implemented to prevent sedimentation of receiving waterways.

Given the above, it is unlikely that the proposed development will modify or destroy abiotic factors necessary for the long-term survival of the ecological community.

ii. *characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants*

The subject land is located on the edges of the urban matrix of Googong Township. It has been heavily disturbed by historic activities, primarily grazing. It is likely to be predominately inhabited by common native and exotic fauna, particularly birds. The proposed development is unlikely to adversely alter the species composition of the Box-Gum Woodland nearby the subject land or within any other patch. The impact of the proposed development is unlikely to lead to changes in fire or flooding regimes or increases in the harvesting of plants. The removal of understorey species will only occur as a direct result of vegetation clearing in the subject land.

In addition, the proposed development enacts the following principles detailed in Section 3.1.1 to avoid and minimise impacts to native vegetation, including areas of BC Act Box-Gum Woodland.

- Locating the project in areas of negligible biodiversity value and in areas where the native vegetation or threatened species habitat is in the poorest condition.
- Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.
- Reducing the clearing footprint of the project.
- Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories.
- Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat.

Potential indirect impacts, including indirect impacts to BC Act Box-Gum Woodland, will be minimised and mitigated during operation by the measures outlined in Section 3.3.1. These measures include the following.

- A CEMP to guide the proposed development from before construction commences and until construction is completed.
- All trees to be retained will be protected and managed in accordance with the CEMP, GFIMS, and reserve management plan. Trees to be cleared will be removed in accordance with the CEMP. At a minimum this will include pre-clearance surveys, clearing outside of the breeding season of most locally occurring native fauna (i.e. August to December), and fauna rescue procedures.
- Weeds will be managed in accordance with the CEMP, GFIMS, PTWL P&MP, and reserve management plan.
- Native vegetation and habitat (including habitat features such as surface rock and woody debris) to be retained in E2 zoned land, the 10.96 ha reserve, large lots will be protected in accordance with the CEMP, GFIMS, and reserve management plan.
- The PTWL Conservation Area will be managed according to the PTWL P&MP.
- Indirect impacts upon the ecological values of the Googong Foreshores will be minimised through the implementation of the GFIMS and PTWL P&MP.
- Water Sensitive Urban Design (WSUD) measures will be implemented to manage surface run-off and changes to hydrology.

In summary, the impacted nature of the vegetation and habitat in the subject land combined with the avoidance, minimisation, and mitigation measures outlined in the BCAR ensure that the proposed development is unlikely to adversely alter the species composition of the Box-Gum Woodland which surrounds the subject land or within any other patch or lead to changes in fire or flooding regimes.

iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC

Many of the exotic species which occur in the locality already occur throughout the subject land and broader locality. The proposed development is unlikely to result in the introduction and establishment of additional invasive weeds. The construction works for the proposed development may temporarily increase the occurrence of the weed species already present, however appropriate vehicle hygiene and ongoing weed management measures will be implemented to minimise the risk of weed introduction and spread (refer Section 3.3.1 of this BCAR).

Some exotic pest fauna species are likely to occur in the subject land and surrounds. The proposed development is unlikely to increase the incidence of these species given the proximity of the subject land to existing urban areas (i.e. Googong Township). Notably, the proposed development is not likely to introduce or increase the numbers of exotic avifauna present in the area.

It is likely that herbicides will be used in the subject land to control the existing weed infestation and improve the overall ecological condition of the subject land. These herbicides will be applied in a targeted manner to treat specific species. Weed control works will 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, including indirect impacts to BC Act Box-Gum Woodland, will be minimised and mitigated during operation by the measures outlined in Section 3.3.1. These measures include:

- A CEMP to guide the proposed development from before construction commences and until construction is completed.
- All trees to be retained will be protected and managed in accordance with the CEMP, GFIMS, and reserve management plan. Trees to be cleared will be removed in accordance with the CEMP. At a minimum this will include pre-clearance surveys, clearing outside of the breeding season of most locally occurring native fauna (i.e. August to December), and fauna rescue procedures.
- Weeds will be managed in accordance with the CEMP, GFIMS, PTWL P&MP, and reserve management plan.
- Native vegetation and habitat (including habitat features such as surface rock and woody debris) to be retained in E2 zoned land, 10.96 ha reserve, and large lots will be protected in accordance with the CEMP, GFIMS, and reserve management plan.
- The PTWL Conservation Area will be managed according to the PTWL P&MP.
- Indirect impacts upon the ecological values of the Googong Foreshores will be minimised through the implementation of the GFIMS and PTWL P&MP.

- Water Sensitive Urban Design (WSUD) measures will be implemented to manage surface run-off and changes to hydrology.

h. direct or indirect fragmentation and isolation of an important area of the potential TEC

As mentioned previously, the location of Googong Township was chosen as the area was found to support substantial expanses of moderately to highly disturbed agricultural land that was considered unlikely to be of value to threatened flora and fauna. This is particularly true considering that approximately 72% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the study area (rising to approximately 89% when the subject land is considered in isolation) to promote the pastoral productivity of the land.

The proposed development will therefore impact 53.59 ha of low diversity, modified vegetation which meets the definition of BC Act Box-Gum Woodland. These areas of BC Act Box-Gum Woodland in the subject land do not constitute an important area of the TEC locality or wider region, and as such their removal is unlikely to further fragment or isolate an important area of the TEC.

i. the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

The NSW Government Office of Environment & Heritage *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* profile lists the following management activities to contribute to the recovery Box-Gum Woodland.

- Undertake control of rabbits, hares, foxes, pigs, and goats (using methods that do not disturb the native plants and animals of the remnant).
- Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat).
- Do not harvest firewood from remnants (this includes living or standing dead trees and fallen material).
- Leave fallen timber on the ground.
- Encourage regeneration by fencing remnants, controlling stock grazing, and undertaking supplementary planting, if necessary.
- Undertake weed control (taking care to spray or dig out only target species).
- Protect all sites from further clearing and disturbance.
- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as steppingstones for fauna, and flora (pollen and seed dispersal).

The areas of BC Act Box-Gum Woodland that will be retained across a combined area of 107.68 ha (63.75 ha of open space / natural areas, 27.59 ha PTWL Conservation Area, the 10.96 ha reserve, and 5.38 ha retained in large lots) will be managed in accordance with the GFIMS, PTWL P&MP, and reserve management plan. As detailed in Section 3.3, these management plans include a wide variety of measures that address many of the above recommended management activities. As such, the proposed development will therefore

contribute to the recovery of BC Act Box-Gum Woodland through the implementation of such measures.

3.5 Legislative Requirements

3.5.1 Commonwealth EPBC Act – Referral

The proposed development is unlikely to have a significant impact on EPBC Act listed flora or ecological communities given the subject land does not:

- support any EPBC Act listed flora species; or
- support any EPBC Act listed ecological communities;

As detailed in Section 2.3.4, the subject land does support EPBC Act listed threatened species habitat (i.e. Pink-tailed Worm-lizard habitat). The impact of the proposed development of the subject land on Pink-tailed Worm-lizard was included in the EPBC Act referral (EPBC Act Ref:2011/5859) and corresponding EPBC Act approval for the Googong Township. As such, the impact of the proposed development will be mitigated via the implementation of the mitigation/offset measures committed to and approved for the impact of the entire Googong Township (as approved by both the former Commonwealth Department of the Environment and the former NSW Department of Planning with endorsement by the former NSW Office and Environment and Heritage). Accordingly, specific assessment of the impact of the proposed development on the Pink-tailed Worm-lizard as a standalone impact is unnecessary.

As such, referral of the proposed action under the provisions of the EPBC Act is unwarranted and is not recommended.

3.5.2 NSW Biodiversity Conservation Act – 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 are detailed in Appendix G.

3.5.2.1 Biodiversity risk weighting

The biodiversity risk weighting (Section 6.6 of the BAM) is a tool used in the BOS to mitigate the risk in offsetting the loss of vegetation, threatened entities and/or their habitat. The biodiversity risk weighting does this by increasing the quantum of credits required at an impact site. The biodiversity risk weighting is derived from 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 for impacts on ecosystem credits, some of which meets the definition of a TEC (i.e. PCT1334). The subject land also contains threatened species habitat that requires offsetting for impacts on species

credits. The biodiversity risk weighting for the identified ecosystem credits and species credits are shown below.

- PCT999 – Biodiversity risk weighting of 1.50.
- PCT1334 – Biodiversity risk weighting of 2.00.
- Pink-tailed Worm-lizard habitat – Biodiversity risk weighting of 2.00.

3.5.2.2 Ecosystem credit requirements

The results of the BAM credit calculations completed for the proposed development are provided in Table 26. As shown in Table 26, seven of the vegetation zones in the proposed impact area (i.e. the subject land) have a vegetation integrity score sufficient for their clearance to result in generation of ecosystem credits, as outlined in Section 10.3.1.1 of the BAM, these being:

- (a) a vegetation integrity score of ≥ 15 where the PCT is representative of an endangered or critically endangered ecological community, or
- (b) a vegetation zone that has a vegetation integrity score of ≥ 17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
- (c) a vegetation zone that has a vegetation integrity score ≥ 20 where the PCT is not representative of a TEC or associated with threatened species habitat.

Accordingly, the proposed development generates an ecosystem credit obligation, as determined by the BAM Calculator on 11 March 2021.

Table 26. Ecosystem credit requirements.

| PCT & Vegetation Zone | Vegetation Integrity Score | Proposed Clearance Area (ha) | Credits Required |
|-----------------------|----------------------------|------------------------------|------------------|
| PCT999 Zone 1 | 36.0 | 1.26 | 17 |
| PCT999 Zone 2 | 26.8 | 7.77 | 78 |
| PCT999 Zone 3 | 28.8 | 0.08 | 1 |
| PCT999 Zone 4 | 15.6 | 55.02 | 0 |
| PCT999 Zone 5 | 28.6 | 1.01 | 11 |
| PCT1334 Zone 2 | 26.6 | 5.04 | 67 |
| PCT1334 Zone 4 | 24.5 | 48.55 | 594 |

3.5.2.3 Species credit requirements

The subject land supports habitat of potential significance to the Pink-tailed Worm-Lizard, which is a species credit species. Accordingly, as detailed in Table 27, the proposed development generates a species credit obligation, as determined by the BAM Calculator on 11 March 2021.

Table 27. Species credit requirements.

| Species | PCT & Vegetation Zone | Habitat Condition (Vegetation Integrity) Loss | Proposed Clearance Area (ha) | Credits Required |
|---|-----------------------|---|------------------------------|------------------|
| <i>Aprasia parapulchella</i> Pink-tailed Worm-lizard | PCT999 Zone 1 | 36.0 | 0.40 | 7 |
| | PCT999 Zone 2 | 26.8 | 0.14 | 2 |
| | PCT999 Zone 3 | 28.8 | 0.07 | 1 |
| | PCT999 Zone 4 | 15.6 | 1.06 | 8 |
| | PCT999 Zone 5 | 28.6 | 0.08 | 1 |
| | PCT1334 Zone 2 | 26.6 | 0.82 | 11 |
| | PCT1334 Zone 4 | 24.5 | 0.06 | 1 |

3.5.2.4 Estimated credit obligation

Table 28 and Table 29 outline the estimated credit obligation associated with the proposed development as determined by the BAM Calculator on 11 March 2021.

Table 28. Ecosystem credits for plant community types (PCTs), ecological communities and threatened species habitat.

| IBRA sub region | PCT | No. of ecosystem credits |
|-----------------|------|--------------------------|
| Monaro | 999 | 107 |
| Monaro | 1334 | 661 |

Table 29. Species credits for threatened species.

| Species profile ID | Species | No. of Species credits |
|--------------------|--|------------------------|
| 10061 | <i>Aprasia parapulchella</i> Pink-tailed Legless Lizard | 31 |

3.5.2.5 Credit obligation options

As detailed by the NSW Department of Planning, Industry and Environment⁵⁶, the proponent can address the estimated offset obligation in the following two ways.

- 1) The proponent can 'identify and purchase the required 'like for like' credits in the market and then retire those credits via OEH BOAMS [Biodiversity Offsets and Agreement Management System]. For example, credits could be located by using the OEH registers or by retaining a broker to locate credits for them.'
- 2) The proponent can 'use the Offsets Payment Calculator to determine the cost of its credit obligation, and transfer this amount to the Biodiversity Conservation Fund via OEH BOAMS. The Biodiversity Conservation Trust is then responsible for identifying and securing the credit obligation.'

When the proponent has completed these steps for all credits that the proponent is required to retire, they can proceed with their activity in accordance with their approval. The consent authority

⁵⁶ <https://www.environment.nsw.gov.au/biodiversity/offsetsscheme.htm>

is responsible for ensuring compliance with credit obligations, and any other conditions of the consent or approval.

If the proponent chooses Option 2 to meet the credit obligations, the amount which must be paid into the Biodiversity Conservation Fund (BCF) is determined at the time the proponent applies for an invoice from the Biodiversity Conservation Trust (BCT). 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. These risks include the statistical probability that the market credit price paid by the Biodiversity Conservation Trust to landholders is higher or lower than that predicted. The benefits associated with Option 2 include a more streamlined process and no ongoing obligations once the required amount has been paid to the Biodiversity Conservation Fund.

If the proponent chooses Option 1 to meet the credit obligations, the cost per credit purchased from the market is likely to be lower than that to pay into the BCF, and as such, the total monetary cost of the offset obligation is likely to be lower than Option 2. However, the disadvantages associated with Option 1 include a more complicated process and potential delays associated with sourcing credits from the BOS credit market.

3.5.3 NSW Koala SEPP – Koala Habitat Protection Requirements

State Environmental Planning Policies (SEPPs) outline policy objectives relevant to state-wide issues. One SEPP of a biodiversity conservation focus, the *State Environmental Planning Policy (Koala Habitat Protection) 2020*⁵⁷ (the 'Koala Habitat Protection SEPP') is of relevance to the proposed development. The Koala Habitat Protection SEPP –

Aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

- (a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and*
- (b) by encouraging the identification of areas of core koala habitat, and*
- (c) by encouraging the inclusion of areas of core koala habitat in environment protection zones.*

With regard to the current application of the Koala Habitat Protection SEPP for the subject land, the following points are noted.

1. The subject land is located within the Queanbeyan-Palerang Regional Local Government Area (LGA), which is an LGA to which the Koala Habitat Protection SEPP applies as listed in Schedule 1.
2. *Potential koala habitat means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.*

The subject land does not support any of the tree species listed in Schedule 2 of the Koala Habitat Protection SEPP. As such, the subject land does not support 'potential koala habitat'.

⁵⁷ Available at <https://legacy.legislation.nsw.gov.au/EPis/2020-698.pdf>

3. There are no recent records of Koalas in the locality and the species is generally not known to occur in the lowland agricultural lands of the Queanbeyan-Palerang Regional LGA.

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land therefore does not support Koala habitat and as such is unlikely to constitute important or occupied Koala habitat now or in the future.

In light of the above, Council can be satisfied that the subject land is not Koala habitat, and it is therefore not prevented by the Koala Habitat Protection SEPP from granting consent to a development application within the subject land.

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- *Land Zoning Map - Sheet LZN_007.*
- *LEP Lot Size Map - Sheet LSZ_007.*
- *Terrestrial Biodiversity Map – Sheet BIO_001.*

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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 | |
| 999 | 1 | 1 | 1 | 0 | 7 | 7 | 0 | 0 | |
| | | 2 | 2 | 3 | 8 | 10 | 0 | 2 | |
| | 2 | 1 | 1 | 0 | 11 | 2 | 0 | 0 | |
| | | 2 | 1 | 0 | 9 | 1 | 0 | 0 | |
| | | 3 | 0 | 0 | 8 | 4 | 0 | 0 | |
| | | 4 | 1 | 0 | 6 | 2 | 0 | 0 | |
| | 3 | 1 | 0 | 1 | 8 | 12 | 1 | 2 | |
| | 4 | 1 | 0 | 0 | 6 | 5 | 0 | 0 | |
| | | 2 | 0 | 0 | 7 | 2 | 0 | 0 | |
| | | 3 | 0 | 0 | 8 | 6 | 0 | 0 | |
| | | 4 | 0 | 0 | 8 | 4 | 0 | 0 | |
| | | 5 | 0 | 0 | 6 | 3 | 0 | 0 | |
| | 5 | 1 | 1 | 0 | 4 | 2 | 0 | 0 | |
| | 6 | 1 | 0 | 0 | 5 | 3 | 0 | 0 | |
| | | 2 | 0 | 0 | 4 | 1 | 0 | 0 | |
| | | 3 | 0 | 0 | 2 | 1 | 0 | 0 | |
| | 110 | 1 | 1 | 0 | 0 | 6 | 0 | 0 | 0 |
| | | | 2 | 0 | 0 | 5 | 0 | 0 | 0 |
| 3 | | | 0 | 0 | 5 | 2 | 0 | 0 | |
| 1334 | 1 | 1 | 4 | 8 | 11 | 10 | 0 | 1 | |
| | 2 | 1 | 0 | 0 | 6 | 3 | 0 | 0 | |
| | | 2 | 1 | 0 | 5 | 1 | 0 | 0 | |

| PCT code | Veg. Zone | Plot No. | Composition (species richness) | | | | | |
|----------|-----------|----------|--------------------------------|-------|--------------------|------|------|-------|
| | | | Tree | Shrub | Grass & grass like | Forb | Fern | Other |
| | | 3 | 0 | 0 | 7 | 3 | 0 | 0 |
| | 4 | 1 | 0 | 0 | 6 | 2 | 0 | 0 |
| | | 2 | 0 | 0 | 7 | 1 | 0 | 0 |
| | | 3 | 0 | 0 | 8 | 8 | 1 | 2 |
| | | 4 | 0 | 0 | 7 | 0 | 0 | 0 |
| | | 5 | 0 | 0 | 7 | 2 | 0 | 0 |
| | 5 | 1 | 4 | 0 | 6 | 1 | 0 | 0 |
| | 6 | 1 | 0 | 0 | 1 | 3 | 0 | 0 |
| | | 2 | 0 | 0 | 5 | 2 | 0 | 0 |
| | | 3 | 0 | 0 | 1 | 1 | 0 | 0 |

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| PCT code | Veg. Zone | Plot No. | Structure (% cover) | | | | | | |
|----------|-----------|----------|---------------------|-------|--------------------|------|------|-------|---|
| | | | Tree | Shrub | Grass & grass like | Forb | Fern | Other | |
| 999 | 1 | 1 | 5 | 0 | 47 | 1.1 | 0 | 0 | |
| | | 2 | 17 | 0.3 | 28.5 | 4.8 | 0 | 0.2 | |
| | 2 | 1 | 5 | 0 | 51.3 | 0.2 | 0 | 0 | |
| | | 2 | 20 | 0 | 37.5 | 0.1 | 0 | 0 | |
| | | 3 | 0 | 0 | 34.3 | 0.5 | 0 | 0 | |
| | | 4 | 20 | 0 | 21 | 0.2 | 0 | 0 | |
| | 3 | 1 | 0 | 0.1 | 57.4 | 1.6 | 0.1 | 0.3 | |
| | 4 | 1 | 0 | 0 | 52.1 | 0.5 | 0 | 0 | |
| | | 2 | 0 | 0 | 33.7 | 0.2 | 0 | 0 | |
| | | 3 | 0 | 0 | 47.7 | 1.5 | 0 | 0 | |
| | | 4 | 0 | 0 | 52.3 | 0.5 | 0 | 0 | |
| | | 5 | 0 | 0 | 66 | 0.3 | 0 | 0 | |
| | 5 | 1 | 35 | 0 | 21.5 | 0.2 | 0 | 0 | |
| | 6 | 1 | 0 | 0 | 24.5 | 0.3 | 0 | 0 | |
| | | 2 | 0 | 0 | 2.1 | 0.1 | 0 | 0 | |
| | | 3 | 0 | 0 | 15 | 0.1 | 0 | 0 | |
| | 110 | 1 | 1 | 0 | 0 | 22.7 | 0 | 0 | 0 |
| | | | 2 | 0 | 0 | 35.1 | 0 | 0 | 0 |
| 3 | | | 0 | 0 | 20.1 | 0.2 | 0 | 0 | |
| 1334 | 1 | 1 | 25.5 | 3.1 | 25.8 | 3.1 | 0 | 0.1 | |
| | 2 | 1 | 0 | 0 | 30.1 | 0.4 | 0 | 0 | |
| | | 2 | 25 | 0 | 15.5 | 0.1 | 0 | 0 | |
| | | 3 | 0 | 0 | 35.3 | 0.3 | 0 | 0 | |
| 4 | 1 | 0 | 0 | 52.6 | 0.2 | 0 | 0 | | |

| PCT code | Veg. Zone | Plot No. | Structure (% cover) | | | | | |
|----------|-----------|----------|---------------------|-------|--------------------|------|------|-------|
| | | | Tree | Shrub | Grass & grass like | Forb | Fern | Other |
| | | 2 | 0 | 0 | 27.5 | 0.1 | 0 | 0 |
| | | 3 | 0 | 0 | 43.6 | 2.7 | 0.1 | 0.2 |
| | | 4 | 0 | 0 | 38.2 | 0 | 0 | 0 |
| | | 5 | 0 | 0 | 41 | 0.2 | 0 | 0 |
| | 5 | 1 | 18 | 0 | 6.3 | 0.1 | 0 | 0 |
| | 6 | 1 | 0 | 0 | 0.1 | 0.3 | 0 | 0 |
| | | 2 | 0 | 0 | 16.6 | 0.2 | 0 | 0 |
| | | 3 | 0 | 0 | 1 | 0.1 | 0 | 0 |

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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 | | | | | | |
| 999 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 23 | 23 | 1.1 | |
| | | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 62 | 3 | 0.1 | |
| | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 28.4 | 0 | 1 | |
| | | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 66 | 1 | 0.2 | |
| | | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 61 | 2 | 0.7 | |
| | | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 43 | 4 | 5.5 | |
| | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 0 | 0.4 | |
| | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 0 | 0.7 |
| | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | 2.3 |
| | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17.6 | 0 | 0 |
| | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34.6 | 0 | 0 |
| | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.6 | 0 | 0.1 |
| | 5 | 1 | 0 | 0 | 2 | 6 | 7 | 0 | 1 | 27 | 10 | 1.2 | |
| | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 0 | 0.5 |
| | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 3.1 |
| | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17.4 | 8 | 0 |
| | 110 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 2.6 |
| | | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 5.1 |
| 3 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15.4 | 0 | 5 | |
| 1334 | 1 | 1 | 9 | 0 | 1 | 1 | 7 | 3 | 0 | 61 | 8 | 0.3 | |
| | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | |
| | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 62 | 0 | 0 |
| | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 15.2 | 4 | 0.5 |

| 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 | | | | | | |
| | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 3 | |
| | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 0 | 0.2 | |
| | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.6 | 0 | 0.3 | |
| | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 1.3 | |
| | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0.5 | |
| | 5 | 1 | 17 | 3 | 6 | 6 | 1 | 4 | 1 | 68 | 16 | 1.7 | |
| | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | 2 |
| | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | 6.8 |
| | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.6 | 0 | 0 |

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Appendix B. Flora species recorded by plot and percent cover or presence

| Species Name | PCT999 | | | | | | | | | | | | | | | PCT1110 | | | PCT1334 | | | | | | | | | | | | | | | Recorded elsewhere in subject land | | | | | | | |
|--------------------------------|--------|-----|--------|-----|-----|-----|--------|--------|-----|-----|-----|-----|--------|------|------|---------|------|-----|---------|-----|-----|--------|------|-----|--------|-----|-----|-----|------|--------|------|------|------|------------------------------------|--------|--|--|--------|--|--|--|
| | Zone 1 | | Zone 2 | | | | Zone 3 | Zone 4 | | | | | Zone 5 | | | Zone 6 | | | Zone 1 | | | Zone 1 | | | Zone 2 | | | | | Zone 4 | | | | | Zone 5 | | | Zone 6 | | | |
| | 1 | 2 | 1 | 2 | 3 | 4 | 1 | 1 | 2 | 3 | 4 | 5 | 1 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5 | 1 | 1 | 2 | 3 | | | | | | | | | |
| Exotic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Acetosella vulgaris</i> | 1.0 | | | 0.1 | 0.5 | | 0.3 | 0.1 | 2.0 | | | | | 0.5 | 3.0 | | 2.0 | | 2.0 | | | | 0.2 | 1.0 | 0.1 | 0.1 | 0.1 | | | 2.0 | 1.0 | | | | | | | | | | |
| <i>Aira sp.</i> | | | | | | | | | | | | 0.3 | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | |
| <i>Arctotheca calendula</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| <i>Avena sp.</i> | | | | | | | | | | | | | | | | | | | | | | | | 2.0 | | | | | | | 1.0 | | | | | | | | | | |
| <i>Briza maxima</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| <i>Briza minor</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| <i>Bromus sp.</i> | 0.2 | 0.8 | 0.1 | | 0.1 | | 0.3 | | 0.5 | | 5.0 | 1.0 | 0.1 | 5.0 | | 0.5 | 2.0 | 3.0 | 2.0 | | | | 0.2 | | | 0.1 | 0.2 | 0.2 | 0.1 | 20.0 | 2.0 | 5.0 | | | | | | | | | |
| <i>Capsella bursa-pastoris</i> | | | | | | | | | | | | | 0.1 | | | 0.1 | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | |
| <i>Carthamus lanatus</i> | | | | 0.1 | | 0.1 | | 0.1 | | | | | | | 0.1 | | | | | | | 0.1 | 2.0 | | 0.1 | 0.2 | 0.5 | | | 0.1 | | | | | | | | | | | |
| <i>Chondrilla juncea</i> | 0.1 | 0.1 | | | | 0.1 | | | | | | | | | | | | | | | 0.1 | | 0.5 | 0.2 | | | | | 1.0 | | | | | | | | | | | | |
| <i>Cirsium vulgare</i> | | | | | | | | 0.1 | 0.5 | | 0.1 | | | 0.1 | | | 3.0 | 0.5 | 2.0 | | 0.1 | | | | | 0.2 | 0.1 | | 0.1 | | 2.0 | | | | | | | | | | |
| <i>Coryza sp.</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | | | | | |
| <i>Cynodon dactylon</i> | | | | | | | | | | | | | | | 5.0 | 10.0 | | 2.0 | 25.0 | | | | 0.5 | | | 5.0 | | | | | | 20.0 | | | | | | | | | |
| <i>Cyperus eragrostis</i> | | | | 0.1 | 0.5 | | | 0.1 | | | | | 1.0 | | | | 0.5 | | | | | | | | | 1.0 | | | | | | 0.5 | | | | | | | | | |
| <i>Dactylis glomerata</i> | | | | | | | | | | | | | | | | | | | | | 1.0 | | | | | | | | 2.0 | 0.1 | | | | | | | | | | | |
| <i>Echium plantagineum</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | |
| <i>Echium vulgare</i> | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | |
| <i>Eleusine tristachya</i> | | | | | 0.5 | 0.2 | | 0.1 | 0.5 | 1.0 | | | | | 5.0 | | | | | | | | | | | | | | | | | | 10.0 | | | | | | | | |
| <i>Eragrostis curvula</i> | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | 1.0 | | 0.1 | | | | | | | | | | |
| <i>Erodium cicutarium</i> | 1.0 | | | 0.1 | 0.2 | 0.2 | | 0.1 | | 1.0 | 1.0 | 0.5 | 0.2 | | 0.5 | | | | | | | | 10.0 | 0.1 | 0.2 | 1.0 | 0.3 | | 2.0 | 0.1 | 1.0 | | | | | | | | | | |
| <i>Gnaphalium americanum</i> | | | | | | | | 0.1 | | | | | | | | | 0.1 | | | | | | | | | | | | | 0.1 | | | | | | | | | | | |
| <i>Hirschfeldia incana</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| <i>Holcus lanatus</i> | | | | | | | | | | | | | | | | | 3.0 | 2.0 | 0.2 | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hordeum sp.</i> | | | | 0.1 | | 5.0 | | | 3.0 | | | | 20.0 | | 25.0 | 10.0 | 5.0 | 0.5 | | | | 0.1 | | | | 1.0 | | | | 0.5 | 3.0 | | | | | | | | | | |
| <i>Hypericum perforatum</i> | | | | | | | | | | | | | | | | | | | | | 0.1 | | | 0.1 | | | | | | | | | | | | | | | | | |
| <i>Hypochaeris glabra</i> | | | | | | | | | | | | 0.2 | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | |
| <i>Hypochaeris radicata</i> | 5.0 | 0.1 | 1.0 | 0.5 | 1.0 | 0.1 | 0.5 | 15.0 | 2.0 | 0.5 | 5.0 | | | 10.0 | | 10.0 | 10.0 | 3.0 | 0.2 | 1.0 | 1.0 | 0.5 | 1.0 | 5.0 | 2.0 | 1.0 | 1.0 | 0.5 | 2.0 | | | | | | | | | | | | |
| <i>Lolium perenne</i> | | | | 2.0 | | 0.2 | | | | | | | 5.0 | 3.0 | | | 10.0 | 2.0 | 1.0 | | | 0.1 | | 0.1 | | | | | 20.0 | 1.0 | 15.0 | | | | | | | | | | |
| <i>Malva sp.</i> | | | | | 0.2 | | | | | | | | 1.0 | | 2.0 | 3.0 | | | | | | | | | | | | | | 0.1 | 5.0 | | | | | | | | | | |
| <i>Marrubium vulgare</i> | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Modiola caroliniana</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | |
| <i>Myosotis discolor</i> | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Nassella trichotoma</i> | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | 0.1 | | 0.1 | | | | | | | | | | |
| <i>Onopordum acanthium</i> | | | | 0.1 | | 0.2 | | | | | | | | | | 0.5 | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | |
| <i>Paronychia brasiliana</i> | 1.0 | 0.1 | | 0.5 | 1.0 | 0.2 | 0.1 | 0.5 | 0.2 | | 0.1 | 1.0 | 1.0 | 0.5 | 0.5 | 1.0 | | | 0.5 | | 0.2 | 0.5 | | | 0.2 | 0.2 | 0.3 | 0.5 | | | 10.0 | 0.5 | | | | | | | | | |
| <i>Paspalum dilatatum</i> | | | | | | | | | | | | | | | | | 0.1 | 5.0 | 2.0 | | | | | | | | | | 0.1 | | 5.0 | | | | | | | | | | |
| <i>Petrorhagia nanteuilii</i> | | | | | | | | | | | | | | | | | | | | | | | 0.2 | | | 0.1 | | | | | | | | | | | | | | | |
| <i>Phalaris aquatica</i> | | | | 0.1 | | | | | | | | | | | | | 10.0 | | | | | | 0.5 | | | | | | 50.0 | 0.1 | 5.0 | 5.0 | | | | | | | | | |
| <i>Pinus radiata</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | | | | | | |
| <i>Plantago lanceolata</i> | | | 0.5 | 0.2 | | | | 0.5 | | | | | | | | 0.1 | 5.0 | 2.0 | 3.0 | | 1.0 | 1.0 | | 0.2 | 0.2 | | | 2.0 | | 2.0 | | | | | | | | | | | |

| Species Name | PCT999 | | | | | | | | | | | | | | PCT1110 | | | PCT1334 | | | | | | | | | | | Recorded elsewhere in subject land | | | | | | | | | | | | |
|---|--------|------|--------|------|------|------|--------|--------|------|------|------|------|--------|--------|---------|------|--------|---------|------|--------|------|------|------|--------|------|------|--------|------|------------------------------------|-----|------|--------|-----|--|--------|-----|-----|------|-----|-----|-----|
| | Zone 1 | | Zone 2 | | | | Zone 3 | Zone 4 | | | | | Zone 5 | Zone 6 | | | Zone 1 | | | Zone 1 | | | | Zone 2 | | | Zone 4 | | | | | Zone 5 | | | Zone 6 | | | | | | |
| | 1 | 2 | 1 | 2 | 3 | 4 | 1 | 1 | 2 | 3 | 4 | 5 | 1 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5 | | 1 | 1 | 2 | 3 | | | | | | | | |
| <i>Persicaria prostrata</i> | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pimelea curviflora</i> | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | |
| <i>Poa labillardieri</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3.0 | | | | |
| <i>Poa sieberiana</i> | | 0.1 | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | |
| <i>Pterostylis</i> sp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | |
| <i>Pultenaea procumbens</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.0 | | | | |
| <i>Rubus parvifolius</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | |
| <i>Rumex brownii</i> | 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 | | 0.1 | | | | | | |
| <i>Rytidosperma</i> sp. | 15.0 | 5.0 | 30.0 | 25.0 | 20.0 | 3.0 | 35.0 | 5.0 | 5.0 | 40.0 | 35.0 | 5.0 | 3.0 | 5.0 | | 10.0 | 0.5 | | | 0.1 | 5.0 | 5.0 | 5.0 | 10.0 | 5.0 | 30.0 | 10.0 | 10.0 | | | | | 0.5 | | | | | | | | |
| <i>Senecio quadridentatus</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | |
| <i>Solenogyne dominii</i> | | | 0.1 | | 0.2 | | 0.1 | | | | 1.0 | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Themeda triandra</i> | 1.0 | | | | | | | | | | | 1.0 | | | | | | | | | | | | | | | | | | | | | | | 5.0 | 1.0 | | 10.0 | | 1.0 | |
| <i>Tricoryne elatior</i> | 0.1 | | | | | | | | | | | | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | 0.1 | |
| <i>Triptilodiscus pygmaeus</i> | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | |
| <i>Vittadinia cuneata</i> | | | | | | | | | | | | | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Vittadinia muelleri</i> | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | 0.1 |
| <i>Wahlenbergia communis</i> | | | 2.0 | | | | | | | | | | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | 0.1 |
| <i>Wahlenbergia gracilis</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | 0.1 |
| Number of Species | 22 | 31 | 18 | 21 | 20 | 21 | 33 | 20 | 21 | 18 | 18 | 17 | 17 | 17 | 12 | 13 | 18 | 19 | 20 | 40 | 14 | 13 | 22 | 19 | 17 | 29 | 18 | 16 | 20 | 17 | 24 | 14 | | | | | | | | | |
| Number of Native Species | 15 | 25 | 14 | 11 | 12 | 9 | 24 | 11 | 9 | 14 | 12 | 9 | 7 | 8 | 5 | 3 | 6 | 5 | 7 | 34 | 9 | 7 | 10 | 8 | 8 | 19 | 7 | 9 | 11 | 4 | 7 | 2 | | | | | | | | | |
| No. Non-grass Native Understorey Species | 8 | 16 | 6 | 5 | 6 | 4 | 18 | 7 | 4 | 8 | 7 | 4 | 2 | 5 | 2 | 1 | 4 | 4 | 6 | 22 | 4 | 3 | 6 | 4 | 2 | 12 | 2 | 4 | 2 | 3 | 4 | 1 | | | | | | | | | |
| Number of Exotic Species | 7 | 6 | 4 | 10 | 8 | 12 | 9 | 9 | 12 | 4 | 6 | 8 | 10 | 9 | 7 | 10 | 12 | 14 | 13 | 6 | 5 | 6 | 12 | 11 | 9 | 10 | 11 | 7 | 9 | 13 | 17 | 12 | | | | | | | | | |
| Number of High Threat Weeds | 2 | 1 | 1 | 2 | 3 | 3 | 2 | 3 | 4 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 3 | 2 | 3 | 3 | 0 | 0 | 4 | 2 | 2 | 3 | 3 | 1 | 4 | 1 | 6 | 0 | | | | | | | | | |
| % Native Ground Cover | 85.1 | 96.3 | 95.2 | 90.8 | 89.7 | 63.5 | 95.7 | 73.6 | 71.2 | 96.7 | 77.8 | 91.1 | 42.8 | 41.3 | 5.1 | 36.9 | 33.1 | 36.5 | 30.3 | 87.7 | 92.7 | 84.8 | 71.8 | 84.3 | 71.3 | 90.5 | 66.4 | 86.7 | 10.3 | 0.6 | 33.9 | 1.6 | | | | | | | | | |

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Appendix C. Fauna species recorded

| Class | Common name | Scientific name | BC Act status |
|-----------------|------------------------------|--|-------------------|
| Aves | Yellow-rumped Thornbill | <i>Acanthiza chrysorrhoa</i> | Protected |
| Aves | Indian Myna | <i>Acridotheres tristis</i> | - |
| Aves | Skylark | <i>Alauda arvensis</i> | - |
| Aves | Grey Teal Cockatoo | <i>Anas gracilis</i> | Protected |
| Aves | Pacific Black Duck | <i>Anas superciliosa</i> | Protected |
| Aves | Australian (Richard's) Pipit | <i>Anthus novaeseelandiae</i> | Protected |
| Aves | Dusky Woodswallow | <i>Artamus cyanopterus</i> | Vulnerable |
| Aves | Hardhead Duck | <i>Aythya australis</i> | Protected |
| Aves | Corella | <i>Cacatua sp.</i> | Protected |
| Aves | European Goldfinch | <i>Carduelis carduelis</i> | - |
| Aves | Australian Wood Duck | <i>Chenonetta jubata</i> | Protected |
| Aves | Australian Raven | <i>Corvus coronoides</i> | Protected |
| Aves | White-faced Heron | <i>Egretta novaehollandiae</i> | Protected |
| Aves | Brown Falcon | <i>Falco berigora</i> | Protected |
| Aves | Nankeen Kestrel | <i>Falco cenchroides</i> | Protected |
| Aves | Magpie-lark | <i>Grallina cyanoleuca</i> | Protected |
| Aves | Australian Magpie | <i>Gymnorhina tibicen</i> | Protected |
| Aves | White-winged Triller | <i>Lalage sueurii</i> | Protected |
| Aves | Red-browed Finch | <i>Neochmia temporalis</i> | Protected |
| Aves | Crested Pigeon | <i>Ocyphaps lophotes</i> | Protected |
| Aves | Rufous Whistler | <i>Pachycephala rufiventris</i> | Protected |
| Aves | House Sparrow | <i>Passer domesticus</i> | - |
| Aves | Tree Martin | <i>Petrochelidon nigricans</i> | Protected |
| Aves | Crimson Rosella | <i>Platycercus elegans</i> | Protected |
| Aves | Eastern Rosella | <i>Platycercus eximius</i> | Protected |
| Aves | Red-rumped Parrot | <i>Psephotus haematonotus</i> | Protected |
| Aves | Grey Fantail | <i>Rhipidura albiscapa</i> | Protected |
| Aves | Willy Wagtail | <i>Rhipidura leucophrys</i> | Protected |
| Aves | Common Starling | <i>Sturnus vulgaris</i> | - |
| Aves | Australasian Grebe | <i>Tachybaptus novaehollandiae</i> | Protected |
| Mammalia | White-striped Mastiff Bat | <i>Austronomus australis</i> | Protected |
| Mammalia | Gould's Wattle Bat | <i>Chalinolobus gouldii</i> | Protected |
| Mammalia | Chocolate Wattle Bat | <i>Chalinolobus morio</i> | Protected |
| Mammalia | Eastern Grey Kangaroo | <i>Macropus giganteus</i> | Protected |
| Mammalia | Large Bent-winged Bat | <i>Miniopterus orianae oceanensis</i> | Vulnerable |
| Mammalia | Southern Freetail Bat | <i>Mormopterus planiceps</i> | Protected |
| Mammalia | Eastern Free-tailed Bat | <i>Mormopterus ridei</i> | Protected |

| Class | Common name | Scientific name | BC Act status |
|-----------------|--------------------------------|-------------------------------------|-------------------|
| Mammalia | Long-eared Bat | <i>Nyctophilus sp.</i> | Protected |
| Mammalia | Large Forest Bat | <i>Vespadelus darlingtonia</i> | Protected |
| Mammalia | Southern Forest Bat | <i>Vespadelus regulus</i> | Protected |
| Mammalia | Little Forest Bat | <i>Vespadelus vulturnus</i> | Protected |
| Mammalia | Red Fox | <i>Vulpes vulpes</i> | - |
| Reptilia | Pink-tailed Worm-lizard | <i>Aprasia parapulchella</i> | Vulnerable |
| Reptilia | Eastern Plains Froglet | <i>Crinia parinsignifera</i> | Protected |
| Reptilia | Common Eastern Froglet | <i>Crinia signifera</i> | Protected |
| Reptilia | Eastern Striped Skink | <i>Ctenotus robustus</i> | Protected |
| Reptilia | Cunningham's Skink | <i>Egernia cunninghami</i> | Protected |
| Reptilia | Delicate Skink | <i>Lampropholis delicata</i> | Protected |
| Reptilia | Spotted Grass Frog | <i>Limnodynastes tasmaniensis</i> | Protected |
| Reptilia | Red-bellied Black Snake | <i>Pseudechis porphyriacus</i> | Protected |
| Reptilia | Eastern Brown Snake | <i>Pseudonaja textilis</i> | Protected |

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Appendix D. Remnant tree survey results table

Trees to be retained

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|-------------------|
| | | | | | | S | M | L | XL | |
| 1 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 8 | 0 | 0 | 0 | 0 | |
| 2 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 3 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 80 | 10 | 0 | 0 | 0 | 0 | |
| 4 | DEAD | | D | 60 | 7 | 3 | 2 | 0 | 0 | |
| 5 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 10 | 1 | 0 | 1 | 0 | |
| 6 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 50 | 7 | 0 | 1 | 0 | 0 | |
| 7 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 8 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 60 | 14 | 0 | 1 | 0 | 1 | |
| 9 | DEAD | | D | 70 | 8 | 1 | 1 | 0 | 0 | |
| 10 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 60 | 10 | 0 | 0 | 0 | 0 | |
| 11 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 10 | 1 | 0 | 0 | 0 | |
| 12 | <i>Eucalyptus nortonii</i> | Bundy | A | 110 | 9 | 0 | 0 | 0 | 0 | |
| 13 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 70 | 8 | 0 | 0 | 0 | 0 | |
| 14 | DEAD | | D | 30 | 6 | 2 | 0 | 0 | 0 | Open cracks |
| 15 | <i>Eucalyptus nortonii</i> | Bundy | A | 80 | 10 | 0 | 0 | 0 | 0 | |
| 16 | <i>Eucalyptus nortonii</i> | Bundy | A | 100 | 11 | 0 | 0 | 0 | 0 | |
| 17 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 5 | 0 | 0 | 0 | 0 | |
| 18 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 19 | <i>Eucalyptus nortonii</i> | Bundy | A | 20 | 5 | 0 | 0 | 0 | 0 | |
| 20 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 21 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 8 | 1 | 0 | 0 | 0 | |
| 22 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 23 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 6 | 0 | 0 | 0 | 0 | Basal hollow only |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|------------------------------------|
| | | | | | | S | M | L | XL | |
| 24 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 25 | <i>Eucalyptus nortonii</i> | Bundy | A | 120 | 8 | 0 | 0 | 0 | 0 | |
| 26 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 27 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 2 | 0 | 0 | 0 | |
| 28 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 12 | 0 | 1 | 1 | 0 | |
| 29 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 100 | 16 | 0 | 0 | 0 | 1 | 2 stick nests |
| 30 | <i>Eucalyptus bridgesiana</i> | Apple Box | A | 100 | 12 | 0 | 0 | 0 | 0 | 1 mistletoe |
| 31 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 42 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 110 | 12 | 1 | 1 | 3 | 1 | |
| 43 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 0 | 0 | 0 | 0 | 0 | 0 | |
| 44 | DEAD | | D | 50 | 5 | 1 | 2 | 0 | 0 | |
| 45 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 6 | 2 | 2 | 0 | 0 | Plus basal hollow |
| 46 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 110 | 12 | 0 | 0 | 0 | 0 | |
| 47 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 10 | 0 | 0 | 0 | 0 | 1 stick nest |
| 48 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 90 | 7 | 0 | 0 | 0 | 0 | |
| 49 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 6 | 0 | 0 | 0 | 0 | |
| 50 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 51 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 10 | 0 | 0 | 0 | 0 | 1 stick nest |
| 52 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 90 | 9 | 0 | 0 | 0 | 0 | |
| 59 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 10 | 0 | 0 | 0 | 0 | |
| 60 | <i>Eucalyptus nortonii</i> | Bundy | A | 120 | 9 | 0 | 0 | 0 | 0 | |
| 61 | <i>Eucalyptus nortonii</i> | Bundy | A | 110 | 10 | 0 | 0 | 0 | 0 | |
| 62 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 110 | 14 | 0 | 0 | 0 | 0 | Chewed joints - no hollows visible |
| 63 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 12 | 0 | 0 | 0 | 0 | |
| 64 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 7 | 0 | 0 | 0 | 0 | |
| 65 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 10 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|-------------------|
| | | | | | | S | M | L | XL | |
| 66 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 5 | 0 | 0 | 0 | 0 | |
| 69 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 50 | 6 | 0 | 0 | 0 | 0 | |
| 70 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 8 | 0 | 0 | 0 | 0 | |
| 71 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 72 | <i>Eucalyptus nortonii</i> | Bundy | A | 100 | 9 | 0 | 0 | 0 | 0 | |
| 73 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 110 | 15 | 0 | 0 | 0 | 0 | |
| 74 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 80 | 8 | 0 | 0 | 0 | 0 | |
| 121 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 60 | 14 | 0 | 0 | 0 | 0 | |
| 124 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 14 | 0 | 0 | 0 | 0 | |
| 125 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 130 | 13 | 0 | 0 | 1 | 1 | |
| 126 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 80 | 13 | 0 | 0 | 0 | 0 | |
| 127 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 80 | 13 | 0 | 0 | 0 | 0 | 1 stick nest |
| 175 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 110 | 15 | 0 | 1 | 0 | 0 | |
| 176 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 100 | 13 | 0 | 0 | 0 | 0 | |
| 183 | DEAD | Yellow Box | D | 120 | 10 | 1 | 0 | 0 | 0 | |
| 184 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 185 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 186 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 187 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 188 | <i>Eucalyptus bridgesiana</i> | Apple Box | A | 70 | 8 | 0 | 0 | 0 | 0 | |
| 189 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 60 | 9 | 0 | 0 | 0 | 0 | |
| 190 | DEAD | | D | 30 | 7 | 0 | 0 | 0 | 0 | |
| 191 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 192 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 30 | 9 | 0 | 0 | 0 | 0 | |
| 193 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 202 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 30 | 7 | 0 | 0 | 0 | 0 | Basal hollow only |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|--------------|--------------|----------|------------|---------|---|---|----|-------|
| | | | | | | S | M | L | XL | |
| 323 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 17 | 0 | 0 | 0 | 0 | |
| 324 | DEAD | | D | 80 | 15 | 3 | 0 | 0 | 0 | |
| 326 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 327 | <i>Eucalyptus nortonii</i> | Bundy | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 328 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 10 | 0 | 0 | 0 | 0 | |
| 329 | DEAD | Red Box | A | 40 | 9 | 0 | 0 | 0 | 0 | |
| 330 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 8 | 0 | 0 | 0 | 0 | |
| 331 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 11 | 0 | 0 | 0 | 0 | |
| 332 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 11 | 1 | 0 | 0 | 0 | |
| 333 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 80 | 11 | 0 | 2 | 0 | 0 | |
| 335 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 12 | 0 | 0 | 0 | 0 | |
| 373 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 13 | 0 | 0 | 0 | 0 | |
| 379 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 120 | 18 | 0 | 1 | 0 | 0 | |
| 448 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 15 | 0 | 0 | 0 | 0 | |
| 449 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 90 | 17 | 0 | 0 | 0 | 0 | |
| 450 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 451 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 16 | 0 | 0 | 0 | 0 | |
| 452 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 454 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 90 | 14 | 0 | 0 | 0 | 0 | |
| 455 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 10 | 0 | 0 | 0 | 0 | |
| 456 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 457 | DEAD | | D | 40 | 3 | 1 | 0 | 0 | 0 | |
| 458 | DEAD | | D | 30 | 6 | 0 | 0 | 0 | 0 | |
| 459 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 40 | 5 | 0 | 2 | 0 | 0 | |
| 460 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 11 | 0 | 0 | 0 | 0 | |
| 461 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 12 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|--------------------|
| | | | | | | S | M | L | XL | |
| 462 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 11 | 0 | 0 | 0 | 0 | |
| 463 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 11 | 0 | 0 | 0 | 0 | |
| 464 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 16 | 0 | 1 | 0 | 0 | Worn/chewed hollow |
| 465 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 14 | 0 | 0 | 0 | 0 | |
| 466 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 11 | 0 | 0 | 0 | 0 | |
| 467 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 11 | 0 | 0 | 0 | 0 | |
| 468 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 12 | 0 | 0 | 0 | 0 | |
| 469 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 90 | 15 | 0 | 0 | 0 | 0 | |
| 470 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 10 | 0 | 0 | 0 | 0 | |
| 471 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 12 | 1 | 0 | 0 | 0 | |
| 472 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 13 | 1 | 2 | 0 | 0 | |
| 473 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 40 | 11 | 0 | 0 | 0 | 0 | |
| 474 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 475 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 2 | 0 | 0 | Worn/chewed hollow |
| 476 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 13 | 0 | 1 | 1 | 0 | |
| 477 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 5 | 1 | 1 | 0 | 0 | |
| 478 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 15 | 0 | 1 | 0 | 0 | |
| 479 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 2 | 1 | 0 | |
| 480 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 481 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 14 | 0 | 1 | 0 | 0 | |
| 482 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 16 | 0 | 0 | 0 | 0 | |
| 483 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 16 | 0 | 0 | 0 | 0 | |
| 484 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 17 | 0 | 0 | 0 | 0 | |
| 485 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 17 | 0 | 0 | 0 | 0 | |
| 486 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 16 | 2 | 0 | 0 | 0 | Plus basal hollow |
| 487 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 40 | 4 | 0 | 1 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|--------------------|
| | | | | | | S | M | L | XL | |
| 488 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 489 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 13 | 0 | 0 | 0 | 0 | |
| 490 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 12 | 0 | 0 | 0 | 0 | |
| 491 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 15 | 1 | 0 | 0 | 0 | Worn/chewed hollow |
| 492 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 14 | 0 | 0 | 0 | 0 | |
| 493 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 494 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 14 | 0 | 0 | 0 | 0 | |
| 496 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 497 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 14 | 1 | 0 | 0 | 0 | Worn/chewed hollow |
| 498 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 90 | 17 | 0 | 1 | 0 | 0 | |
| 499 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 17 | 0 | 0 | 0 | 0 | |
| 500 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 501 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 40 | 12 | 1 | 0 | 0 | 0 | |
| 502 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 14 | 0 | 0 | 0 | 0 | |
| 503 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 16 | 0 | 0 | 0 | 0 | |
| 504 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 505 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 506 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 13 | 0 | 0 | 0 | 0 | |
| 507 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 16 | 0 | 0 | 0 | 0 | |
| 508 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 509 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 6 | 0 | 0 | 0 | 0 | |
| 510 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 90 | 16 | 0 | 0 | 0 | 0 | |
| 511 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 13 | 0 | 0 | 0 | 0 | |
| 512 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 515 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 516 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|--------------|--------------|----------|------------|---------|---|---|----|--------------|
| | | | | | | S | M | L | XL | |
| 517 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 18 | 0 | 0 | 0 | 0 | |
| 518 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 50 | 13 | 0 | 0 | 0 | 0 | |
| 519 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 50 | 17 | 0 | 0 | 0 | 0 | |
| 520 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 16 | 0 | 0 | 0 | 0 | |
| 533 | <i>Eucalyptus rubida</i> | Candlebark | A | 100 | 10 | 0 | 0 | 0 | 0 | |
| 534 | <i>Eucalyptus rubida</i> | Candlebark | A | 20 | 5 | 0 | 0 | 0 | 0 | |
| 535 | <i>Eucalyptus rubida</i> | Candlebark | A | 100 | 10 | 1 | 0 | 0 | 0 | |
| 659 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 14 | 0 | 1 | 0 | 0 | |
| 660 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 661 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 13 | 0 | 0 | 0 | 0 | |
| 662 | DEAD | Red Box | D | 60 | 5 | 1 | 1 | 1 | 0 | |
| 664 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 11 | 0 | 0 | 0 | 0 | |
| 665 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 666 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 667 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 13 | 2 | 1 | 1 | 0 | |
| 675 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 14 | 1 | 3 | 1 | 0 | |
| 676 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 10 | 0 | 0 | 0 | 0 | |
| 677 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 90 | 16 | 2 | 1 | 2 | 0 | Trunk cavity |
| 678 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 90 | 11 | 0 | 0 | 0 | 0 | |
| 680 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 10 | 0 | 0 | 0 | 0 | |
| 681 | <i>Eucalyptus nortonii</i> | Bundy | A | 80 | 13 | 0 | 0 | 0 | 0 | |
| 682 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 10 | 0 | 0 | 0 | 0 | |
| 683 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 12 | 0 | 0 | 0 | 0 | |
| 684 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 11 | 0 | 0 | 0 | 0 | |
| 685 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 686 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 12 | 1 | 0 | 1 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|---------------------|--------------|----------|------------|---------|---|---|----|-------|
| | | | | | | S | M | L | XL | |
| 687 | DEAD | | D | 80 | 12 | 3 | 0 | 1 | 1 | |
| 688 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 11 | 0 | 1 | 0 | 0 | |
| 689 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 690 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 110 | 13 | 0 | 0 | 0 | 0 | |
| 691 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 13 | 0 | 0 | 0 | 0 | |
| 692 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 13 | 0 | 0 | 0 | 0 | |
| 693 | DEAD | Scribbly Gum | D | 70 | 10 | 4 | 1 | 0 | 0 | |
| 694 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 50 | 7 | 2 | 0 | 0 | 0 | |
| 695 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 696 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 13 | 0 | 0 | 0 | 0 | |
| 697 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 90 | 14 | 0 | 0 | 0 | 0 | |
| 698 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 699 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 700 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 13 | 0 | 0 | 0 | 0 | |
| 701 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 702 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 703 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 10 | 1 | 0 | 0 | 0 | |
| 704 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 705 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 10 | 0 | 0 | 0 | 0 | |
| 706 | DEAD | Scribbly Gum | D | 40 | 6 | 1 | 0 | 0 | 0 | |
| 707 | DEAD | | D | 60 | 6 | 2 | 1 | 0 | 0 | |
| 708 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 10 | 0 | 0 | 0 | 0 | |
| 709 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 10 | 0 | 0 | 0 | 0 | |
| 710 | DEAD | Bundy/Long-leaf Box | D | 70 | 10 | 1 | 0 | 0 | 0 | |
| 711 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 50 | 9 | 0 | 1 | 0 | 0 | |
| 713 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 120 | 13 | 1 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|--------------|
| | | | | | | S | M | L | XL | |
| 714 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 50 | 11 | 0 | 0 | 0 | 0 | |
| 715 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 10 | 0 | 0 | 0 | 0 | |
| 716 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 717 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 718 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 50 | 11 | 0 | 0 | 0 | 0 | |
| 719 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 720 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 721 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 60 | 13 | 0 | 0 | 0 | 0 | |
| 722 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 723 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 724 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 80 | 15 | 0 | 0 | 0 | 0 | |
| 725 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 80 | 14 | 0 | 0 | 0 | 0 | |
| 726 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 727 | DEAD | | D | 70 | 6 | 1 | 1 | 0 | 0 | |
| 728 | DEAD | | D | 80 | 8 | 0 | 1 | 1 | 1 | |
| 729 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 12 | 0 | 0 | 0 | 0 | |
| 730 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 9 | 1 | 1 | 0 | 1 | 1 stick nest |
| 731 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 9 | 0 | 0 | 0 | 0 | |
| 732 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 11 | 0 | 0 | 0 | 0 | |
| 733 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 80 | 11 | 0 | 0 | 0 | 0 | |
| 734 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 100 | 11 | 1 | 0 | 0 | 1 | |
| 735 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 9 | 0 | 0 | 0 | 0 | |
| 736 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 50 | 7 | 1 | 0 | 1 | 0 | |
| 737 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 80 | 11 | 2 | 1 | 0 | 0 | |
| 738 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 40 | 9 | 1 | 0 | 0 | 0 | |
| 739 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 14 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|--------------------------------|
| | | | | | | S | M | L | XL | |
| 740 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 16 | 0 | 0 | 1 | 0 | |
| 741 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 9 | 0 | 1 | 0 | 0 | |
| 742 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 110 | 17 | 1 | 1 | 0 | 0 | |
| 748 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 749 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 11 | 0 | 0 | 0 | 0 | |
| 751 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 10 | 0 | 0 | 0 | 0 | |
| 752 | DEAD | Scribbly Gum | D | 90 | 9 | 3 | 1 | 1 | 0 | |
| 753 | DEAD | Scribbly Gum | D | 50 | 5 | 1 | 1 | 0 | 0 | |
| 754 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 16 | 2 | 1 | 0 | 0 | Starlings emerging from hollow |

DRAFT

Trees to be retained

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|----------------------------|-------------------|--------------|----------|------------|---------|---|---|----|-------------------|
| | | | | | | S | M | L | XL | |
| 32 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 5 | 1 | 0 | 0 | 0 | |
| 33 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 6 | 1 | 0 | 0 | 0 | Open cracks only |
| 34 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 7 | 1 | 0 | 1 | 0 | |
| 35 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 5 | 0 | 0 | 0 | 0 | |
| 36 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 37 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 6 | 0 | 0 | 0 | 0 | |
| 38 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 6 | 0 | 0 | 0 | 0 | |
| 39 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 40 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 5 | 0 | 0 | 0 | 0 | Basal hollow only |
| 41 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 7 | 0 | 0 | 0 | 0 | |
| 53 | DEAD | | D | 50 | 7 | 2 | 0 | 0 | 0 | |
| 54 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 8 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|---------------------|--------------|----------|------------|---------|---|---|----|-------------------|
| | | | | | | S | M | L | XL | |
| 55 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 8 | 0 | 0 | 0 | 0 | |
| 56 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 7 | 0 | 0 | 0 | 0 | Basal hollow only |
| 57 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 58 | DEAD | Bundy/Long-leaf Box | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 67 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 90 | 17 | 0 | 0 | 0 | 0 | |
| 68 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 75 | DEAD | Bundy/Long-leaf Box | D | 90 | 7 | 0 | 0 | 0 | 0 | |
| 76 | DEAD | | D | 40 | 3 | 0 | 0 | 0 | 0 | |
| 77 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 5 | 0 | 0 | 0 | 0 | |
| 78 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 4 | 0 | 0 | 0 | 0 | |
| 79 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 80 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 5 | 0 | 0 | 0 | 0 | |
| 81 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 4 | 0 | 0 | 0 | 0 | |
| 82 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 7 | 0 | 0 | 0 | 0 | |
| 83 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 84 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 5 | 0 | 0 | 0 | 0 | |
| 85 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 86 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 87 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 88 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 89 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 90 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 91 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 92 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 93 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 94 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 8 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|---------------------|--------------|----------|------------|---------|---|---|----|-------|
| | | | | | | S | M | L | XL | |
| 95 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 96 | <i>Eucalyptus nortonii</i> | Bundy | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 97 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 98 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 7 | 1 | 0 | 0 | 0 | |
| 99 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 6 | 1 | 0 | 0 | 0 | |
| 100 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 101 | DEAD | | D | 30 | 6 | 0 | 0 | 0 | 0 | |
| 102 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 103 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 9 | 0 | 1 | 0 | 0 | |
| 104 | DEAD | Bundy/Long-leaf Box | A | 40 | 5 | 0 | 1 | 0 | 0 | |
| 105 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 13 | 0 | 1 | 1 | 1 | |
| 106 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 9 | 0 | 2 | 0 | 0 | |
| 108 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 109 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 110 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 111 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 112 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 4 | 0 | 0 | 0 | 0 | |
| 113 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 114 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 115 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 116 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 8 | 0 | 0 | 0 | 0 | |
| 117 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 6 | 0 | 0 | 0 | 0 | |
| 118 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 60 | 8 | 1 | 1 | 0 | 0 | |
| 119 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 120 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 90 | 9 | 0 | 2 | 0 | 1 | |
| 122 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 12 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|---------------------|--------------|----------|------------|---------|---|---|----|--------------|
| | | | | | | S | M | L | XL | |
| 123 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 120 | 15 | 0 | 0 | 0 | 0 | |
| 128 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 129 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 130 | DEAD | Bundy/Long-leaf Box | A | 40 | 5 | 0 | 0 | 0 | 0 | |
| 131 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 132 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 133 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 134 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 135 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 136 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 137 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 138 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 5 | 0 | 0 | 0 | 0 | |
| 139 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 140 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 50 | 9 | 2 | 0 | 0 | 0 | |
| 141 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 142 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 143 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 50 | 8 | 0 | 0 | 0 | 0 | |
| 144 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 145 | DEAD | | D | 30 | 7 | 0 | 0 | 0 | 0 | |
| 146 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 147 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 148 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 149 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 150 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 40 | 7 | 0 | 0 | 0 | 0 | 1 stick nest |
| 151 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 152 | <i>Eucalyptus polyanthemus</i> | Red Box | A | 70 | 10 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|-------|
| | | | | | | S | M | L | XL | |
| 153 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 6 | 0 | 0 | 0 | 0 | |
| 154 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 5 | 0 | 0 | 0 | 0 | |
| 155 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 12 | 2 | 3 | 0 | 0 | |
| 156 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 4 | 0 | 0 | 0 | 0 | |
| 157 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 6 | 0 | 0 | 0 | 0 | |
| 158 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 6 | 0 | 0 | 0 | 0 | |
| 159 | DEAD | | D | 20 | 2 | 1 | 0 | 0 | 0 | |
| 160 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 161 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 162 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 20 | 5 | 0 | 0 | 0 | 0 | |
| 163 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 164 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 6 | 0 | 0 | 0 | 0 | |
| 165 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 7 | 0 | 0 | 0 | 0 | |
| 166 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 9 | 0 | 0 | 0 | 0 | |
| 167 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 9 | 0 | 0 | 0 | 0 | |
| 168 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 169 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 170 | DEAD | | D | 40 | 6 | 0 | 0 | 0 | 0 | |
| 171 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 7 | 0 | 0 | 0 | 0 | |
| 172 | DEAD | | D | 50 | 7 | 1 | 0 | 0 | 0 | |
| 173 | DEAD | | D | 40 | 6 | 0 | 0 | 0 | 0 | |
| 174 | DEAD | | D | 20 | 3 | 2 | 0 | 0 | 0 | |
| 177 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 100 | 12 | 0 | 1 | 0 | 0 | |
| 178 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 100 | 13 | 2 | 1 | 0 | 0 | |
| 179 | <i>Eucalyptus nortonii</i> | Bundy | A | 90 | 8 | 0 | 0 | 0 | 0 | |
| 180 | <i>Eucalyptus nortonii</i> | Bundy | A | 80 | 7 | 2 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|---|
| | | | | | | S | M | L | XL | |
| 181 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 8 | 0 | 0 | 0 | 0 | |
| 182 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 7 | 0 | 0 | 0 | 0 | |
| 194 | <i>Eucalyptus nortonii</i> | Bundy | A | 100 | 8 | 0 | 0 | 0 | 0 | |
| 195 | <i>Eucalyptus nortonii</i> | Bundy | A | 90 | 8 | 0 | 0 | 0 | 0 | |
| 196 | <i>Eucalyptus nortonii</i> | Bundy | A | 30 | 5 | 0 | 0 | 0 | 0 | |
| 197 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 198 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 7 | 0 | 0 | 0 | 0 | |
| 199 | <i>Eucalyptus nortonii</i> | Bundy | A | 70 | 7 | 0 | 0 | 0 | 0 | |
| 200 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 40 | 7 | 0 | 0 | 0 | 0 | |
| 201 | DEAD | | D | 50 | 6 | 0 | 0 | 0 | 0 | |
| 203 | <i>Eucalyptus nortonii</i> | Bundy | A | 60 | 7 | 0 | 0 | 0 | 0 | |
| 204 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 10 | 0 | 0 | 0 | 0 | Chewed joints, no obvious hollow entrance |
| 205 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 80 | 12 | 0 | 0 | 0 | 0 | |
| 206 | <i>Eucalyptus nortonii</i> | Bundy | A | 100 | 10 | 0 | 0 | 0 | 0 | |
| 207 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 80 | 9 | 0 | 0 | 0 | 0 | |
| 208 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 120 | 17 | 0 | 2 | 0 | 1 | |
| 209 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 15 | 0 | 0 | 0 | 0 | |
| 210 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 9 | 0 | 0 | 0 | 0 | |
| 211 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 212 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 11 | 0 | 0 | 0 | 0 | |
| 213 | DEAD | | D | 80 | 12 | 1 | 2 | 0 | 1 | |
| 214 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 110 | 14 | 0 | 0 | 0 | 0 | |
| 215 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 120 | 16 | 0 | 1 | 0 | 0 | |
| 322 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 17 | 1 | 1 | 0 | 0 | |
| 325 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 5 | 0 | 0 | 0 | 0 | |
| 336 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 80 | 12 | 0 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------------|--------------|----------|------------|---------|---|---|----|------------------|
| | | | | | | S | M | L | XL | |
| 337 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 12 | 0 | 0 | 0 | 0 | |
| 360 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 361 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 110 | 15 | 0 | 0 | 0 | 0 | |
| 362 | <i>Eucalyptus nortonii</i> | Bundy | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 363 | <i>Eucalyptus nortonii</i> | Bundy | A | 20 | 5 | 0 | 0 | 0 | 0 | |
| 364 | DEAD | Scribbly Gum | D | 80 | 14 | 2 | 3 | 0 | 0 | Mostly dead tree |
| 365 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 110 | 18 | 0 | 2 | 4 | 0 | |
| 366 | <i>Eucalyptus dives</i> | Broad-leaved Peppermint | A | 30 | 8 | 0 | 0 | 0 | 0 | |
| 367 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 50 | 15 | 0 | 0 | 0 | 0 | |
| 368 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 16 | 0 | 0 | 0 | 0 | |
| 369 | DEAD | | D | 50 | 10 | 1 | 0 | 0 | 0 | |
| 370 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 90 | 15 | 1 | 0 | 0 | 0 | |
| 371 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 80 | 12 | 0 | 1 | 0 | 0 | |
| 372 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 14 | 0 | 0 | 0 | 0 | |
| 374 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 110 | 17 | 1 | 1 | 0 | 0 | |
| 375 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 15 | 0 | 2 | 0 | 0 | |
| 376 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 15 | 0 | 0 | 0 | 0 | |
| 377 | DEAD | | D | 90 | 10 | 0 | 0 | 0 | 0 | |
| 378 | DEAD | | D | 120 | 18 | 0 | 3 | 0 | 1 | |
| 380 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 20 | 4 | 0 | 0 | 0 | 0 | |
| 381 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 14 | 1 | 0 | 0 | 0 | |
| 382 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 4 | 4 | 0 | 0 | 0 | 0 | |
| 383 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 18 | 0 | 1 | 1 | 0 | |
| 384 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 9 | 0 | 0 | 0 | 0 | |
| 385 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 110 | 15 | 2 | 0 | 0 | 0 | |
| 386 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 60 | 13 | 1 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|--------------|--------------|----------|------------|---------|---|---|----|--|
| | | | | | | S | M | L | XL | |
| 387 | <i>Eucalyptus nortonii</i> | Bundy | A | 80 | 10 | 0 | 0 | 0 | 0 | |
| 388 | <i>Eucalyptus nortonii</i> | Bundy | A | 80 | 10 | 0 | 0 | 0 | 0 | |
| 389 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 120 | 17 | 0 | 0 | 0 | 0 | |
| 390 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 70 | 15 | 0 | 2 | 0 | 0 | |
| 391 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 16 | 0 | 2 | 0 | 0 | |
| 392 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 393 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 14 | 0 | 2 | 0 | 0 | |
| 394 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 60 | 12 | 0 | 0 | 0 | 0 | |
| 396 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 11 | 0 | 0 | 0 | 0 | |
| 445 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 110 | 15 | 0 | 0 | 0 | 0 | |
| 446 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 12 | 0 | 0 | 0 | 0 | |
| 447 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 17 | 0 | 0 | 0 | 0 | |
| 453 | DEAD | | D | 80 | 13 | 2 | 0 | 0 | 0 | |
| 513 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 0 | 0 | 0 | 0 | |
| 514 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 15 | 1 | 0 | 0 | 0 | |
| 521 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 16 | 0 | 0 | 0 | 0 | |
| 522 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 40 | 13 | 0 | 0 | 0 | 0 | |
| 523 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 17 | 0 | 0 | 0 | 0 | |
| 524 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 17 | 1 | 1 | 0 | 0 | |
| 525 | <i>Eucalyptus nortonii</i> | Bundy | A | 50 | 5 | 0 | 0 | 0 | 0 | |
| 526 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 30 | 10 | 0 | 0 | 0 | 0 | |
| 527 | <i>Eucalyptus nortonii</i> | Bundy | A | 20 | 8 | 0 | 0 | 0 | 0 | |
| 633 | DEAD | Red Box | D | 70 | 6 | 2 | 0 | 0 | 0 | |
| 655 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 120 | 16 | 1 | 0 | 0 | 0 | |
| 656 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 80 | 12 | 1 | 0 | 0 | 0 | Much of tree dead but epicormic growth |
| 657 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 50 | 11 | 1 | 0 | 0 | 0 | |

| Tree Number | Species Name | Common Name | Alive / Dead | DBH (cm) | Height (m) | Hollows | | | | Notes |
|-------------|--------------------------------|-------------------|--------------|----------|------------|---------|---|---|----|-------|
| | | | | | | S | M | L | XL | |
| 658 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 70 | 14 | 0 | 0 | 0 | 0 | |
| 668 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 100 | 12 | 0 | 0 | 0 | 0 | |
| 669 | <i>Eucalyptus polyanthemos</i> | Red Box | A | 120 | 12 | 0 | 0 | 0 | 0 | |
| 670 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 40 | 8 | 0 | 0 | 0 | 0 | |
| 671 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 70 | 17 | 0 | 0 | 0 | 0 | |
| 672 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 100 | 17 | 0 | 0 | 0 | 0 | |
| 673 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 16 | 0 | 0 | 0 | 0 | |
| 674 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 20 | 3 | 0 | 0 | 0 | 0 | |
| 744 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 70 | 13 | 0 | 0 | 0 | 0 | |
| 745 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 50 | 10 | 1 | 0 | 0 | 0 | |
| 746 | <i>Eucalyptus blakelyi</i> | Blakely's Red Gum | A | 100 | 15 | 1 | 2 | 0 | 0 | |
| 747 | <i>Eucalyptus melliodora</i> | Yellow Box | A | 60 | 12 | 0 | 0 | 0 | 0 | |
| 750 | DEAD | Blakely's Red Gum | A | 50 | 13 | 0 | 0 | 0 | 0 | |
| 753 | <i>Eucalyptus rossii</i> | Scribbly Gum | A | 50 | 5 | 1 | 1 | 0 | 0 | |

Appendix E. Fly By Night Bat Surveys Pty Ltd Anabat® analysis

DRAFT

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28th December 2018

Hi Alan

Following are the results for the files you sent for the sites at Googong, NSW.

DRAFT

Best wishes



Glenn Hoye



| Site | Date | A.au | M.pl | M.ri | C.go | C.mo | F.ta | M.sc | N.sp | V.da | V.re | V.vu | Total Passes |
|------|------------|------|------|------|------|------|------|------|------|------|------|------|--------------|
| AB1 | 10/11/2018 | | C | P | C | C | | | | C | C | C | 71 |
| AB1 | 11/11/2018 | | C | P | C | C | | P | | C | | C | 134 |
| AB1 | 12/11/2018 | C | C | P | C | C | | P | C | C | | C | 91 |
| AB1 | 13/11/2018 | C | C | P | C | C | Po | P | | C | C | C | 143 |
| AB1 | 19/11/2018 | | C | P | C | P | | | | C | | C | 179 |
| AB2 | 10/11/2018 | | C | P | C | | | P | | P | C | C | 39 |
| AB2 | 11/11/2018 | C | C | P | C | C | | | | P | | C | 69 |
| AB2 | 12/11/2018 | C | C | Po | C | C | | P | | P | | P | 22 |
| AB2 | 13/11/2018 | C | C | P | C | C | | | | P | C | C | 28 |
| AB2 | 19/11/2018 | C | C | Po | C | | | | C | P | C | C | 27 |

Species

| | | | | | |
|------------------------------|---------------------------|--|-------------|-----------------------------|-----------------------------------|
| A.au | White-striped Mastiff Bat | <i>Austronomus australis</i> | M.pl | Southern Freetail Bat | <i>Mormopterus planiceps</i> |
| M.pl | Southern Freetail Bat | <i>Mormopterus planiceps</i> | C.go | Gould's Wattled Bat | <i>Chalinolobus gouldii</i> |
| C.mo | Chocolate Wattled Bat | <i>Chalinolobus morio</i> | F.ta | Eastern Falsistrelle* | <i>Falsistrellus tasmaniensis</i> |
| M.sc | Eastern Bent-wing Bat | <i>Miniopterus schreibersii oceanensis</i> | N.sp | Unidentified Long-eared Bat | <i>Nyctophilus sp.</i> |
| V.da | Large Forest Bat | <i>Vespadelus darlingtoni</i> | V.re | Southern Forest Bat | <i>Vespadelus regulus</i> |
| V.vu | Little Forest Bat | <i>Vespadelus vulturnus</i> | | | |
| Confidence of Identification | | | | | |
| C | Confident | P | Probable | Po | Possible |



Appendix F. Likelihood of occurrence

Key for below table

EPBC Act:

CE - critically endangered

E - endangered

V - vulnerable

CD - conservation dependent

BC Act:

CE1 - critically endangered species (Schedule 1, Part 1)

E1 - endangered species (Schedule 1, Part 2)

E2 - endangered population (Schedule 1, Part 2, Division 4)

E4 - presumed extinct (Schedule 3, Part 1)

V1 - vulnerable species (Schedule 2, Part 3)

Note: The brief species distribution and habitat descriptions provided in the below table are sourced / appropriated from the threatened species online profiles, listing determinations and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. These resources and associated references are provided on the relevant government websites.

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|--|--|
| Birds | | | | |
| <i>Anthochaera phrygia</i> Regent Honeyeater | CE | CE1 | A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises a number of other eucalypt species. Nectar and fruit from the mistletoes <i>Amyema miquelii</i> , <i>A. pendula</i> , and <i>A. cambagei</i> are also eaten during the breeding season. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and sheoaks as well as within mistletoe haustoria (section of the root which connects with the host tree). An open cup-shaped nest is constructed by the female of bark, grass, twigs and wool. | Low It is possible that the species may visit the subject land to forage. The subject land is unlikely to contain nesting resources of potential significance to the species. |
| <i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow | - | V1 | The Dusky Woodswallow has two separate populations. The eastern population is found from Atherton Tableland, Queensland south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west Western Australia. The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses. The south-eastern population migrates north in autumn. | Confirmed The species was recorded in the subject land during field surveys. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|---|--|
| <i>Botaurus poiciloptilus</i> Australasian Bittern | E | E1 | Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. | Negligible There is no potential habitat for the species in the subject land. |
| <i>Calidris ferruginea</i> Curlew Sandpiper | CE | E | The Curlew Sandpiper is distributed around most of the Australian coastline. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. | Negligible There is no potential habitat for the species in the subject land. |
| <i>Callocephalon fimbriatum</i> Gang-gang Cockatoo | - | V1 | In summer the Gang-gang Cockatoo occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, the species occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. The Gang-gang Cockatoo usually breeds in tall forests in the Southern Tablelands region, however they have been observed on occasion to breed in Box-Gum Woodland and other similar lowland habitat around Canberra (R. Speirs pers. obs., M. Mulvaney pers. comm.). | Moderate The species has been recorded in the locality and is likely to periodically forage in the subject land. However, the species is not known to nest in the locality. |
| <i>Calyptorhynchus lathami</i> Glossy Black-cockatoo | - | V1 | The Glossy Black-cockatoo has a patchy distribution, having once been widespread across most of the south-east of Australia. The species is now distributed throughout an area which extends from the coast near Eungella in eastern Queensland to Mallacoota in Victoria. Glossy black-cockatoos feed on casuarina seeds, however they occasionally consume seeds from eucalypts, angophoras, acacias and hakeas, as well as insect larvae. In the ACT region the species feeds almost exclusively on Drooping Sheoak <i>Allocasuarina verticillata</i> . Pairs mate for life and nest in the hollows of large, old living or dead eucalypt trees. Breeding takes place between March and August. | Low It is possible that the species may visit the subject land, however the subject land does not contain nesting resources or foraging resources of potential significance to the species. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|--|-----------------|---------------|---|--|
| <i>Chthonicola sagittata</i> Speckled Warbler | - | V1 | The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat includes scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant. | Moderate This species has been recorded in locality and may visit the subject land to forage. However, the subject land has been degraded to the extent that it does not contain nesting resources or foraging resources of potential significance to the species. |
| <i>Circus assimilis</i> Spotted Harrier | - | V1 | The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Preys on terrestrial mammals, birds and reptiles, occasionally insects and rarely carrion. | Low The species is an uncommon, non-breeding visitor to the region. However, the species has been recorded in the locality and may visit the subject land to forage. The subject land is unlikely to contain resources of significance to the species. |
| <i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies) | - | V1 | In the region, Brown Treecreepers occur in dry woodlands and open forest below 1,000 metres. Brown Treecreepers also frequent paddocks and grasslands where there are sufficient logs, stumps and dead trees nearby. The species prefers relatively undisturbed woodland and dry open forest where the native understorey, especially grasses, has been preserved. The species usually prefers predominantly rough-barked trees such as Stringybarks and rough barked Boxes. | Low It is possible that the species may visit the subject land to forage. The subject land does not contain nesting resources or foraging resources of potential significance to the species. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|---|--|
| <i>Daphoenositta chrysoptera</i> Varied Sittella | - | V1 | The Varied Sittella occurs in a wide variety of woodland and forest habitats, particularly in lowland areas. The species prefers areas with a dominance of rough barked trees, notably Red Stringybark at relatively high density. The species is rarely recorded in sparsely treed areas. | Moderate The species has been recorded in the locality and may forage and nest in the subject land. |
| <i>Epthianura albifrons</i> White-fronted Chat | - | V1 | The White-fronted Chat is a small insectivorous bird found across the southern half of Australia. It mostly occurs in temperate to arid climates and very rarely sub-tropical areas, occupying foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. This species is gregarious, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. | Confirmed The species was recorded by Biosis (2015b) in the subject land during field surveys. |
| <i>Glossopsitta pusilla</i> Little Lorikeet | - | V1 | The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, Nomadic movements are common, influenced by season and food availability. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen. | Low This species has been recorded in the locality, but is an uncommon, non-breeding visitor to the region. The subject land is unlikely to contain foraging resources of significance to the species. |
| <i>Grantiella picta</i> Painted Honeyeater | - | V1 | The Painted Honeyeater is found in Queensland and New South Wales west of the Great Dividing Range, through to northern Victoria. The species displays some migratory movement and is occasionally found in the Northern Territory and is a vagrant to South Australia and the ACT. The species frequents eucalypt forests and woodlands, particularly those that are infested heavily with mistletoes. | Low It is possible that the species may visit the subject land to forage, however the subject land is unlikely to contain nesting resources for the species. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|--|-----------------|---------------|---|---|
| <i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle | - | V1 | The White-bellied Sea-Eagle is generally found along the coastline and offshore islands of mainland Australia and Tasmania. The species distribution extends inland along some of the larger waterways, especially in eastern Australia. It is an occasional visitor to the ACT and breeding activity has been recorded once at Shepherd's Lookout. | Low The species has been recorded in the locality and is likely to occasionally over-fly the subject land. The species is unlikely to breed in the subject land, and subject land does not contain foraging habitat of significance to the species. |
| <i>Hieraetus morphnoides</i> Little Eagle | - | V1 | The Little Eagle is distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment, and occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. The species is sensitive to human disturbance. DRAFT | Moderate The species has been recorded in the locality and may forage and nest in the subject land. However, no indications of breeding activity (i.e. large stick nests, presence repeatedly observed) were observed in the subject land or nearby during spring 2018 surveys. |
| <i>Lathamus discolor</i> Swift Parrot | CE | E1 | The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability. | Low It is possible that the species may visit the subject land to feed on flowering eucalypts. The subject land does not contain foraging resources of potential significance to the species. |
| <i>Melanodryas cucullata cucullata</i> Hooded Robin (southeastern form) | - | V1 | The Hooded Robin occupies drier eucalypt forest, woodland and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps. The species uses stumps, posts or fallen timber from which to locate prey on the ground. The species is found in woodland, often with scattered Yellow Box and/or Blakely's Red Gum, with long grass and low shrubs, or fallen logs. | Moderate The species has been recorded in the locality and may forage and nest in the subject land. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|--|-----------------|---------------|---|---|
| <i>Numenius madagascariensis</i> Eastern Curlew | CE | - | The eastern curlew is Australia's largest shorebird and a long-haul flyer. The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It is extremely shy and will take flight at the first sign of danger. | Negligible There is no potential habitat for the species in the subject land. |
| <i>Pachycephala olivacea</i> Olive Whistler | - | V1 | The species predominantly inhabits wet forests on the ranges of the east coast (above about 500m). During the winter months they may move to lower altitudes. They forage in trees and shrubs and on the ground, feeding on berries and insects, and make nests of twigs and grass in the low forks of shrubs. | Low The species has been recorded in the locality. However, the subject land is unlikely to contain resources of significance to the species. |
| <i>Petroica boodang</i> Scarlet Robin | - | V1 | The Scarlet Robin is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes, breeding in drier eucalypt forests and temperate woodlands. | Confirmed The species was recorded by Biosis (2015b) in the subject land during field surveys. |
| <i>Petroica phoenica</i> Flame Robin | - | V1 | The Flame Robin is found in south-eastern Australia, from the Queensland border to Tasmania, western Victoria and south-east South Australia. In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. The species migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. | Confirmed The species was recorded by Biosis (2015b) in the subject land during field surveys. |
| <i>Polytelis swainsonii</i> Superb Parrot | V | V1 | Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Breeds in hollow branches of tall eucalypt trees within nine kilometres of feeding areas. | Low The species was not observed in the subject land or nearby during the field surveys, however it is possible that the species may visit the subject land to forage. It is unlikely that Superb Parrots would breed in the remnant trees in the subject land. The subject land does not contain foraging resources of potential significance to the species. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|--|---|
| <i>Rostratula australis</i> Australian Painted Snipe | V | E1 | Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. The species prefers freshwater wetlands, ephemeral or permanent, although it has been recorded in brackish waters. | Negligible There is no potential habitat for the species in the subject land. |
| <i>Stagonopleura guttata</i> Diamond Firetail | - | V1 | The Diamond Firetail is found in eastern Australia, from Eyre Peninsula, South Australia, to south-eastern Queensland. There has been a decline in density throughout the range, and many remaining populations may now be isolated. The species inhabits a wide range of eucalypt-dominated vegetation communities that have a grassy understorey, including woodland and mallee. | Moderate The species has been recorded in the locality and may forage and nest in the subject land. |
| Fish and Crustacea | | | | |
| <i>Bidyanus bidyanus</i> Silver Perch | CE | V1 | Silver perch are endemic to the Murray-Darling system (including all states and sub-basins). They show a general preference for faster-flowing water, including rapids and races, and more open sections of river, throughout the Murray-Darling Basin. Silver perch are a highly migratory freshwater fish. The extensive migration of adults, particularly during flooding, has long been recognised and is considered to be part of their spawning behaviour. | Negligible There is no potential habitat for the species in the subject land. |
| <i>Maccullochella peelii</i> Murray Cod | V | - | The Murray Cod's natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. The species is found in the waterways of the Murray– Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater species and will not tolerate high salinity levels. | Negligible There is no potential habitat for the species in the subject land. |
| <i>Macquaria australasica</i> Macquarie Perch | E | E1 | 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. | Negligible There is no potential habitat for the species in the subject land. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|--|--|
| Frogs | | | | |
| <i>Litoria aurea</i> Green and Golden Bell Frog | V | E1 | The Green and Golden Bell Frog occurs mainly along coastal lowland areas of eastern NSW and Victoria. The furthest inland record of the species is at a recently discovered population near Hoskinstown in the Southern Tablelands (referred to as the Molonglo population). The species was previously known from elsewhere in the Southern Tablelands, but is now considered to have disappeared from the ACT and central slopes around Bathurst. In NSW, the species commonly occupies disturbed habitats, and breeds largely in ephemeral ponds. However, in Victoria, the Green and Golden Bell Frog occupies habitats with little human disturbance and commonly breeds in permanent ponds, as well as ephemeral ponds. | Negligible The species has not been recorded within 10 km of the subject land and is unlikely to occur in the subject land. |
| <i>Litoria castanea</i> Yellow-spotted Tree Frog | E | - | The Yellow-spotted Tree Frog previously had a disjunct distribution, being recorded on the New England Tablelands and on the Southern Tablelands from Lake George to Bombala. The species has only recently (2010) been rediscovered on the Southern Tablelands. Prior to this the species had not been recorded on the Southern Tablelands since the 1970s. Found in large permanent ponds, lakes and dams with an abundance of bulrushes and other emergent vegetation, it shelters during autumn and winter under fallen timber, rocks, other debris or thick vegetation. | Negligible The species has not been recorded within 10 km of the subject land and is unlikely to occur in the subject land. |
| <i>Litoria raniformis</i> Growling Grass Frog | V | E1 | In NSW the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. The species has also been found in irrigated rice crops. Outside the breeding season animals disperse away from water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks. The species previously occurred on the Southern Tablelands at a number of sites within the Murrumbidgee River corridor, however it is now widely considered to have become extinct on the Southern Tablelands. | Negligible The species has not been recorded within 10 km of the subject land and is unlikely to occur in the subject land. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|--|---|
| Insects | | | | |
| <i>Synemon plana</i> Golden Sun Moth | CE | E1 | The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species occurs in Natural Temperate Grasslands and Box-Gum Grassy Woodland in which the groundcover is dominated by Wallaby Grasses (<i>Rytidosperma</i> sp.). It is believed that the females lay up to 200 eggs at the base of the Wallaby Grass tussocks. After hatching, the larvae tunnel underground where they remain feeding on the roots of Wallaby Grass tussocks. The species is also known to feed on the introduced species (and Weed of National Significance), Chilean Needle Grass <i>Nassella neesiana</i> . | Low The species was not recorded during targeted surveys and is considered unlikely to occur in the subject land. |
| Mammals | | | | |
| <i>Chalinolobus dwyeri</i> Large-eared Pied Bat | V | V1 | The Large-eared Pied Bat appears to exist in a number of small populations throughout its range. Very few maternity sites are known. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. | Negligible There is no potential habitat in the subject land for the species. |
| <i>Dasyurus maculatus maculatus</i> Spot-tailed Quoll (SE mainland population) | E | V1 | The Spot-tailed Quoll occurs along the east coast of Australia and the Great Dividing Range. The species uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000ha, while males have larger home ranges of between 2000 and 5000ha. Breeding occurs from May to August. | Low The species has been recorded in the locality and it may pass through the subject land. However, the subject land is unlikely to contain resources of significance to the species. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|--|-----------------|---------------|--|--|
| <i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle | - | V1 | The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. The species prefers moist, tall forest environments. The species is not known to forage or roost in urban or highly modified rural areas. | High The species is likely to forage across the subject land and may roost in tree hollows. Targeted ANABAT® surveys recorded the species as 'possibly' occurring in the subject land. |
| <i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat | - | V1 | The Large Bent-winged Bat is a subspecies of the Common Bent-wing Bat, with a range thought to be from central Victoria to Cape York Peninsula, Queensland. It is a fast flyer, able to travel many kilometres in a night. Caves are the primary roosting habitat for this species however similar man-made structures are also used (culverts, eaves etc.). The species forages above the forest canopy. | Confirmed Targeted ANABAT® surveys detected this species foraging in the subject land. |
| <i>Myotis macropus</i> Southern Myotis | - | V1 | The Southern Myotis occurs 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, hollow-bearing trees, man-made structures (bridges, culverts etc.) and in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. The species catches aquatic insects and small fish with their large hind claws, and also catches flying insects. | Low There are no suitable waterbodies in the subject land and the species is not known to venture far from such habitat features. The species has not been recorded in the locality. |
| <i>Nyctophilus corbeni</i> Corben's Long-eared Bat | V | V1 | Corben's Long-eared Bat (also known as the Eastern Long-eared Bat), inhabits a variety of vegetation types, feeding on ground dwelling insects and roosting in tree hollows. This species is known to occur over a wide range of northern, eastern and central NSW, primarily in the Murray Darling Basin. However, this species has not been recorded past Yass and Tumut. Nyctophilus species are unusual in that species are not distinguishable (within the Nyctophilus genus) by their call used for echolocation. | Low It is likely that common <i>Nyctophilus</i> species occur throughout the locality, however <i>N. corbeni</i> is unlikely to occur in the subject land. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|--|---|
| <i>Petauroides Volans</i> Greater Glider | V | - | 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. | Negligible The subject land does not contain potential habitat for the species. |
| <i>Petrogale penicillata</i> Brush-tailed Rock-wallaby | V | E1 | In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. They occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. They browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. | Negligible The species is not known to occur in the lowland areas of the ACT or nearby NSW. |
| <i>Phascolarctos cinereus</i> Koala (combined populations of Qld, NSW and the ACT) | V | V1 | In NSW, the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. They are solitary with varying home ranges. In high quality habitat home ranges may be 1-2 hectare and overlap, while in semi-arid country they are usually discrete and around 100 ha. | Low There are five Koala records within 10 km of the subject land. All are in intact vegetation to the east of Queanbeyan, NSW. Based on the historic clearing and thinning both on and surrounding the subject land, it is unlikely that the species would visit the subject land to forage or breed. Furthermore, no evidence of koala was detected (e.g. scats, scratch marks). |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|---|--|
| <p><i>Pteropus poliocephalus</i> Grey-headed Flying Fox</p> | V | - | <p>The Grey-headed Flying Fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. Whilst Brisbane, Newcastle, Sydney and Melbourne are occupied continuously, the species is widespread throughout their range during summer. In autumn the species occupies coastal lowlands and is uncommon inland. In winter the species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW and on the northwest slopes (associated with flowering eucalypts of these areas).</p> <p>The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands.</p> <p>The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. The roost at Commonwealth Park in Canberra is the only known roost in the ACT region.</p> | <p>Low</p> <p>It is possible that the species may visit the subject land to forage. The subject land does not contain a camp or occur near a known camp.</p> |
| Reptiles | | | | |
| <p><i>Aprasia parapulchella</i> Pink-tailed Worm-lizard</p> | V | V1 | <p>The Pink-tailed Worm-lizard is a fossorial species which lives beneath surface rocks and occupies ant burrows. It feed on ants, particularly their eggs and larvae. Thought to lay eggs within the ant nests under rocks that it uses as a source of food and shelter and for thermoregulation. Key habitat features are a cover of native grasses, particularly Kangaroo Grass, sparse or no tree cover, little or no leaf litter, and scattered small rock with shallow embedment in the soil surface.</p> | <p>Confirmed</p> <p>Species was recorded in the subject land during targeted field surveys.</p> |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|--|-----------------|---------------|---|--|
| <i>Delma impar</i> Striped Legless Lizard | V | V1 | The Striped Legless Lizard is patchily distributed in grasslands of south-eastern NSW, the ACT, north-eastern, central and south-western Victoria, and south-eastern South Australia. Most areas where the species persists are thought to have had low to moderate levels of agricultural disturbance in the past and it has been suggested that ploughing in particular may be incompatible with the survival of the species. Until recently, the species was thought to inhabit only native grasslands dominated by species such as Tall Speargrass and Kangaroo Grass. In recent years, surveys have revealed the Striped Legless Lizard in many sites dominated by exotic grasses such as Phalaris, Serrated Tussock and Flatweed. They have also been found in several secondary grassland sites, generally within two kilometres of primary grassland. | Low No records exist of the species in the surrounding area. Rock-turning surveys completed for this BCAR and previous studies of the Googong Township did not record the species, nor did the pitfall trapping survey undertaken in 2009 (Biosis Research and Ecwise Environmental 2009). Previous tile surveys performed by the ACT Government along the Googong Foreshores over multiple years have not detected this species. |
| <i>Suta flagellum</i> Little Whip Snake | - | V1 | Occurs in Natural Temperate Grassland, grassy woodland, and secondary grasslands derived from clearing of woodland. Found on well-drained hillsides, mostly associated with scattered loose rocks. | Low No records exist of the species in the surrounding area. Rock-turning surveys completed for this BCAR and previous studies of the Googong Township did not record the species, nor did the pitfall trapping survey undertaken in 2009 (Biosis Research and Ecwise Environmental 2009). Previous tile surveys performed by the ACT Government along the Googong Foreshores over multiple years have not detected this species. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|---|---|
| <i>Tympanocryptis pinguicolla</i> Grassland Earless Dragon | E | E | In the Canberra-Monaro region the Grassland Earless Dragon is restricted to Natural Temperate Grassland that is dominated by perennial tussock-forming species. It is known to make use of grass tussocks as well as small holes in the ground that are also used by invertebrates such as wolf spiders and crickets. The species is known to occur in suitable native grassland habitat in the Majura and Jerrabomberra valleys in the ACT and at 'Letchworth' near Queanbeyan in NSW. | Negligible The subject land does not support potential habitat for this species. |
| <i>Varanus rosenbergi</i> Rosenberg's Goanna | - | V1 | Rosenberg's Goanna is a medium to large monitor species occurring in southern parts of Western Australia and South Australia, with isolated populations in Victoria and New South Wales. In NSW it has been recorded from coastal areas around Sydney and further south, and west to Mount Victoria and the Namadgi and Kosciusko national parks. The species is found in a range of habitats including coastal heaths, humid woodlands and both wet and dry sclerophyll forests, preferring eucalyptus woodlands and heathland. Termite mounds are a critical habitat component, and are used for egg incubation. | Low The species is known to occur in the locality, however it is unlikely to occur in the subject land due to the extent of past vegetation clearing, disturbance caused by long-term grazing, and lack of termite mounds. |
| Plants | | | | |
| <i>Caladenia tessellata</i> Thick-lipped Spider-orchid | V | E1 | Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. | Low The species has not been recently recorded in the locality and was not recorded during field surveys. |
| <i>Dillwynia glaucula</i> Michelago Parrot-pea | - | E1 | Michelago Parrot-pea is recorded from four areas on the NSW Southern Tablelands: near Windellama, where the species is locally abundant, near Mongarlowe, north-east of Michelago and at Numeralla. There is potential habitat between the known sites. Occurs on exposed patches of clay or on rocky outcrops in eucalypt woodland often dominated by Scribbly Gum <i>Eucalyptus rossii</i> , Snow Gum <i>E. pauciflora</i> , Broad-leafed Peppermint <i>E. dives</i> and Red Stringybark <i>E. macrorhyncha</i> . The understorey may be either grassy or shrubby. Grows adjacent to Natural Temperate Grassland in the Michelago area. | Low While present in the locality, this conspicuous species was not recorded during field surveys. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|---|---|
| <i>Dodonea procumbens</i> Trailing Hop-bush | V | V1 | Trailing Hop-bush is found in the dry areas of the Monaro, between Michelago and Dalgety where it occurs mostly in Natural Temperate Grassland or Snow Gum <i>Eucalyptus pauciflora</i> Woodland. A single known population occurs at Lake Bathurst (the northern-most occurrence of the species) where it occurs adjacent to the lake bed in grassland dominated by Corkscrew Grass <i>Austrostipa scabra</i> and Curly Sedge <i>Carex bichenoviana</i> . The species grows on sandy-clay soils in open bare patches where there is little competition from other species. The species often occurs on roadside batters and does not persist in heavily grazed pastures. | Low The species is conspicuous when present and was not recorded during surveys. |
| <i>Eucalyptus aggregata</i> Black Gum | V | V1 | Black Gum occurs on the central and southern tablelands of NSW, and in a small disjunct population in Victoria. In NSW, it occurs predominantly in the South Eastern Highlands Bioregion. The species is a small to medium-sized woodland tree which grows in grassy woodlands on alluvial soils in moist sites along creeks on broad, cold and poorly-drained flats and hollows. It commonly occurs with Candlebark <i>Eucalyptus rubida</i> , Ribbon Gum <i>E. viminalis</i> , and Snow Gum <i>E. pauciflora</i> , with a grassy understorey of River Tussock <i>Poa labillardieri</i> . Most populations are located on private land or road verges and travelling stock routes. | Negligible This species is not present in the subject land. |
| <i>Lepidium hyssopifolium</i> Basalt Peppergrass | E | E | This species is known from a few populations in NSW, Victoria and Tasmania. The Basalt Pepper-grass is known to establish on open, bare ground with limited competition from other plants. It was previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance such as road and rail verges, on the fringes of developed agricultural land or within small reserves in agricultural land. Many populations are now generally found amongst exotic pasture grasses and beneath exotic trees. | Negligible The species is not known to occur in the locality and it was not recorded during field surveys. |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|---|-----------------|---------------|--|---|
| <i>Leucochrysum albicans</i> var. <i>tricolor</i> Hoary Sunray | E | - | The Hoary Sunray occurs from Queensland to Victoria and in Tasmania. In the ACT the species can be seen in spring in abundance on the roadside along Fairbairn Avenue and into Mt Ainslie Nature Reserve, on the western slopes of Mt Majura and adjacent to the Federal Highway road easement. In NSW it is distributed on the inland slopes and plains including grasslands and woodlands on the Monaro and is quite a common species along in less modified areas. The species is usually found in ungrazed and lightly grazed areas, along roadsides in particular. It appears to be very sensitive to grazing, but responds to disturbance as a coloniser and appears to tolerate mowing. Flowers spring to summer. | Low While relatively common in the locality, this conspicuous species was not recorded during field surveys. |
| <i>Pelargonium sp. Striatellum</i> Omeo Stork's-bill | E | E1 | An undescribed species of Pelargonium, Omeo Stork's Bill is a tufted perennial herb threatened by grazing, recreational activities, and exotic species. It is known to occur just above the high-water level of ephemeral lakes in NSW and Victoria. | Negligible There is no potential habitat for this species in the subject land. |
| <i>Pomaderris pallida</i> Pale Pomaderris | V | V1 | Pale Pomaderris has been recorded from near Kydra Trig, north-west of Nimmitabel, Tinderry Nature Reserve, and the Queanbeyan River. A record from Byadbo in Kosciuszko National Park has not been relocated. The main distribution is along the Murrumbidgee in the ACT. It was recorded recently in eastern Victoria. This species usually grows in shrub communities surrounded by Brittle Gum <i>Eucalyptus mannifera</i> and Red Stringybark <i>E. macrorhynca</i> or Black Cypress <i>Callitris endlicheri</i> woodland. | Low While present in the locality, this conspicuous species was not recorded during field surveys. |
| <i>Prasophyllum petilum</i> Tarengo Leek Orchid | E | E1 | When first described in 1991, the Tarengo Leek Orchid was known only from the Hall Cemetery in the ACT. It has since been found at four sites in New South Wales: Captains Flat Cemetery, Ilford Cemetery, Steves Travelling Stock Route (TSR) at Delegate and the Tarengo TSR near Boorowa. The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The three cemetery sites originally contained grassy woodland, dominated by Snow Gum <i>Eucalyptus pauciflora</i> and Black Gum <i>E. aggregata</i> at Captains Flat, and Blakely's Red Gum <i>E. blakelyi</i> and Yellow Box <i>E. melliodora</i> at Hall and Ilford. Both Tarengo TSR and Steves TSR are natural grasslands. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and TSRs, land from which grazing has been restricted. | Negligible There is no potential habitat in the study area for the species |

| Species Name | EPBC Act Status | BC Act Status | Description (Distribution and Habitat) | Likelihood of Occurrence |
|--|-----------------|---------------|---|--|
| <i>Rutidosia leptorrhynchoidea</i> Button Wrinklewort | E | E1 | In the ACT and NSW, Button Wrinklewort occurs in box-gum woodland, secondary grassland derived from box-gum woodland or in natural temperate grassland. It prefers open spaces where it does not have to compete for light. It is known from several sites in the ACT, NSW and Victoria, where it is threatened by habitat loss, grazing and weed encroachment. | Low While present in the locality, this conspicuous species was not recorded during the field surveys. |
| <i>Swainsona recta</i> Small Purple-pea | E | E1 | The Small Purple-pea occurs in the grassy understorey of woodlands and open forests dominated by Blakely's Red Gum, Yellow Box, Candlebark and Bundy. The species grows in association with understorey dominants that include Kangaroo Grass, Poa tussocks and spear-grasses. Plants die back in summer, surviving as rootstocks until they shoot again in autumn. The species is intolerant of grazing but generally tolerant of fire, which also enhances germination by breaking the seed coat and reducing competition from other species. | Low The species is known to occur in the locality but was not detected during surveys. The species is highly intolerant of stock grazing and the subject land has been grazed over an extended period. The species is unlikely to be present in the subject land. |
| <i>Swainsona sericea</i> Silky Swainson-pea | - | V1 | Silky Swainson-pea is a low growing perennial, found from the Northern Tablelands to the Southern Tablelands and Monaro region as well as further inland on the slopes and plains. The species is found in Natural Temperate Grassland and Snow Gum Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes. | Low The species is known to occur in the locality but was not detected during surveys. The species is highly intolerant of stock grazing and the subject land has been grazed over an extended period. The species is unlikely to be present in the subject land. |
| <i>Thesium australe</i> Austral Toadflax | V | V1 | Found in very small to large populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is often found in damp sites in association with Kangaroo Grass but it is also found on other grass species at inland sites. Occurs on clay soils in grassy woodlands or coastal headlands. | Negligible There is no potential habitat in the study area for the species. |

Appendix G. BAM summary reports

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Proposal Details

| | | |
|--------------------------------|--|-------------------------|
| Assessment Id | Assessment name | BAM data last updated * |
| 00012842/BAAS17089/18/00012843 | 2820 Googong Neighbourhoods 3-5 - BCAR | 22/02/2021 |
| Assessor Name | Report Created | BAM Data version * |
| Robert Speirs | 12/03/2021 | 37 |
| Assessor Number | Assessment Type | BAM Case Status |
| BAAS17089 | Biocertification | Finalised |
| Assessment Revision | Date Finalised | |
| 1 | 11/03/2021 | |

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* 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 | 999_Zone_1 | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Zone_1 | 1.26 | 1 | |

BAM Vegetation Zones Report

| | | | | | |
|---|-------------|--|--------|-------|---|
| 2 | 999_Zone_2 | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Zone_2 | 7.77 | 3 |
| 3 | 999_Zone_3 | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Zone_3 | 0.08 | 1 |
| 4 | 999_Zone_4 | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Zone_4 | 55.02 | 5 |
| 5 | 999_Zone_5 | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Zone_5 | 1.01 | 1 |
| 6 | 1334_Zone_2 | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion | Zone_2 | 5.04 | 3 |
| 7 | 1334_Zone_4 | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion | Zone_4 | 48.55 | 4 |

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Proposal Details

| | | |
|--------------------------------|--|-------------------------|
| Assessment Id | Proposal Name | BAM data last updated * |
| 00012842/BAAS17089/18/00012843 | 2820 Googong Neighbourhoods 3-5 - BCAR | 22/02/2021 |
| Assessor Name | Report Created | BAM Data version * |
| Robert Speirs | 12/03/2021 | 37 |
| Assessor Number | Assessment Type | BAM Case Status |
| BAAS17089 | Biocertification | Finalised |
| Assessment Revision | | Date Finalised |
| 1 | | 11/03/2021 |

* 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) |
|--|---------------------------------|--|
| Barking Owl | Ninox connivens | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| Brown Treecreeper (eastern subspecies) | Climacteris picumnus victoriae | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Diamond Firetail | Stagonopleura guttata | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Dusky Woodswallow | Artamus cyanopterus cyanopterus | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |

BAM Predicted Species Report

| | | |
|-----------------------------------|--|--|
| Eastern False Pipistrelle | <i>Falsistrellus tasmaniensis</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| Flame Robin | <i>Petroica phoenicea</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Gang-gang Cockatoo | <i>Callocephalon fimbriatum</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Hooded Robin (south-eastern form) | <i>Melanodryas cucullata cucullata</i> | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Koala | <i>Phascolarctos cinereus</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Large Bent-winged Bat | <i>Miniopterus orianae oceanensis</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Little Eagle | <i>Hieraetus morphnoides</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Little Lorikeet | <i>Glossopsitta pusilla</i> | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |

BAM Predicted Species Report

| | | |
|----------------------|------------------------------|--|
| Powerful Owl | <i>Ninox strenua</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| Regent Honeyeater | <i>Anthochaera phrygia</i> | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Rosenberg's Goanna | <i>Varanus rosenbergi</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| Scarlet Robin | <i>Petroica boodang</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Speckled Warbler | <i>Chthonicola sagittata</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Spotted Harrier | <i>Circus assimilis</i> | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Spotted-tailed Quoll | <i>Dasyurus maculatus</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Square-tailed Kite | <i>Lophoictinia isura</i> | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Swift Parrot | <i>Lathamus discolor</i> | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |

BAM Predicted Species Report

| | | |
|------------------|---------------------------|--|
| Turquoise Parrot | Neophema pulchella | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Varied Sittella | Daphoenositta chrysoptera | 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion |
| | | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |

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 |
|-------------|-----------------|----------------------------|
|-------------|-----------------|----------------------------|

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Proposal Details

| | | |
|---|--|---------------------------------------|
| Assessment Id 00012842/BAAS17089/18/00012843 | Proposal Name 2820 Googong Neighbourhoods 3-5 - BCAR | BAM data last updated * 22/02/2021 |
| Assessor Name Robert Speirs | Report Created 12/03/2021 | BAM Data version * 37 |
| Assessor Number BAAS17089 | Assessment Type Biocertification | BAM Case Status Finalised |
| Assessment Revision 1 | Date Finalised 11/03/2021 | |

* 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 |
|---|--|---|
| <i>Aprasia parapulchella</i> Pink-tailed Legless Lizard | Yes (surveyed) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months? |
| <i>Callocephalon fimbriatum</i> Gang-gang Cockatoo | No (surveyed) *Survey months are outside of the months specified in Bionet. | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months? |
| <i>Hieraetus morphnoides</i> Little Eagle | No (surveyed) *Survey months are outside of the months specified in Bionet. | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months? |

BAM Candidate Species Report

| | | |
|--|---------------|---|
| <i>Synemon plana</i> Golden Sun Moth | No (surveyed) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr |
| | | <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug |
| | | <input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec |
| | | <input type="checkbox"/> Survey month outside the specified months? |

Threatened species assessed as not on site

Refer to BAR for detailed justification

| Common name | Scientific name | Justification in the BAM-C |
|-------------------------|---------------------------------------|----------------------------|
| Barking Owl | <i>Ninox connivens</i> | Refer to BAR |
| Brush-tailed Phascogale | <i>Phascogale tapoatafa</i> | Habitat degraded |
| Button Wrinklewort | <i>Rutidosia leptorrhynchoidea</i> | Habitat degraded |
| Eastern Pygmy-possum | <i>Cercartetus nanus</i> | Habitat degraded |
| Koala | <i>Phascolarctos cinereus</i> | Habitat degraded |
| Large Bent-winged Bat | <i>Miniopterus orianae oceanensis</i> | Refer to BAR |
| Lemon Zieria | <i>Zieria citriodora</i> | Habitat degraded |
| Pink Robin | <i>Petroica rodinogaster</i> | Refer to BAR |
| Powerful Owl | <i>Ninox strenua</i> | Refer to BAR |
| Regent Honeyeater | <i>Anthochaera phrygia</i> | Habitat degraded |
| Silky Swainson-pea | <i>Swainsona sericea</i> | Habitat degraded |
| Silver-leafed Gum | <i>Eucalyptus pulverulenta</i> | Refer to BAR |
| Small Purple-pea | <i>Swainsona recta</i> | Habitat degraded |
| Southern Myotis | <i>Myotis macropus</i> | Habitat constraints |
| Square-tailed Kite | <i>Lophoictinia isura</i> | Habitat degraded |
| Squirrel Glider | <i>Petaurus norfolcensis</i> | Habitat degraded |
| Swift Parrot | <i>Lathamus discolor</i> | Refer to BAR |



BAM Biodiversity Credit Report (Like for like)

Proposal Details

| | | |
|--------------------------------|--|-------------------------|
| Assessment Id | Proposal Name | BAM data last updated * |
| 00012842/BAAS17089/18/00012843 | 2820 Googong Neighbourhoods 3-5 - BCAR | 22/02/2021 |
| Assessor Name | Assessor Number | BAM Data version * |
| Robert Speirs | BAAS17089 | 37 |
| Proponent Names | Report Created | BAM Case Status |
| | 12/03/2021 | Finalised |
| Assessment Revision | Assessment Type | Date Finalised |
| 1 | Biocertification | 11/03/2021 |

* 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 Woodland | Endangered Ecological Community | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Species | | |
| Nil | | |

Additional Information for Approval

| | |
|--------------------------------|--|
| Assessment Id | Proposal Name |
| 00012842/BAAS17089/18/00012843 | 2820 Googong Neighbourhoods 3-5 - BCAR |



BAM Biodiversity Credit Report (Like for like)

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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 |
|--|---|----------------|--------|-----------|-----------------------------|
| 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Not a TEC | 65.1 | 106 | 1 | 107 |

| 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Like-for-like credit retirement options | | | | | |
|--|---|---------------|------|-----|---------|-------------|
| | Class | Trading group | Zone | HBT | Credits | IBRA region |
| | | | | | | |

BAM Biodiversity Credit Report (Like for like)

| | | | | | |
|--|---|-------------------|------------|-----------|--|
| <p>Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177</p> | <p>Southern Tableland Dry Sclerophyll Forests <50%</p> | <p>999_Zone_1</p> | <p>Yes</p> | <p>17</p> | <p>Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p> |
| <p>Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177</p> | <p>Southern Tableland Dry Sclerophyll Forests <50%</p> | <p>999_Zone_2</p> | <p>Yes</p> | <p>78</p> | <p>Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p> |
| <p>Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177</p> | <p>Southern Tableland Dry Sclerophyll Forests <50%</p> | <p>999_Zone_3</p> | <p>No</p> | <p>1</p> | <p>Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p> |

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BAM Biodiversity Credit Report (Like for like)

| | | | | | |
|--|---|---|------------|-----|--|
| | Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_4 | No | 0 Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_5 | Yes | 11 Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

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Species Credit Summary



BAM Biodiversity Credit Report (Like for like)

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|--------------|---------|
| Aprasia parapulchella / Pink-tailed Legless Lizard | 999_Zone_1, 999_Zone_2, 999_Zone_3, 999_Zone_4, 999_Zone_5, 1334_Zone_2, 1334_Zone_4 | 2.6 | 31.00 |

Credit Retirement Options

Like-for-like credit retirement options

| Aprasia parapulchella / Pink-tailed Legless Lizard | Spp | IBRA subregion |
|---|---|----------------|
| | Aprasia parapulchella / Pink-tailed Legless Lizard | Any in NSW |

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Proposal Details

| | | |
|--------------------------------|--|-------------------------|
| Assessment Id | Proposal Name | BAM data last updated * |
| 00012842/BAAS17089/18/00012843 | 2820 Googong Neighbourhoods 3-5 - BCAR | 22/02/2021 |
| Assessor Name | Assessor Number | BAM Data version * |
| Robert Speirs | BAAS17089 | 37 |
| Proponent Name(s) | Report Created | BAM Case Status |
| | 12/03/2021 | Finalised |
| Assessment Revision | Assessment Type | Date Finalised |
| 1 | Biocertification | 11/03/2021 |

* 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.

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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 Woodland | Endangered Ecological Community | 1334-Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion |
| Species | | |
| Nil | | |

Additional Information for Approval

PCTs With Customized Benchmarks

| |
|------------|
| PCT |
| No Changes |

Predicted Threatened Species Not On Site

| Name |
|------------|
| No Changes |

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 |
|--|---|----------------|--------|-----------|-----------------------------|
| 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Not a TEC | 65.1 | 106 | 1 | 107.00 |

| 999-Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | Like-for-like credit retirement options | | | | | |
|---|---|---|------------|-----|--|--|
| | Class | Trading group | Zone | HBT | Credits | IBRA region |
| | Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_1 | Yes | 17 | Monaro,Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_2 | Yes | 78 | Monaro,Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. | |

BAM Biodiversity Credit Report (Variations)

| | | | | | |
|---|---|----------------|-----|---------|--|
| Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_ 3 | No | 1 | Monaro,Bungonia, Crookwell, Kybayan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_ 4 | No | 0 | Monaro,Bungonia, Crookwell, Kybayan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Southern Tableland Dry Sclerophyll Forests This includes PCT's: 296, 299, 345, 349, 351, 352, 649, 652, 653, 700, 701, 727, 728, 729, 730, 888, 911, 912, 953, 957, 999, 1089, 1093, 1177 | Southern Tableland Dry Sclerophyll Forests <50% | 999_Zone_ 5 | Yes | 11 | Monaro,Bungonia, Crookwell, Kybayan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Variation options | | | | | |
| Formation | Trading group | Zone | HBT | Credits | IBRA region |
| | | | | | |

BAM Biodiversity Credit Report (Variations)

| | | | | | |
|---|--------------------------------|------------|----------------------------|----|---|
| Dry Sclerophyll Forests (Shrubby sub-formation) | Tier 4 or higher threat status | 999_Zone_1 | Yes (including artificial) | 17 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Dry Sclerophyll Forests (Shrubby sub-formation) | Tier 4 or higher threat status | 999_Zone_2 | Yes (including artificial) | 78 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Dry Sclerophyll Forests (Shrubby sub-formation) | Tier 4 or higher threat status | 999_Zone_3 | No | 1 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Dry Sclerophyll Forests (Shrubby sub-formation) | Tier 4 or higher threat status | 999_Zone_4 | No | 0 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Dry Sclerophyll Forests (Shrubby sub-formation) | Tier 4 or higher threat status | 999_Zone_5 | Yes (including artificial) | 11 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

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Species Credit Summary

BAM Biodiversity Credit Report (Variations)

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|--------------|---------|
| Aprasia parapulchella / Pink-tailed Legless Lizard | 999_Zone_1, 999_Zone_2, 999_Zone_3, 999_Zone_4, 999_Zone_5, 1334_Zone_2, 1334_Zone_4 | 2.6 | 31.00 |

Credit Retirement Options Like-for-like options

| | | | |
|--|--|---|-------------|
| Aprasia parapulchella / Pink-tailed Legless Lizard | Spp | IBRA region | |
| | Aprasia parapulchella /Pink-tailed Legless Lizard | Any in NSW | |
| | Variation options | | |
| | Kingdom | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region |
| Fauna | Vulnerable | Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. | |

Proposal Details

| | | |
|---|--|---------------------------------------|
| Assessment Id 00012842/BAAS17089/18/00012843 | Proposal Name 2820 Googong Neighbourhoods 3-5 - BCAR | BAM data last updated * 22/02/2021 |
| Assessor Name Robert Speirs | Report Created 12/03/2021 | BAM Data version * 37 |
| Assessor Number BAAS17089 | BAM Case Status Finalised | Date Finalised 11/03/2021 |
| Assessment Revision 1 | Assessment Type Biocertification | |

* 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) | BC Act Listing status | EPBC Act listing status | Species sensitivity to gain class (for BRW) | Biodiversity risk weighting | Potential SAI | Ecosystem credits |
|---|----------------------|-----------|------------------------------------|--|-----------|-----------------------|-------------------------|---|-----------------------------|---------------|-------------------|
| Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | | | | | | | | | | | |
| 1 | 999_Zone_1 | Not a TEC | 36 | 36.0 | 1.3 | | | High Sensitivity to Potential Gain | 1.50 | | 17 |
| 2 | 999_Zone_2 | Not a TEC | 26.8 | 26.8 | 7.8 | | | High Sensitivity to Potential Gain | 1.50 | | 78 |

| | | | | | | | | | | | |
|---|-------------|---|------|------|------|---------------------------------|--|------------------------------------|------|-----------------|------------|
| 3 | 999_Zone_3 | Not a TEC | 28.8 | 28.8 | 0.08 | | | High Sensitivity to Potential Gain | 1.50 | | 1 |
| 4 | 999_Zone_4 | Not a TEC | 15.6 | 15.6 | 55 | | | High Sensitivity to Potential Gain | 1.50 | | 0 |
| 5 | 999_Zone_5 | Not a TEC | 28.6 | 28.6 | 1 | | | High Sensitivity to Potential Gain | 1.50 | | 11 |
| | | | | | | | | | | Subtotal | 107 |
| Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion | | | | | | | | | | | |
| 6 | 1334_Zone_2 | White Box Yellow Box Blakely's Red Gum Woodland | 26.6 | 26.6 | 5 | Endangered Ecological Community | | High Sensitivity to Potential Gain | 2.00 | TRUE | 67 |
| 7 | 1334_Zone_4 | White Box Yellow Box Blakely's Red Gum Woodland | 24.5 | 24.5 | 48.6 | Endangered Ecological Community | | High Sensitivity to Potential Gain | 2.00 | TRUE | 594 |
| | | | | | | | | | | Subtotal | 661 |
| | | | | | | | | | | Total | 768 |

Species credits for threatened species

| Vegetation zone name | Habitat condition (Vegetation Integrity) | Change in habitat condition | Area (ha)/Count (no. individuals) | BC Act Listing status | EPBC Act listing status | Biodiversity risk weighting | Potential SAI | Species credits |
|--|--|-----------------------------|-----------------------------------|-----------------------|-------------------------|-----------------------------|---------------|-----------------|
| <i>Aprasia parapulchella</i> / Pink-tailed Legless Lizard (Fauna) | | | | | | | | |
| 999_Zone_1 | | 36.0 | 36.0 | 0.4 | Vulnerable | Vulnerable | 2 False | 7 |
| 999_Zone_2 | | 26.8 | 26.8 | 0.14 | Vulnerable | Vulnerable | 2 False | 2 |
| 999_Zone_3 | | 28.8 | 28.8 | 0.07 | Vulnerable | Vulnerable | 2 False | 1 |
| 999_Zone_4 | | 15.6 | 15.6 | 1.1 | Vulnerable | Vulnerable | 2 False | 8 |
| 999_Zone_5 | | 28.6 | 28.6 | 0.08 | Vulnerable | Vulnerable | 2 False | 1 |

BAM Credit Summary Report

| | | | | | | | | |
|-------------|------|------|------|------------|------------|---|-----------------|-----------|
| 1334_Zone_2 | 26.6 | 26.6 | 0.82 | Vulnerable | Vulnerable | 2 | False | 11 |
| 1334_Zone_4 | 24.5 | 24.5 | 0.06 | Vulnerable | Vulnerable | 2 | False | 1 |
| | | | | | | | Subtotal | 31 |

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Biodiversity payment summary report

| | | | |
|--------------------------------|----------------------|--|-----------------|
| Assessment Id | Payment data version | Assessment Revision | Report created |
| 00012842/BAAS17089/18/00012843 | | 1 | 12/03/2021 |
| Assessor Name | Assessor Number | Proposal Name | BAM Case Status |
| Robert Speirs | BAAS17089 | 2820 Googong Neighbourhoods 3-5 - BCAR | Finalised |
| Assessment Type | Date Finalised | | |
| Biocertification | 11/03/2021 | | |

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PCT list

| Price calculated | PCT common name | Credits |
|------------------|---|---------|
| Yes | 999 - Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | 107 |
| Yes | 1334 - Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion | 661 |

Species list

| Price calculated | Species | Credits |
|------------------|--|---------|
| Yes | <i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard) | 31 |

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

| | |
|--------------------------------|--|
| Assessment Id | Proposal Name |
| 00012842/BAAS17089/18/00012843 | 2820 Googong Neighbourhoods 3-5 - BCAR |



Biodiversity payment summary report

| IBRA sub region | PCT common name | Threat status | Offset trading group | Risk premium | Administrative cost | Methodology adjustment factor | Price per credit | No. of ecosystem credits | Final credits price |
|--|---|---------------|---|--------------|---------------------|-------------------------------|------------------|--------------------------|-----------------------|
| Monaro | 999 - Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion | No | Southern Tableland Dry Sclerophyll Forests <50% | 19.23% | \$119.08 | 2.2898 | \$3,668.56 | 107 | \$392,536.16 |
| Monaro | 1334 - Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion | No | Southern Tableland Grassy Woodlands >90% | 20.69% | \$134.31 | 0.7822 | \$4,186.78 | 661 | \$2,767,460.19 |
| Subtotal (excl. GST) | | | | | | | | | \$3,159,996.35 |
| GST | | | | | | | | | \$315,999.64 |
| Total ecosystem credits (incl. GST) | | | | | | | | | \$3,475,995.98 |

Species credits for threatened species

| Species profile ID | Species | Threat status | Price per credit | Risk premium | Administrative cost | No. of species credits | Final credits price |
|--------------------|--|---------------|------------------|--------------|---------------------|------------------------|---------------------|
| 10061 | <i>Aprasia parapulchella</i> (Pink-tailed Legless Lizard) | Vulnerable | \$463.67 | 20.6900% | \$80.00 | 31 | \$19,827.70 |



Biodiversity payment summary report

| | |
|----------------------|--------------------|
| Subtotal (excl. GST) | \$19,827.70 |
|----------------------|--------------------|

| | |
|-----|-------------------|
| GST | \$1,982.77 |
|-----|-------------------|

| | |
|--|--------------------|
| Total species credits (incl. GST) | \$21,810.47 |
|--|--------------------|

| | |
|--------------------|-----------------------|
| Grand total | \$3,497,806.45 |
|--------------------|-----------------------|

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