Subdivision of 7 Iceton Place, Yass, NSW

Biodiversity Development Assessment Report

Draft 04 – April 2021
Prepared for Iceton Investments Pty Ltd

Document Information

Report for: Iceton Investments Pty Ltd

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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

Iceton Investments Pty Ltd (Iceton Investments) is currently progressing the planning and approval process for the proposed subdivision of 7 Iceton Place (Lot 2 DP1243702 and Lots 13 & 14 DP786575), Yass, NSW (the 'proposed development' of the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by Iceton Investments to complete the necessary biodiversity surveys and prepare this Biodiversity Development Assessment Report (BDAR) 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 BDAR is to present the results of Capital Ecology's application of the NSW *Biodiversity Assessment Method* (BAM) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act). This BDAR also includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Survey Overview

Vegetation and potential flora/fauna habitat were surveyed and mapped in accordance with the BAM. This involved the following five ecological surveys performed by Capital Ecology between 4 September 2019 and 29 November 2019.

- Plant Community Type and Vegetation Zone assessment and mapping.
- BAM plots.
- A full program of targeted Striped Legless Lizard *Delma impar* surveys, involving 10 checks of 10 grids (50 tiles per grid) following methodology 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.
- Threatened flora and threatened bird surveys via opportunistic observations.

Results

Native vegetation

The subject land supports one Plant Community Type (PCT).

- PCT1289 – *Wallaby Grass – Red-grass – Tall Speargrass – Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion*.

Before European occupation, the whole of the subject land and surrounding properties would have been characterised by grassland PCTs. The subject land has been substantially modified by its current and past land use, which has primarily been grazing and cropping. Approximately 92% of the

subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. More recently, all of the small rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. As a result, the vast majority of the subject land has a disturbed soil profile and a groundstorey dominated by exotic perennial and annual pasture species.

The riparian vegetation in the subject land is largely charactered by exotic pasture grasses and the only woody riparian vegetation is restricted to a few small patches of Willow *Salix* sp. and Elm *Ulmus* sp.. The lack of reliable water flows, standing pools, and native riparian vegetation indicates that O'Briens Creek and its tributaries are unlikely to provide habitat of significance to aquatic/riparian flora or fauna.

There are three windrows comprised largely of planted exotic trees (e.g. Elm and Pine *Pinus* sp.). At the time of survey, the whole of the subject land was heavily grazed by stock.

The subject land is bordered to the north by Yass Valley Way, to the east and west by large lot residential properties, and to the south by agricultural land. The vegetation in the surrounding properties is similar to that present in the subject land (i.e. substantially modified and largely dominated by exotic species). Therefore, while the native and exotic pasture in the subject land is likely to be of some limited habitat value to a variety of native birds, reptiles, and herbivorous mammals, the subject land is unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature.

Threatened ecological communities

PCT1289 is identified as the potential EPBC Act listed threatened ecological community (TEC) *Natural Temperate Grassland of the South Eastern Highlands*. However, the vegetation has been modified and degraded to the extent that it no longer supports the native dominance and/or native diversity required to meet the listing criteria of the TEC.

As such, no part of the subject land supports an EPBC Act or BC Act listed threatened ecological community.

Threatened species

The historic activities which have occurred across the majority of the subject land have substantially degraded the habitat value for native flora and fauna. As a result, no threatened flora species were recorded within the subject land, nor were the majority of the threatened fauna species considered to have the potential to occur. However, targeted surveys did detect Striped Legless Lizard (BC Act and EPBC Act vulnerable) and Golden Sun Moth (BC Act endangered, EPBC Act critically endangered).

Striped Legless Lizards were recorded a total of 11 times between 19 September 2019 and 18 November 2019. The low capture rate and small number of individuals recorded over 10 weeks indicates that the density of Striped Legless Lizards in the subject land is very low. The Striped Legless Lizard habitat in the subject land is characterised by tussock-forming exotic pasture grasses (notably Phalaris *Phalaris aquatic*) with high herbage mass, a defined tussock structure, and a low-lying position in the landscape. In total, the subject land is estimated to support 17.10 ha of Striped Legless Lizard habitat. Of that, 1.81 ha (11%), all of which occurs in PCT1289 Zone 2, will be impacted by the proposed development. The remaining 15.29 ha (89%) will be protected and managed in-perpetuity.

A total of 373 Golden Sun Moths were recorded in the subject land across the four surveys. Golden Sun Moths were recorded at moderate to high density across much of PCT1289 Zone 1 (i.e. native dominant grassland/pasture). The portions of PCT1289 Zone 1 where individuals were recorded were generally flat or gently sloping, dominated by a mix of Tall Speargrass *Austrostipa bigeniculata* and Wallaby Grasses *Rhytidosperma* spp., and were characterised by low herbage mass and extensive patches of bare ground. In total, the subject land is estimated to support 11.64 ha of Golden Sun Moth habitat. The greatest number of Golden Sun Moths were recorded in the northern-most two patches of habitat, which, while making up 40% of the assessed extent of Golden Sun Moth habitat in the subject land, accounted for 77% of the recorded Golden Sun Moth individuals. The proposed development will impact 2.88 ha (25%) of the Golden Sun Moth habitat that occurs in the subject land. The remaining 8.76 ha (75.4%), which includes the two patches of habitat which recorded the greatest number of Golden Sun Moth, will be protected and managed in-perpetuity.

Impacts

Native vegetation

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

- 5.59 ha of PCT1289 Zone 1 – low diversity native pasture (BC Act native vegetation).

PCT1289 Zone 1 has a vegetation integrity score that requires offsetting for impacts on ecosystem credits.

- PCT1289 Zone 1 – vegetation integrity score of 25.9.

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

Threatened species habitat

The proposed development will result in the clearance of the following threatened species habitat.

- 2.88 ha of Golden Sun Moth habitat (BC Act endangered, EPBC Act critically endangered), located in PCT1289 Zone 1; and
- 1.81 ha of Striped Legless Lizard habitat (BC Act and EPBC Act vulnerable), located in PCT1289 Zone 2.

The clearance of 2.88 ha of Golden Sun Moth in PCT1289 Zone 1 requires offsetting for impacts on species credits.

- Golden Sun Moth – habitat condition (vegetation integrity) loss of 25.9.

Golden Sun Moth is listed as a serious and irreversible impacts (SAII) entity. Accordingly, the proposed development could result in a SAII on a BC Act listed entity. However, as detailed in this BDAR, following substantial avoidance, minimisation, and mitigation measures, the proposed removal of 2.88 ha of Golden Sun Moth habitat is unlikely to constitute a SAII.

The clearance of 1.81 ha of Striped Legless Lizard habitat only generates a 1 species credit. This arises as the vegetation throughout PCT1289 Zone 2 is low diversity exotic pasture that lacks both composition and structure and, because of this, results in a vegetation integrity that is too low to generate a greater number of species credits. The impact to 1.81 ha of Striped Legless lizard habitat

in non-native vegetation is therefore classified as a prescribed biodiversity impact. Accordingly, if acceptable to both Council and the Biodiversity Conservation Trust, the impact of the proposed development on 1.81 ha of Striped Legless Lizard habitat will be offset in the following manner.

- The impact on 1.81 ha of Striped Legless Lizard habitat will be offset by calculating the monetary value of the credit obligation that would be generated assuming that the impact to the species were to occur in low diversity native pasture (i.e. PCT1289 Zone 1) and the obligation met by paying into the Biodiversity Conservation Fund. The resultant calculated amount will be dedicated by the proponents of the proposed development to the management of the 24.9 ha Community Title Lot that will be established to protect the retained Striped Legless Lizard habitat.

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

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.

However, the subject land does support habitat for EPBC Act listed threatened species (i.e. Golden Sun Moth and Striped Legless Lizard). Based on Capital Ecology's experience with similar projects and the corresponding Significant Impact Criteria (SIC) assessments, once the proposed avoidance, minimisation, and mitigation measures are taken into account, the residual impacts to 2.88 ha of Golden Sun Moth habitat and 1.81 ha of Striped Legless Lizard habitat are unlikely to constitute a significant impact on either species. Nevertheless, for legal certainty, referral of the proposed action to the Commonwealth Minister for Agriculture, Water and the Environment is recommended.

NSW BC Act – Biodiversity offset credit calculations

The proposed development will involve the clearance of vegetation which generates the following ecosystem credits, as determined by the BAM Calculator on 21 April 2021.

- PCT1289 Zone 1 – clearance of 5.59 ha generates 63 ecosystem credits.

The proposed development will involve the clearance of threatened species habitat which generates the following species credits, as determined by the BAM Calculator on 21 April 2021.

- Striped Legless Lizard *Delma impar* – clearance of 1.81 ha generates 1 species credit.
- Golden Sun Moth *Synemon plana* – clearance of 2.88 ha generates 56 species credits.

The proposed development will also have a prescribed biodiversity impact on threatened species habitat which generates the following proposed offset measure, as calculated assuming the impact occurs in PCT1289 Zone 1 and using the BAM Calculator on 21 April 2021.

- Striped Legless Lizard *Delma impar* – clearance of 1.81 ha generates 18 species credits. This would total $13,418.56 if the obligation were met by paying into the Biodiversity Conservation Fund.

NSW Koala SEPP – Koala Habitat Protection Requirements

Regarding the application of the Koala Habitat Protection SEPP for the proposed development of the subject land, the following points are noted.

1. The subject land is located within the Yass Valley Council Local Government Area (LGA), which is an LGA to which he Koala Habitat Protection SEPP applies as listed in Schedule 1.

2. The subject land has an area of greater than 1 hectare and there is no approved Koala Plan of Management.

3. The subject land is comprised entirely of naturally occurring grassland and does not support any naturally occurring native trees. Accordingly, the subject land does not support 'potential koala habitat'.

4. 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 Yass Valley Council LGA. The closest Koala record is approximately 7 km to the north-east of the subject land.

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land is therefore considered unlikely to constitute important or occupied Koala habitat now or in the future. Council can therefore be satisfied that the subject land is not Koala habitat, and it is therefore not prevented because of the Koala Habitat Protection SEPP from granting consent to a development application within the subject land.

1 Introduction

Iceton Investments Pty Ltd (Iceton Investments) is currently progressing the planning and approval process for the proposed subdivision of 7 Iceton Place (Lot 2 DP1243702 and Lots 13 & 14 DP786575), Yass, NSW (the 'proposed development' of the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by Iceton Investments to complete the necessary biodiversity surveys and prepare this Biodiversity Development Assessment Report (BDAR) 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 BDAR is to present the results of Capital Ecology's application of the NSW *Biodiversity Assessment Method* (BAM) (NSW Government 2017a[1]) 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). This BDAR also includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.1 Subject Land

The subject land for this BDAR is 173.33 ha in size and encompasses the whole of Lot 2 DP1243702 and Lots 13 & 14 DP786575, Yass, NSW (Figure 1, Figure 2, and Figure 3). The subject land, as shown in Figure 1 and Figure 3, is bordered by:

- Yass Valley Way to the north, beyond which lies 'E3 – Environmental Conservation' zoned land;
- 'R5 – Large Lot Residential' zoned land to the north, east, and west; and
- 'RU1 – Primary Production' zoned land to the south.

Located in the Yass Valley Council Local Government Area (LGA), pursuant to the *Yass Valley Council Local Environmental Plan 2013* (Yass Valley LEP), the subject land is zoned[2] 'R5 – Large Lot Residential' with a minimum lot size[3] of 'AB1 – 10 ha'. It is understood that the proposed development seeks to change the minimum lot size for the subject land to allow for subdivision into residential lots (with a minimum lot size of 1 ha or 2 ha).

The subject land is not identified on the Yass Valley LEP Natural Resources Biodiversity Map[4] or NSW Government Biodiversity Values Map[5].

The topography across the subject land is gently undulating, with the elevation ranging from approximately 505 m Australian Height Datum (AHD) along O'Briens Creek which runs through the centre of the subject land to 550 m AHD on the hill which borders the eastern boundary and 555 m AHD on the ridge in the south-west.

[1] NSW Government (2017a). *Biodiversity Assessment Method*. NSW Office of Environment and Heritage. Published LW 25 August 2017.
[2] Yass Valley Local Environmental Plan (2013). *Land Zoning Map - Sheet LSN_001H and LSN_002B.*
[3] Yass Valley Local Environmental Plan (2013). *Lot Size Map - Sheet LSZ_001H and LSZ_002B.*
[4] Yass Valley Local Environmental Plan (2013). *Natural Resources Biodiversity Map - Sheet NRB_001 and Sheet NRB_002.*
[5] https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

The built infrastructure in the subject land is restricted to a single sheering shed and associated stock yard. The existing boundary and internal fences are in a generally fair and functional condition.

O'Briens Creek passes through the centre of the subject land and joins the Yass River 500 m to the north of the subject land (Figure 4). Three tributaries, which either originate in or to the west of the subject land, join O'Briens Creek. At the time of survey, O'Briens Creek and its tributaries were dry and are only likely to convey water following substantial rain events. The riparian vegetation in the subject land is largely characterised by exotic pasture grasses, especially Phalaris *Phalaris aquatica*. Woody vegetation is restricted to the few small patches of Willow *Salix* sp. and Elm *Ulmus* sp.. There are two moderately sized farm dams in the subject land, both of which held a small amount of water at the time of survey.

Before European occupation, the whole of the subject land and surrounding properties would have been characterised by grassland PCTs. The subject land has been substantially modified by its current and past land use, which has primarily been grazing and cropping. Approximately 92% of the subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. More recently, all of the small rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. As a result, the vast majority of the subject land has a disturbed soil profile and a groundstorey dominated by exotic perennial and annual pasture species. There are three windrows comprised largely of planted exotic trees (e.g. Elm and Pine *Pinus* sp.). At the time of survey, the whole of the subject land was grazed by stock.

1.2 Proposed Development

The proposed development seeks to reduce the minimum lot size for the subject land to allow for its subdivision into residential lots (with a minimum lot size of 1 ha or 2 ha). Following this, the subject land will be subdivided and developed for residential purposes. As shown in Genium Civil Engineering's Proposed Plan of Subdivision[6], included herein as Figure 2, the proposed development will subdivide the subject land to create 71 residential lots and associated infrastructure[7]. Included in these 71 residential lots is a large, 9.3 ha residential lot in the western corner of the subject land (Lot 62, Figure 2). The boundary of this lot has been defined in order to protect and manage the Golden Sun Moth *Synemon plana* habitat that occurs therein.

The proposed development also includes a 24.9 ha Community Title Lot (Lot 72, Figure 2). This lot has been located in order to protect and manage the majority of significant ecological values that occur in the subject land, specifically habitat for Golden Sun Moth and Striped Legless Lizard *Delma impar*.

It is important to note that the aerial imagery used for all figures in this BDAR is sourced from New South Wales Land and Property Information (NSW LPI). This imagery is estimated to be up to 10 years old. All of the rocky patches in the subject land have been cleared since the NSW LPI imagery was captured. The vegetation and habitat mapping as shown throughout this BDAR reflect what is currently present in the subject land. As a result, there are instances where the mapping and NSW LPI imagery do not match. In these instances, the vegetation and habitat mapping performed for this BDAR supersedes the imagery.

[6] Geranium Civil Engineering. *Proposed Plan of Subdivision. Lots 13 & 14 DP786575, Lot 2 DP1243702*. Drawing No. 17037-500, Sheet 6 of 7, Rev D 05/04/2021.

[7] Please note that in some sections the NSW cadastre does not accurately reflect the location of the fence lines and surveyed boundaries of the subject land. Accordingly, the boundary of the subject land has been determined based on a detailed survey performed by Genium Civil Engineering.

1.3 Version History

An earlier version of this BDAR (Capital Ecology 2020[8]) informed the initial rezoning proposal for the subject land. As part of that process, Yass Valley Council and the Department of Planning, Industry and Environment Biodiversity Conservation Division (DPIE-BCD) undertook a preliminary review of the BDAR. DPIE-BCD subsequently requested changes to the design of the proposed development and ongoing protection measures for retained vegetation and threatened species habitat (letter of 11 December 2020 from Allison Treweek, Senior Team Leader – South East, Biodiversity and Conservation Division, DOC20/978477-11).

This version of the BDAR has been revised and updated in the following manner to address comments from DPIE-BCD on the previous version.

- The design of the proposed development was changed to increase the area of the proposed Community Title Lot from 9.1 ha to 24.9 ha, an increase of 274%. The was done to protect and manage a far greater proportion of the Golden Sun Moth habitat and Striped Legless Lizard habitat that occurs in the subject land.

- The Community Title Lot will have an environmental zoning placed over it (e.g. 'E2 – Environmental Conservation'). The exact zoning will be determined in consultation with Yass Valley Council and DPIE-BCD.

- Certain Building Envelopes (BEs) have been moved and/or have been reduced in size in order to provide greater setbacks to areas of retained vegetation and threatened species habitat.

- The ongoing protection measures for retained vegetation and threatened species habitat will occur in the following manner.

  Community Title Lot

  The retained vegetation and threatened species habitat in the Community Title Lot (24.9 ha) will be protected and managed in-perpetuity through specific environmental protection by-laws to be written as part of a Community Management Statement.

  Upon approval of any future Development Application, an appropriately qualified person will prepare a Biodiversity Management Plan (BMP), to be endorsed by Yass Valley Council and DPIE-BCD, for inclusion in the by-laws for the Community Title Lot. This BMP will stipulate the conservation-focused management measures that will be implemented.

  At a minimum, the BMP measures will include actions such as targeted weed control, feral animal control, grazing control, biomass control, and protection of native vegetation and threatened species habitat. The key aims of the management measures will be to protect the retained significant ecological values and reduce the impact of known threatening processes.

[8] Capital Ecology (2020). *Subdivision of 7 Iceton Place, Yass, NSW – Biodiversity Development Assessment Report*. Draft 03 – July 2020. Prepared for Iceton Investments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2909.

Large residential lot

The retained vegetation and threatened species habitat in the large residential lot (9.3 ha) will be protected and managed in-perpetuity via a Conservation Agreement established under the BC Act.

The purpose of the Conservation Agreement will be to protect and manage the significant ecological values the large residential lot supports, in particular the Golden Sun Moth. Management actions will be directed towards protecting threatened species habitat, reducing the impact of known threatening processes, and improving the condition of the groundstorey vegetation. To that end, a management plan endorsed by Yass Valley Council and the DPIE-BCD will be developed for the large residential lot.

As a result of the above actions, the current design of the proposed development:

- protects and manages 89% (15.29 ha) of the Striped Legless Lizard habitat;
- protects and manages 75% (8.76 ha) of the Golden Sun Moth habitat; and
- protects and manages 62% (9.13 ha) of the BC Act Native Vegetation.

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;
- 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 2013a[9]). If it is determined that a proposed action will, or is likely to, have a significant impact on a MNES, the action must be referred to the Minister. The Department will then consider the referred action and the Minister (or their Delegate) will make a determination regarding whether the action requires approval under the EPBC Act and associated conditions and controls.

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

1.4.2 NSW Biodiversity Conservation Act 2016

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

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.

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).

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

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, or vegetation clearing site, or stewardship site;
- guidance on how a proponent (i.e. developer, landholder) can avoid and/or minimise potential biodiversity impacts, or assessment of the management requirements at a proposed biodiversity stewardship site and the likely improvement in biodiversity values that are predicted to occur over time; and
- the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity values for a development site, or the number and class of biodiversity credits to be generated by a proposed stewardship site.

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) 2021

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* ('Koala Habitat Protection SEPP') replaced the *State Environmental Planning Policy (Koala Habitat Protection) 2020* on 17 March 2021. The associated Frequently Asked Questions[10] aim to guide consent authorities, professionals, and the community to understand and implement the requirements of the Koala Habitat Protection SEPP.

The development control provisions of the Koala Habitat Protection SEPP apply to development applications relating to land within a council area listed in Schedule 1 of the Koala Habitat Protection SEPP and:

1. *Where there is an approved Koala Plan of Management for the land*
    a. *the development application must be consistent with the approved koala plan of management that applies to the land.*
2. *Where there is no approved Koala Plan of Management for the land, if the land*
    a. *has an area of at least 1 hectare (including adjoining land within the same ownership)*

Pursuant to the Koala Habitat Protection SEPP, the council may grant development consent if the applicant provides to the council—

1. *information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application—*
    a. *does not include any trees belonging to the koala use tree species listed in Schedule 2 for the relevant koala management area, or*
    b. *is not core koala habitat, or*
2. *information the council is satisfied demonstrates that the land subject of the development application—*
    a. *does not include any trees with a diameter at breast height over bark of more than 10 centimetres, or*
    b. *includes only horticultural or agricultural plantations.*

Core koala habitat is defined as:

1. *an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or*

[10] Available at https://www.planning.nsw.gov.au/-/media/Files/DPE/Factsheets-and-faqs/Policy-and-legislation/faqs-Koala-SEPP-2021-development-applications-process-2021-03.pdf?la=en

2. *an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.*

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 Development Assessment Report

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

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

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

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

With regard to the above, while the minimum lot size designation for the subject land is currently 'AB1 = 10 ha' (LEP Lot Size Map - Sheet LSZ_001H and Sheet LSZ_002B), it is expected to reduce to 'Y = 1 ha' and/or 'Z1 = 2 ha' following rezoning. Therefore, in accordance with Part 7, Clause 7.2 of the BC Regulation, if the BC Act 'native vegetation' (defined in Part 5A of the *Local Land Services Act 2013* as plant species indigenous to NSW) clearance exceeds 5,000 m^2 (0.5 ha) in total, then the BOS is triggered.

As the proposed development will involve the clearance of approximately 5.59 ha of BC Act 'native vegetation' and has the potential to significantly impact two BC Act listed entities (Golden Sun Moth and Striped Legless Lizard), the BOS is triggered and a BDAR is required to assess the impacts of the proposed development.

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

1.5.1 Objectives and Format

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

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

1.5.2 Technical Resources and Qualifications

This BDAR has been prepared by the following technical personnel:

- Robert Speirs – Director / Principal Ecologist

  BAppSc (Ecology), DipPM, MEIANZ, CEnvP-E, Accredited BAM Assessor (No: BAAS17089)
  Robert was project 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, GIS mapping, and report preparation.

- Shannon Thompson – Field Ecologist

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

- Kristy Lee – Field Ecologist

  BSc
  Kristy undertook field surveys and data entry.

- Jesse Murphy – Field Ecologist

  BSc
  Jesse undertook field surveys and data entry.

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 (TRIM 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).

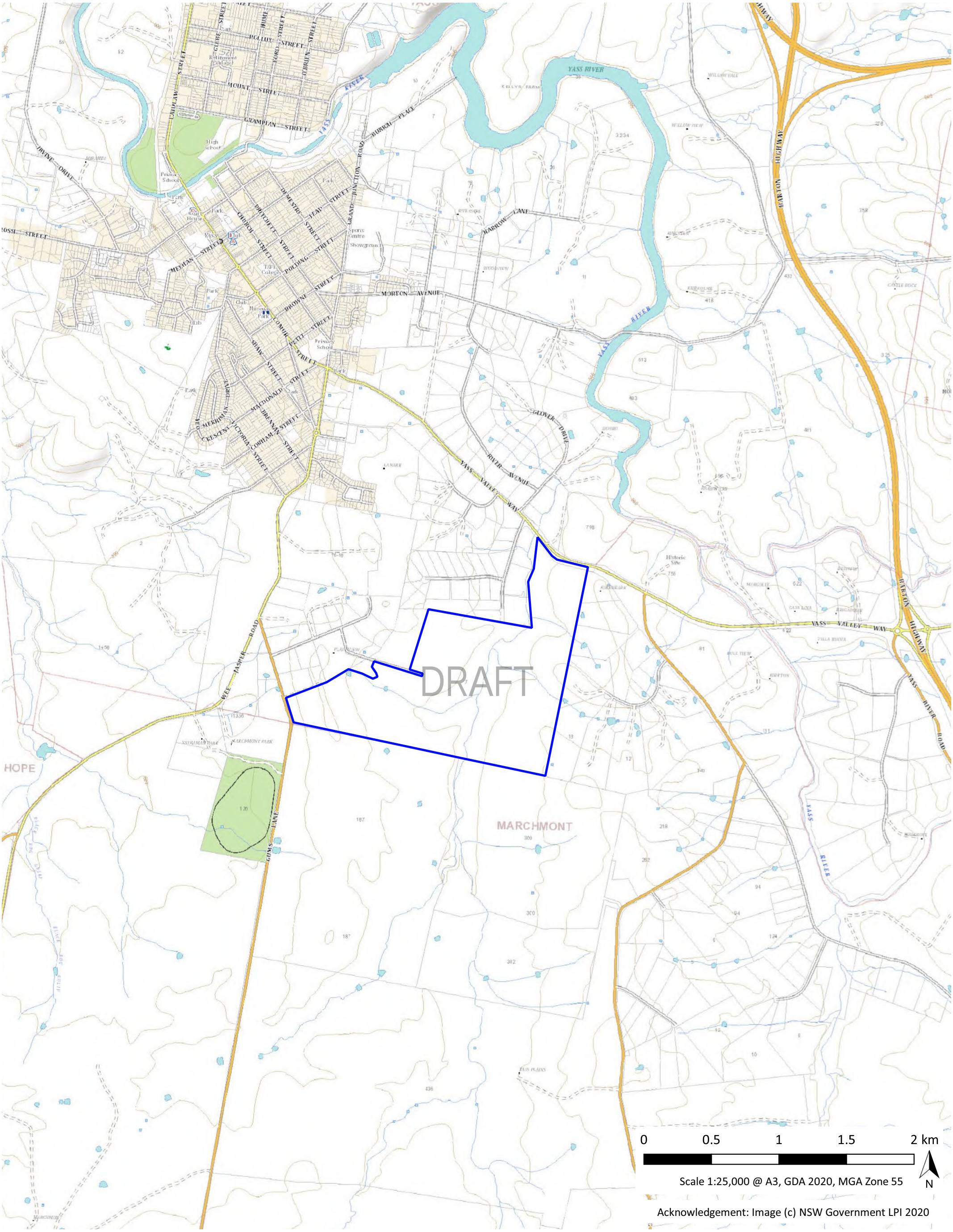


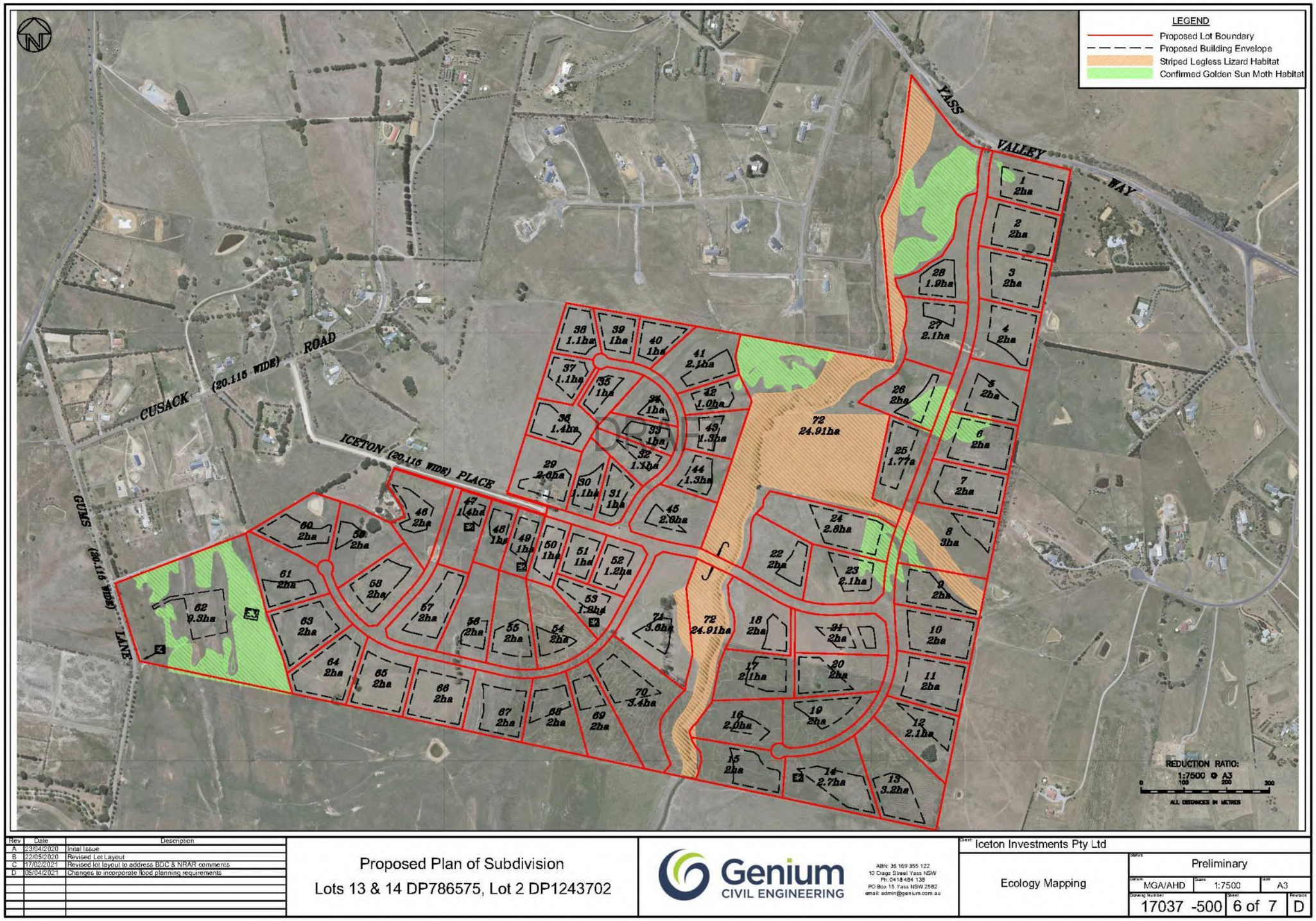
Figure 1. Locality Plan

Legend

Subject Land

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 13 July 2020

Figure 2. The Proposed Development (Genium Civil Engineering)



Rev	Date	Description
A	23/04/2020	Inital Issue
B	22/05/2020	Revised Lot Layout
C	17/02/2021	Revised lot layout to address BDC & NRAR comments
D	06/04/2021	Changes to incorporate flood planning requirements

Proposed Plan of Subdivision
Lots 13 & 14 DP786575, Lot 2 DP1243702

Genium CIVIL ENGINEERING
ABN: 36 169 355 122
10 Diega Street Yass NSW
Ph: 0418 484 138
PO Box 15 Yass NSW 2582
email: admin@genium.com.au

Client: Iceton Investments Pty Ltd
Ecology Mapping
Status: Preliminary
Datum: MGA/AHD | Scale: 1:7500 | Size: A3
Drawing Number: 17037 -500 | Sheet: 6 of 7 | Revision: D

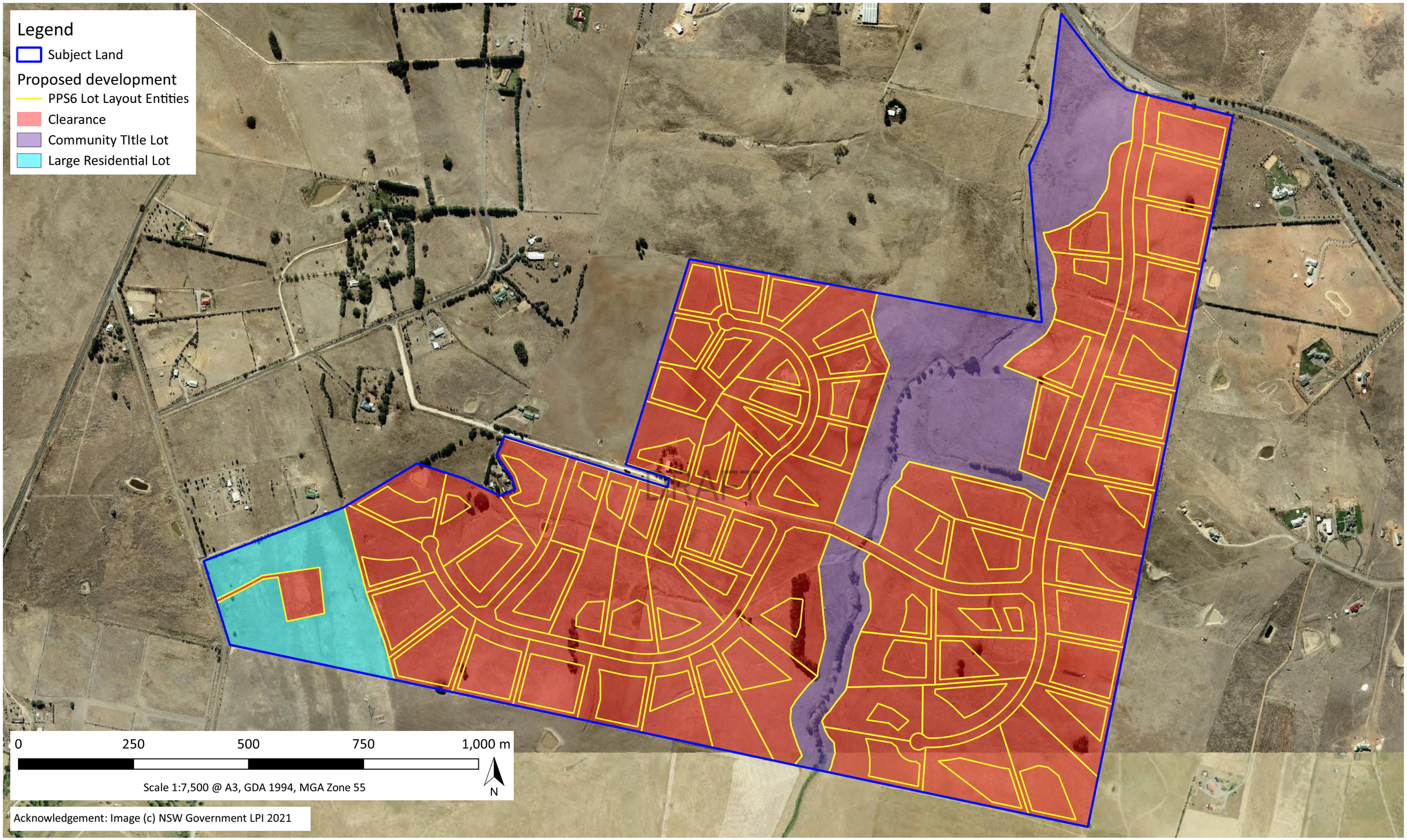


Figure 3. The Subject Land and Proposed Development on Aerial Imagery

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 23 April 2021

2 Part 1 – Biodiversity Assessment (BAM Stage 1)

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

2.1 Landscape Context

As detailed in 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.

Table 1. Landscape features.

Landscape Feature	Description	Figure Reference
IBRA bioregion	The subject land occurs in the **South Eastern Highlands** IBRA bioregion.	-
IBRA subregion	The subject land occurs in the **Murrumbateman** IBRA subregion.	-
BioNet NSW landscapes (Mitchell landscapes)	The subject land contains two Mitchell Landscape: **Robertson Basalts** and **Burrinjuck Ridges.**	Figure 1
Rivers, streams and estuaries (Strahler[11] stream order)	O'Briens Creek, which is a 4th order creek (defined based on the NSW LPI Hydrology Map and as per Appendix 3 of the BAM), passes through the centre of the subject land and joins the Yass River 500 m to the north. Three tributaries, which either originate in or to the west of the subject land, join O'Briens Creek. At the time of survey, O'Briens Creek and its tributaries were dry and are only likely to convey water following substantial rain events. The riparian vegetation in the subject land is largely characterised by exotic pasture grasses, especially Phalaris. The only woody riparian vegetation is restricted to a few small patches of Willow and Elm. The lack of reliable water flows, standing pools, and native riparian vegetation indicates that O'Briens Creek and its tributaries are unlikely to provide habitat of significance to aquatic/riparian flora or fauna. There are two moderately sized farm dams in the subject land, both of which held a small amount water at the time of survey. The dams do not support any fringing vegetation and are only likely to be of limited value to the common native water birds, reptiles, and amphibians which occur in the locality.	Figure 4 Figure 6
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	Before European occupation, the whole of the subject land and surrounding properties would have been characterised by grassland PCTs. The subject land has been substantially modified by its current and past land use, which has primarily been grazing and cropping. Approximately	Figure 5 Figure 6

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

Landscape Feature	Description	Figure Reference
	92% of the subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. More recently, all of the small rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. As a result, the vast majority of the subject land has a disturbed soil profile and a groundstorey dominated by exotic perennial and annual pasture species. There are three windrows comprised largely of planted exotic trees (e.g. Elm and Pine). At the time of survey, the whole of the subject land was grazed by stock. The riparian vegetation in the subject land is largely charactered by exotic pasture grasses and the only woody riparian vegetation is restricted to a few small patches of Willow and Elm. The lack of reliable water flows, standing pools, and native riparian vegetation indicates that O'Briens Creek and its tributaries are unlikely to provide habitat of significance to aquatic/riparian flora or fauna or be otherwise important for habitat connectivity. The subject land is bordered to the north by Yass Valley Way, to the east and west by large lot residential properties, and to the south by agricultural land. The vegetation in the surrounding properties is similar to that present in the subject land (i.e. substantially modified and largely dominated by exotic species). In light of the above, while the native and exotic pasture in the subject land is likely to be of some limited habitat value to a variety of native birds, reptiles, and herbivorous mammals, the subject land is very unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature.	
Areas of geological significance and soil hazard	The subject land does not contain/support any karst, caves, crevices, cliffs or other areas/features of geological significance. There are no hazard soil features.	-
Areas of outstanding biodiversity value	The subject land does not support or occur near any declared area of outstanding biodiversity value (AOBV).	-
Percent native vegetation cover (buffer area)	A 1,500 m buffer was applied to the subject land resulting in an overall buffer area of 1,861 ha. This buffer area contains only grassland PCTs. Accordingly, the following category of native vegetation was defined to identify the total area of native vegetation in the buffer. 1. Non-woody vegetation – the areas which have a grassland PCT and retain at least a substantial proportionate cover (i.e. > 35%) of native groundstorey species. Native vegetation cover was first identified and mapped via interpretation of the available aerial imagery (Google Satellite, NSW LPI). The presence of 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 involved driving the publicly accessible roads within the buffer area and making observations across paddocks etc. from the roadside. As shown in Figure 5, 165 ha (9%) of the buffer area was determined to support native non-woody vegetation cover. This falls into the 0-10% cover class in the BAM Calculator.	Figure 5

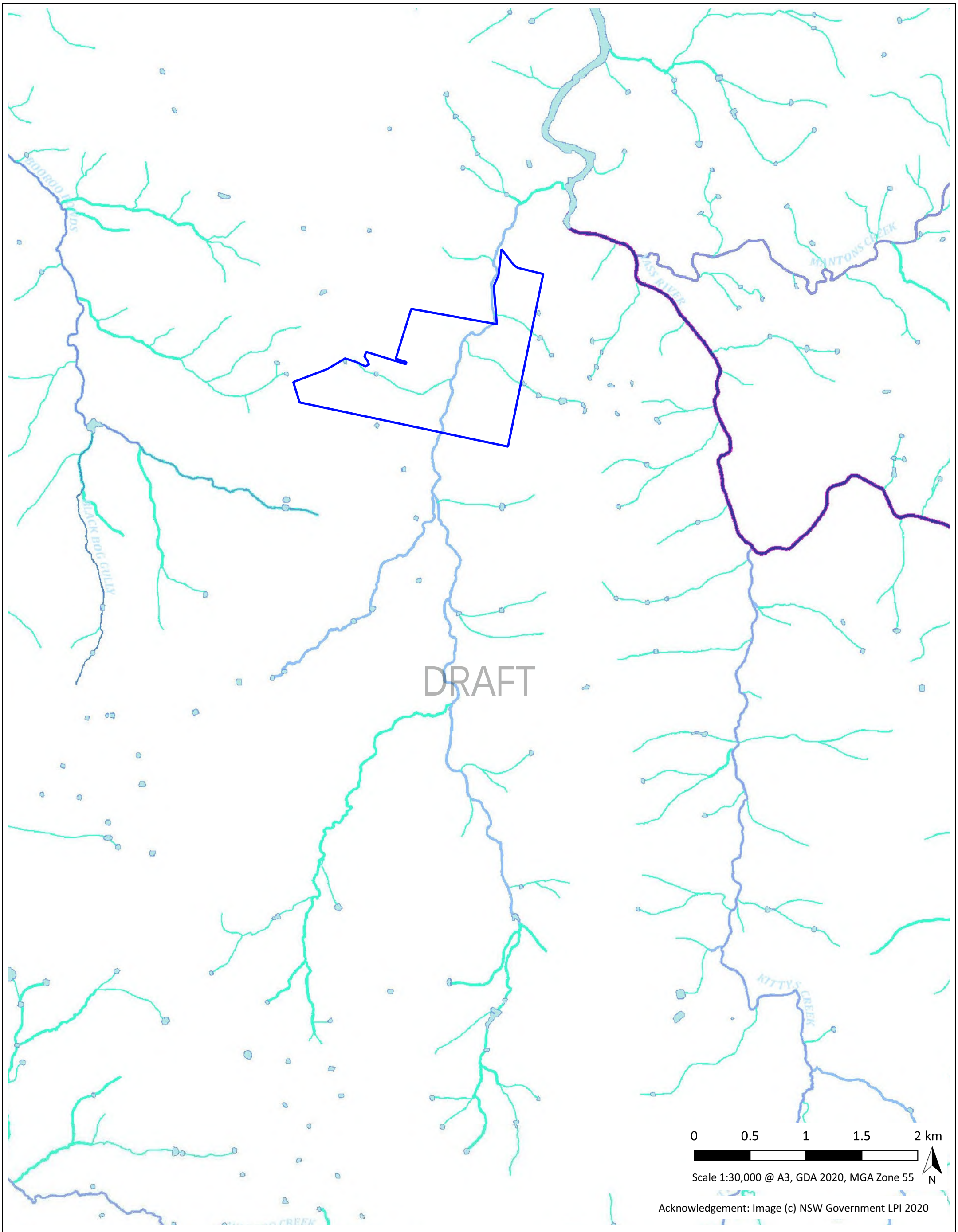


Figure 4. Hydrology

Legend

Subject Land

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Drawn by: S. Reid
Date: 13 July 2020

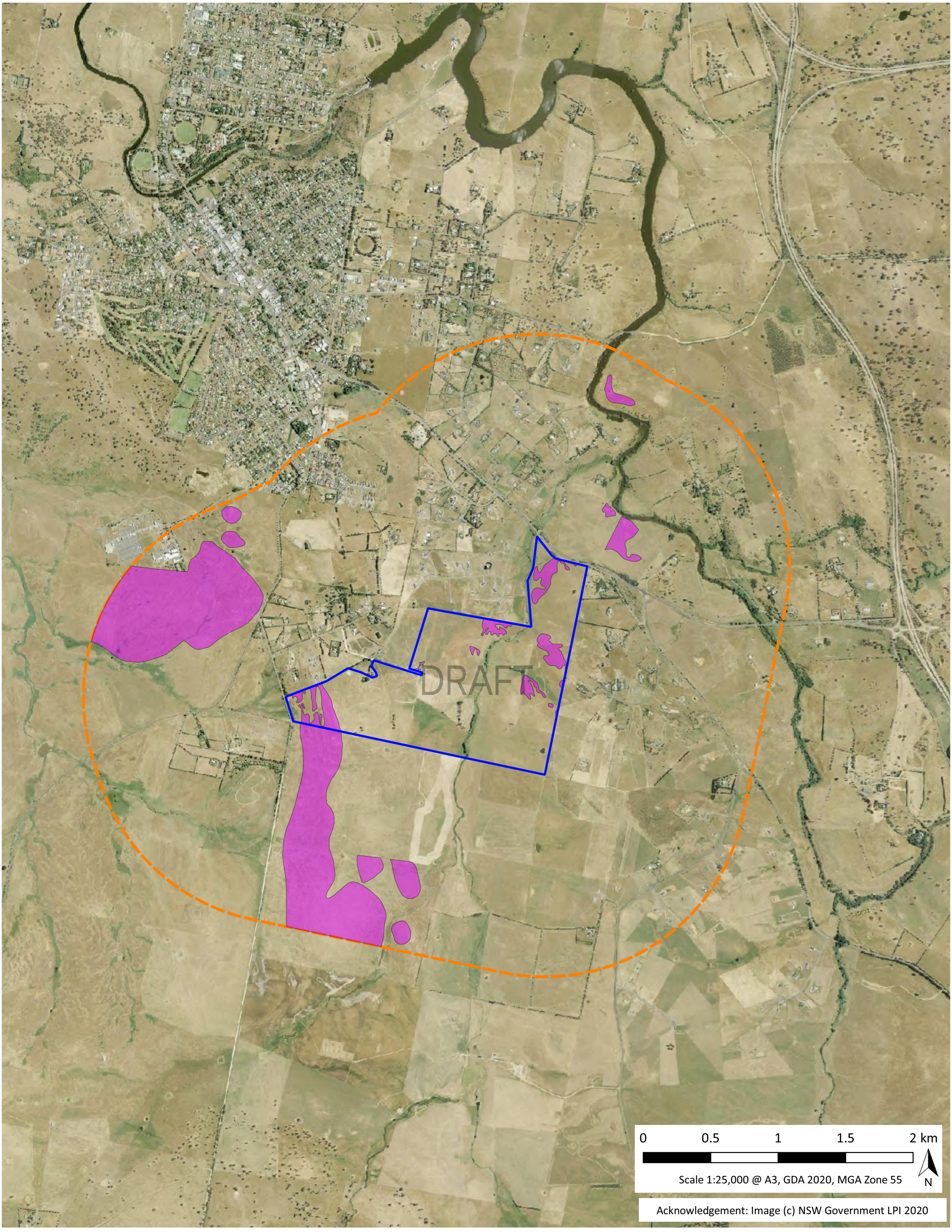

Figure 5. Site Map

Legend

- Subject Land
- 1500m Buffer to Subject Land
- 1500m Buffer - Non-woody Native Vegetation

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Drawn by: S. Reid
Date: 13 July 2020

capital ecology

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

2.2.1 Native vegetation extent

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

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

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

The Commonwealth Government[12,13], ACT Government[14], and previous NSW Government[15] assessment guidelines for the temperate grassland and woodland PCTs of the NSW/ACT Southern Tablelands region each declare vegetation as native dominant if 50% or more of the perennial groundlayer is comprised of native species. However, no such threshold is defined by the BAM, and advice from 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 BDAR (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.

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

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 subject land 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 DPIE 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 2.2.2.3) were also used to assess the subject land for the presence/ absence of habitat constraints and/or microhabitats for ecosystem credits species (Section 2.3.3) 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	23/10/2019	1 person	6 hours
Vegetation assessment	BAM plot	7/11/2019	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 subject land were mapped by marking boundaries directly onto high resolution orthorectified aerial photograph field maps. The PCTs and their characteristics are provided in the NSW Vegetation Information System (VIS) https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm.

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

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

2.2.2.2 Vegetation zone definition and mapping

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

2.2.2.3 Survey Plots/Transects

A series of a BAM plots (i.e. vegetation assessment survey plot/transect sets) were completed to adequately sample each vegetation zone. As illustrated in Diagram 8 from NSW Government (2018[16]), each BAM Plot involved:

a. one 20 x 20 m (400 m^2) plot, used to assess the composition and structure attributes;

b. one 20 x 50 m plot (1,000 m^2) plot, used to assess the function attributes; and

c. five 1 m^2 sub-plots, used to assess average little cover (and other optional groundcover components) for the plot.

All BAM plot locations were selected randomly within the vegetation zone, by marking on a map and walking to the location. BAM plot locations were spread throughout the entire subject land (refer to Figure 6). The information collected during this process was subsequently used to determine the condition of the vegetation present in the subject land.

The number of BAM plots completed in each vegetation zone of the subject land was determined as per the minimum required plot numbers specified in Table 4 of the BAM. As shown in Figure 6, a total of nine plots were completed across two 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.*

As described in Section 2.3.4, exotic dominant areas (i.e. PCT1289 Zone 2, Figure 6) were found to support the threatened Striped Legless Lizard. Accordingly, plots were completed in zones which did not meet the definition of BC Act 'native vegetation'. Surveying all zones also ensured that the vegetation composition (including an accurate determination of BC Act native vegetation presence/absence) and potential threatened species habitat were accurately assessed across all of the vegetation condition types present in the subject land.

It is important to highlight that only those zones which occur in the subject land and 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).

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

2.2.3 BAM targeted survey methods

A number of threatened flora and fauna species were identified by the BAM as potentially occurring in the subject land (referred to as 'species credit species', see Section 2.3.4). The majority of these species were excluded from further consideration based on factors such as habitat constraints, degraded habitat, geographical limitations, or the absence of required microhabitat features (refer to Table 13). Survey dates and survey effort for the remaining species credit species considered to have the potential to occur in the subject land are detailed in Table 3. Weather conditions for survey dates are detailed in Table 4. The survey effort for this assessment totalled 60-person hours.

Table 3. Flora and fauna survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
Striped Legless Lizard tile survey	10-week tile survey program	19/09/2019 26/09/2019 2/10/2019 8/10/2019 16/10/2019 21/10/2019 29/10/2019 7/11/2019 12/11/2019 18/11/2019	2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people	3.0 hours 2.3 hours 3.3 hours 2.7 hours 2.7 hours 2.3 hours 3.0 hours 2.3 hours 2.7 hours 2.5 hours
Golden Sun Moth survey	Random meander through likely habitat	31/10/2019 12/11/2019 18/11/2019 29/11/2019	1 person 2 people 2 people 1 person	2.3 hours 2.3 hours 4.0 hours 1.7 hours
Threatened bird and flora survey	Opportunistic observations	26/09/2019 2/10/2019 7/11/2019	2 people 1 person 2 people	2.3 hours 0.5 hours 6.0 hours

Table 4. Survey weather conditions (Weather Station 073007, Burrinjuck Dam, New South Wales).

Date	Temperature Min-Max	Wind @ 9pm	Cloud (8th)	Rain
4/09/2019	2.8 – 22.1°C	Calm	0	0 mm
19/09/2019	11.3 – 21.8°C	Calm	8	0 mm
26/09/2019	4.7 – 20.2°C	Calm	1	0 mm
2/10/2019	5.7 – 25.2°C	Calm	0	0 mm
8/10/2019	11.0 – 18.0°C	7 km/h	3	0 mm
16/10/2019	11.3 – 25.0°C	Calm	2	0 mm
21/10/2019	7.4 – 26.0°C	Calm	0	0 mm
23/10/2019	10.0 – 29.0°C	7 km/h	0	0 mm
29/10/2019	7.7 – 27.9°C	Calm	0	0 mm
31/10/2019	10.9 – 33.5°C	Calm	0	0 mm
7/11/2019	12.6 – 19.9°C	15 km/h	4	0 mm
12/11/2019	8.3 – 26.2°C	4 km/h	2	0 mm
18/11/2019	9.6 – 26.4°C	Calm	3	0 mm
29/11/2019	14.2 – 34.8°C	Calm	1	0 mm

2.2.3.1 Striped Legless Lizard survey

The NSW Government has not developed survey guidelines for the Striped Legless Lizard. As such, a program of roof tile surveys was undertaken in accordance with both the Commonwealth Government survey guidelines (Commonwealth of Australia 2011[17]) and the ACT Government survey guidelines (ACT Government 2015[18]).

As per the ACT Government survey guidelines, tiles were placed in grids of 50 (10 rows of 5) with 5 m spacing. The guidelines state that sites with greater than 30 ha of potential habitat require 10 grids for the survey program. As the subject land contains greater than 30 ha of potential habitat, ten grids were required. Therefore, 500 tiles were placed for the survey. The location of each grid was chosen to spatially separate the grids as much as practicable to obtain an adequate coverage of the study area whilst still ensuring grids were placed in locations with appropriate Striped Legless Lizard habitat characteristics. Where possible, grids were therefore placed in open grassland with a well-defined grass tussock structure. The location of each corner of the grid was marked with a GPS (accurate +/- 3m) and each tile was assigned a unique number (refer to Figure 9).

Following a two week 'settling in' period, each tile was checked once per week for 10 weeks. Surveys commenced on 19 September 2019 and were completed on 18 November 2019. All tiles were checked between 0730 hrs and 1130 hrs, with the exact timing of each check chosen to reflect the weather conditions. In this regard, checks were timed to occur when the tiles were warm to the touch, but not hot. Start time, finish time, and weather conditions were recorded for each check.

Each captured Striped Legless Lizard had the following data recorded.

- Location (tile number).
- Snout-to-vent (SVL) length (mm).
- Total length (mm).
- Tail condition (Full/Regrowth).
- Other relevant biometrics (markings, colour, age, etc.).
- A macro photograph of the dorsal head scales. This photo was taken as the dorsal head scales of Striped Legless Lizard are unique to each individual and can therefore be used to determine the number of unique captures across the 10-week survey period.

Once processed, the Striped Legless Lizard was released beside the tile of capture, allowing it to move back beneath the tile or to a tussock adjacent to the tile. All other vertebrate fauna found under the tiles were visually identified to species level.

2.2.3.2 Golden Sun Moth survey

The NSW Government has not developed survey guidelines for the Golden Sun Moth. As such, a program of four targeted Golden Sun Moth surveys was undertaken in accordance with the

[17] Commonwealth of Australia (2011). *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable striped legless lizard, Delma impar – EPBC Act policy statement 3.28.*
[18] ACT Government (2015). *Survey Guidelines for Striped Legless Lizard*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

Commonwealth Government survey guidelines (Commonwealth of Australia 2009a[19]) and the ACT Government survey guidelines (ACT Government 2014[20]).

Each survey involved one to two ecologists walking transects approximately 50-100 m apart across the estimated extent of potential habitat (refer to Figure 10). All male Golden Sun Moth flights observed (usually up to 20 m ahead or to either side of the ecologist) were marked via a hand-held GPS.

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

The details of the four survey days and relevant survey conditions are provided in 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 Moth were confirmed to be flying.

A GPS track was recorded for each survey; these are illustrated in Figure 10. As shown on Figure 10, effort was made to vary the alignment of the transects between surveys in order to achieve the best possible coverage of the subject land. Whilst the surveys are primarily focused on recording male Golden Sun Moth flights, the ecologists also examined the ground for female moths and pupal cases, particularly in the areas considered to have the highest potential for Golden Sun Moth occurrence.

Based on observations from the subject land and additional Golden Sun Moth survey sites throughout the ACT and NSW, it is important to note that the 2019 GSM flying season was unusual in comparison to previous years in that it started early (from late October), was short (ending by approximately the first week of December), and included large numbers of moths flying during non-ideal conditions (e.g. during windy days). This unusual season was likely due to the dry winter and early spring followed by dry and hot conditions prior to and throughout the flying season. In addition, Capital Ecology found that Golden Sun Moths were widely observed at moderate to high densities across most of our project sites in 2019, including sites in Murrumbateman, Sutton, and various locations across the ACT.

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

[20] ACT Government (2014). *Survey Guidelines for Golden Sun Moth*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

Table 5. Golden Sun Moth survey conditions.

Date: 31/10/2019 (Survey 1)				**Observer/s:** SR
Survey Site: Iceton Pl, Yass				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1110	26.0	7 WNW	1/8	Warm and relatively still
Finish: 1330	29.9	17 NW	1/8	
General site notes:				
Ideal conditions. Approx. 300 Golden Sun Moths recorded. Only recorded in native areas that also have *Austrostipa* spp. - possible indication of the degree of historic groundstorey disturbance. Golden Sun Moths confirmed flying near Sutton (NSW) and in high numbers at multiple locations in the ACT (via ACT Golden Sun Moth email forum).				
Date: 12/11/2019 (Survey 2)				**Observer/s:** ST, KL
Survey Site: Iceton Pl, Yass				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 0935	20.0	56 NW	7/8	Windy conditions
Finish: 1045	20.7	50 NW	8/8	
General site notes:				
Male Golden Sun Moths recorded both flushed and spontaneously flying, some females recorded. Golden Sun Moths confirmed flying near Sutton (NSW) and in high numbers at multiple locations in the ACT (via ACT Golden Sun Moth email forum).				
Date: 22/11/2019 (Survey 3)				**Observer/s:** ST, JM
Survey Site: Iceton Pl, Yass				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1010	15.2	35 WNW	2/8	Wind increasing with strong gusts
Finish: 1210	18.2	37 WNW	1/8	
General site notes:				
Some male Golden Sun Moths recorded spontaneously flying in low numbers. Golden Sun Moths confirmed flying near Gungahlin (ACT) and in moderate numbers at multiple locations in the ACT (via ACT Golden Sun Moth email forum).				
Date: 29/11/2019 (Survey 4)				**Observer/s:** SR
Survey Site: Iceton Pl, Yass				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1000	24	9 WSW	1/8	Very dry conditions
Finish: 1140	29.3	15 N	1/8	
General site notes:				
Very few Golden Sun Moth observed. Golden Sun Moth observed flying at Yarralumla Brickworks (ACT), near Queanbeyan Nature Reserve (NSW), and in low to moderate numbers at multiple locations in the ACT (via ACT Golden Sun Moth email forum).				

2.2.3.3 Threatened bird and flora survey

Based on the location of the subject land, the type of ecological community it supports (i.e. grassland), and condition of the vegetation (i.e. substantially modified, largely exotic, and heavily grazed), the subject land was assessed as lacking the potential to support EPBC Act and/or BC Act listed threatened bird species and threatened flora species. As such, targeted surveys were not required by the BAM.

Notwithstanding this, opportunistic observations of bird and flora species in the subject land were taken throughout the variety of field surveys associated with this BDAR. An inventory of all species identified in the study area was commenced during the preliminary field inspection (4 September 2019) and supplemented across all of the subsequent surveys undertaken until the final field survey (29 November 2019). These inventories are presented in Appendix B (flora) and Appendix C (fauna). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged.

2.2.4 Vegetation survey and mapping results

2.2.4.1 Plant Community Type (PCT) mapping

Before European occupation, the whole of the subject land would have been characterised by one or more grassland PCTs (e.g. moist/wet tussock grassland in low-lying areas and along water courses, dry tussock grassland on slopes, ridges, and hilltops). However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing and cropping. Approximately 92% of the subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. More recently, all of the small rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. As a result, the vast majority of the subject land has a disturbed soil profile and a groundstorey dominated by exotic perennial and annual pasture species.

This high degree of modification makes accurate identification of the various grassland PCTs impossible. As such, the PCT which occurs in the subject land has been determined as follows.

- Scattered patches of native dominant pasture occur in the subject land. While modified, these areas have not been disturbed to the same degree as the majority of the vegetation in the subject land. As such, these areas were assessed to determine the PCTs that occur in the subject land.
- The scattered patches of native pasture were largely restricted to midslopes and hilltops. Low-lying areas were entirely dominated by exotic pasture species.
- The dominant grass species varied between the scattered patches of native pasture, and were limited to Tall Speargrass *Austrostipa bigeniculata*, Rough Speargrass *A. scabra*, and Wallaby Grasses *Rhytidosperma* spp. (Appendix B).
- Only two other disturbance tolerant native species were recorded in the subject land, being Common Wheat Grass *Elymus scaber* and Swamp Dock *Rumex brownii*.

The NSW Vegetation Information System PCT data power query excel spreadsheet was interrogated using the following filters:

- IBRA – contains ‘South Eastern Highlands’;

- IBRA Subregion – contains 'Murrumbateman';
- Vegetation Formation – 'Grasslands'; and
- Vegetation Class – 'Temperate Montane Grassland'.

This process resulted in 13 candidate PCTs. Six of those PCTs (894, 895, 1185, 1187, 1202, and 1289) listed two or more of the dominant grass species that occur in the scattered patches of native pasture. PCT1185 and 1187 were ruled out based on the description of landscape position. Of the remaining PCTs (894, 895, 1202, and 1289), PCT1289 was chosen as the most appropriate PCT as it best fits the landscape position description.

In light of the above and as shown in Table 6 and Figure 6, it is concluded that the subject land supports a single PCT (PCT1289).

Table 6. PCTs recorded in the subject land.

PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
1289	Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	This community is characterised by mid-dense tall tussock grassland. It occurs in dry locations, though not in the dry rain shadow of the Monaro. It is widespread in the Southern Tablelands (Canberra, Yass, Boorowa, Crookwell, Goulburn, Braidwood, and Bungendore districts) and occurs mainly on well-drained footslopes and midslopes on all lithologies.	This PCT was mapped across the entire subject land.	Not listed	57%

As mentioned previously, approximately 92% of the subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. As a result, the vast majority of the subject land has a disturbed soil profile and a groundstorey dominated by exotic perennial and annual pasture species. Scattered patches of native dominant pasture do occur in the subject land. While modified, these areas have not been disturbed to the same degree as the majority of the vegetation in the subject land.

There are no naturally occurring trees in the subject land. However, there are three windrows comprised of planted exotic trees (e.g. Elm and Pine). None of the planted trees in the subject land were observed to support functional hollows or large stick nests.

The riparian vegetation in the subject land is largely characterised by exotic pasture grasses. The only woody riparian vegetation is restricted to a few small patches of Willow and Elm. The lack of native riparian vegetation indicates that O'Briens Creek and its tributaries are unlikely to be important for habitat connectivity. At the time of survey, the whole of the subject land was grazed by stock.

2.2.4.2 Vegetation zones

As detailed in Table 7, Table 8, and shown in Figure 7, PCT1289 was determined to comprise the following two discernible vegetation zones.

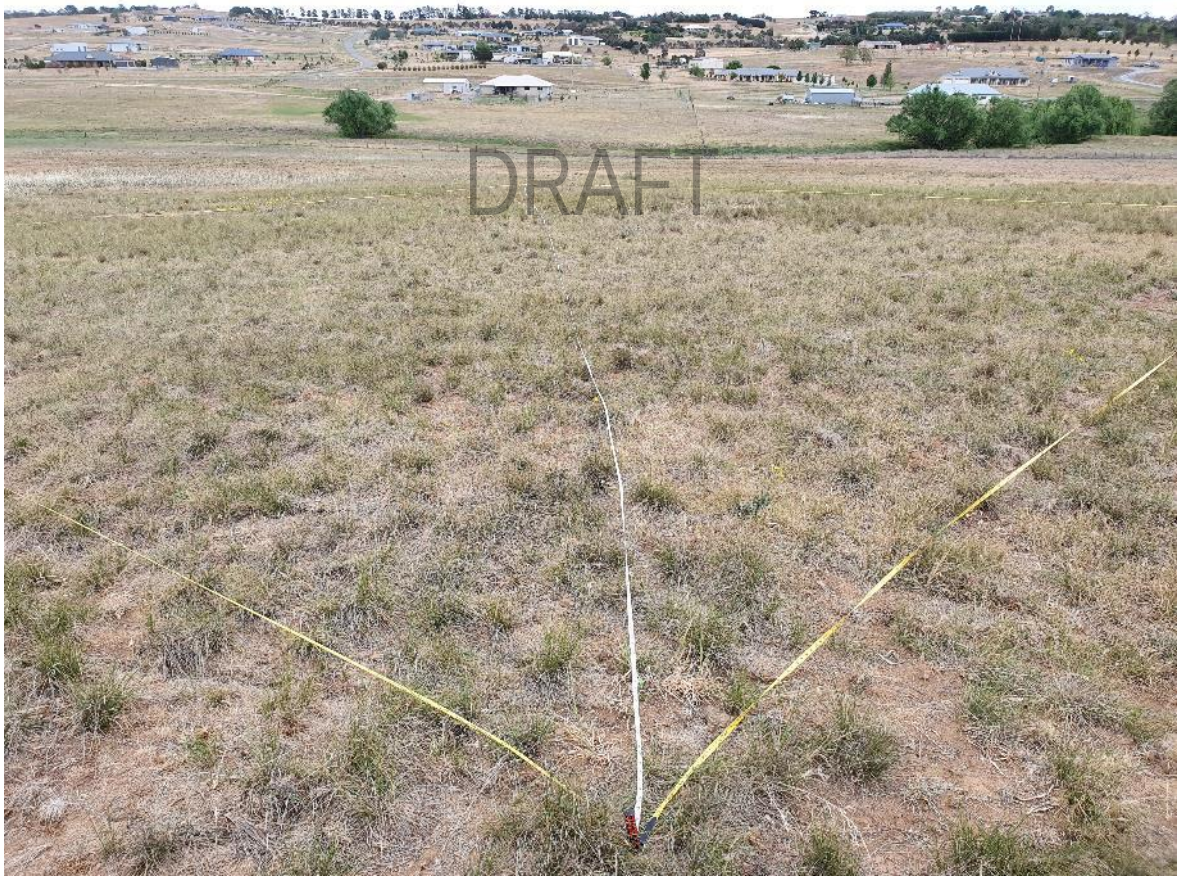
- PCT1289 Zone 1 – native dominant pasture with low native forb diversity.
- PCT1289 Zone 2 – exotic dominant pasture with low native forb diversity.

Only PCT1289 Zone 1 meets the definition of BC Act 'native vegetation'. PCT1289 Zone 2 does not meet the definition of BC Act 'native vegetation' as it has a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and does not contain a cover of native trees and/or shrubs. As per Chapter 5 of the BAM, PCT1289 Zone 2 does not require assessment to determine a vegetation integrity score unless it is determined to be threatened species habitat. As detailed in Table 13 and Section 2.3.4.2, portions of PCT1289 Zone 2 are identified as habitat for the threatened Striped Legless Lizard.

As such, both PCT1289 Zone 1 and PCT1289 Zone 2 are assessed to determine vegetation integrity scores and the impact associated with the proposed development.

Table 7. PCT1289 Zone 1 results summary.

	PCT1289 Zone 1
Description	Native pasture – low diversity Scattered patches of low diversity native pasture dominated by Tall Speargrass, Rough Speargrass, and/or Wallaby Grasses. This zone is restricted to midslopes and hilltops.
Area – subject land	14.72 ha.
Area – impact	5.59 ha
Perennial Groundlayer	79% - 91% native.
Native Species Richness	2 - 4 total native species, 0 - 1 native non-grass species, 0 indicator species (as per Rehwinkel 2015[21]).
Exotic Species Richness	4 - 7 total exotic species.
Significant Weeds	Paterson's Curse *Echium plantagineum*.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.



[21] Rehwinkel (2015). *A Revised Floristic Value Scoring Method to assess grassland condition, an addendum to Friends of Grasslands Forum Proceedings* (30 October – 1 November 2014).

Table 8. PCT1289 Zone 2 results summary.

	PCT1289 Zone 2
Description	Exotic pasture – low diversity Highly modified exotic pasture. Low-lying areas along the creek and tributaries are largely dominated by Phalaris. The remainder is dominated by common annual and perennial grass species (such as Barley Grass *Hordeum* sp., Brome *Bromus* spp., and Perennial Ryegrass *Lolium perenne*), and exotic forbs (such as Clover *Trifolium* spp.).
Area – subject land	158.61 ha.
Area – impact	134.52 ha
Perennial Groundlayer	< 1% native.
Native Species Richness	0 - 2 total native species, 0 - 1 native non-grass species, 0 indicator species (as per Rehwinkel 2015).
Exotic Species Richness	3 - 9 total exotic species.
Significant Weeds	Saffron Thistle *Carthamus lanatus*, Spear Thistle *Cirsium vulgare*, and Scotch Thistle *Onopordum acanthium*.
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 ≤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, only PCT1289 Zone 1 meets the definition of 'intact vegetation'. As shown in Figure 5, the intact native vegetation associated with PCT1289 Zone 1 extends to the south of the subject land for > 100 ha.

PCT1289 Zone 2 does not meet the definition of 'intact vegetation' as it is highly disturbed and lacks a native groundstorey.

2.2.4.4 Vegetation integrity scores

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 impacts associated with the proposed development (refer to Figure 7). 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, Table 8, and shown in Figure 7, only PCT1289 Zone 1 meets the definition of BC Act 'native vegetation'. PCT1289 Zone 2 does not meet the definition of BC Act 'native vegetation' as it has a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and does not contain a sufficient cover of native trees and/or shrubs. However, as detailed in Table 13 and Section 2.3.4.2, portions of PCT1289 Zone 2 are identified as habitat for the threatened Striped Legless Lizard. As such, both PCT1289 Zone 1 and PCT1289 Zone 2 are assessed to determine vegetation integrity scores and the impact associated with the proposed development.

Table 9 presents the results of the BAM plot assessments and details the composition, structure, function, and resulting vegetation integrity score for PCT1289 Zone 1 and PCT1289 Zone 2.

Table 9. Vegetation integrity scores.

	PCT1289 Zone 1	PCT1289 Zone 2
PCT	1289	1289
Zone (condition class)	1	2
Description	- Native groundstorey - low diversity	- Exotic groundstorey - Low diversity
Patch size (ha)	> 100	0
Area in the subject land	14.72 ha	158.61 ha
Area impacted	5.59 ha	134.52 ha
BAM plots assessed in the subject land	3	6
Composition condition score	9.8	0.2
Structure condition score	68.4	0
Function condition score	N/A – grassland PCT	N/A – grassland PCT
Current vegetation integrity score	**25.9**	**0**

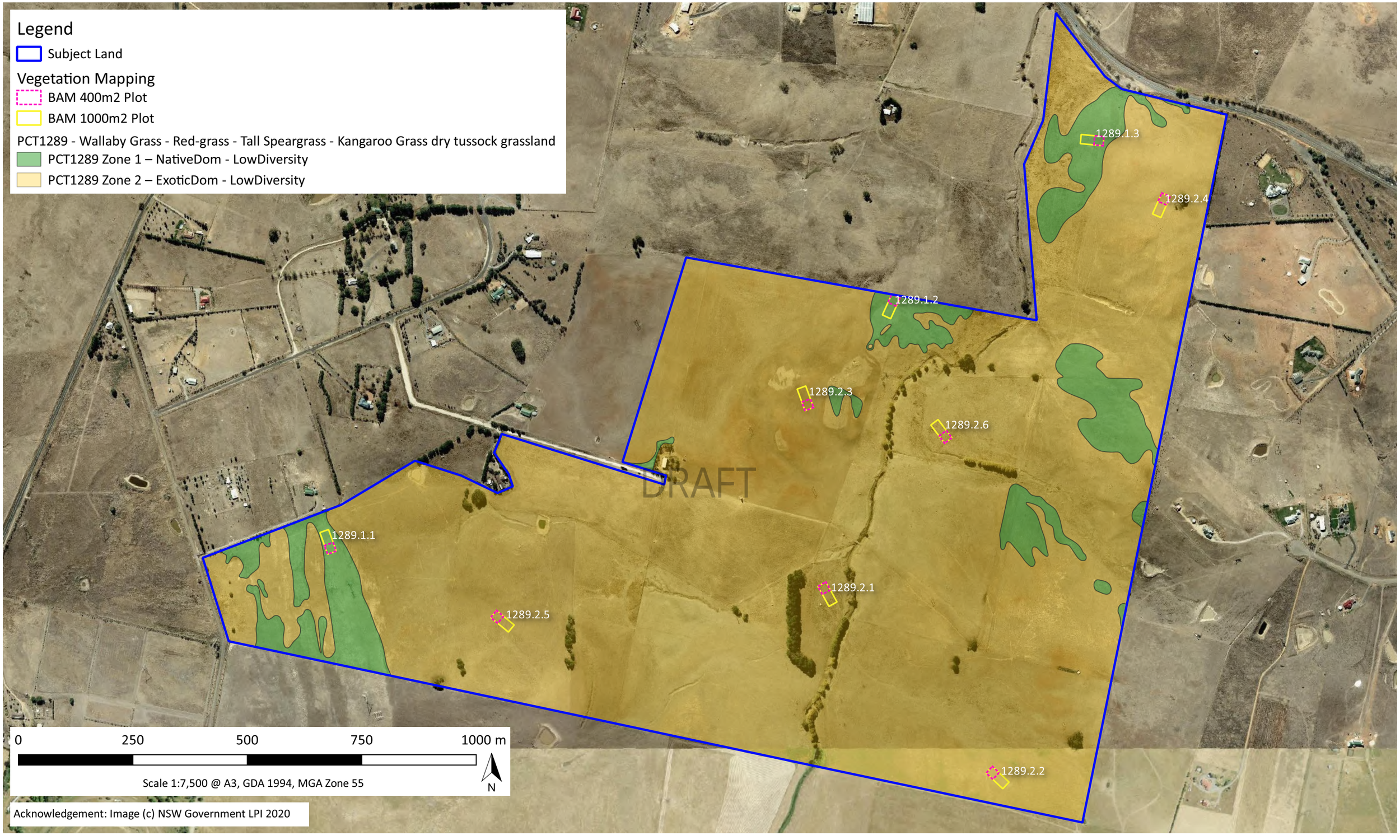


Figure 6. BAM Vegetation Mapping and Survey

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Date: 13 July 2020

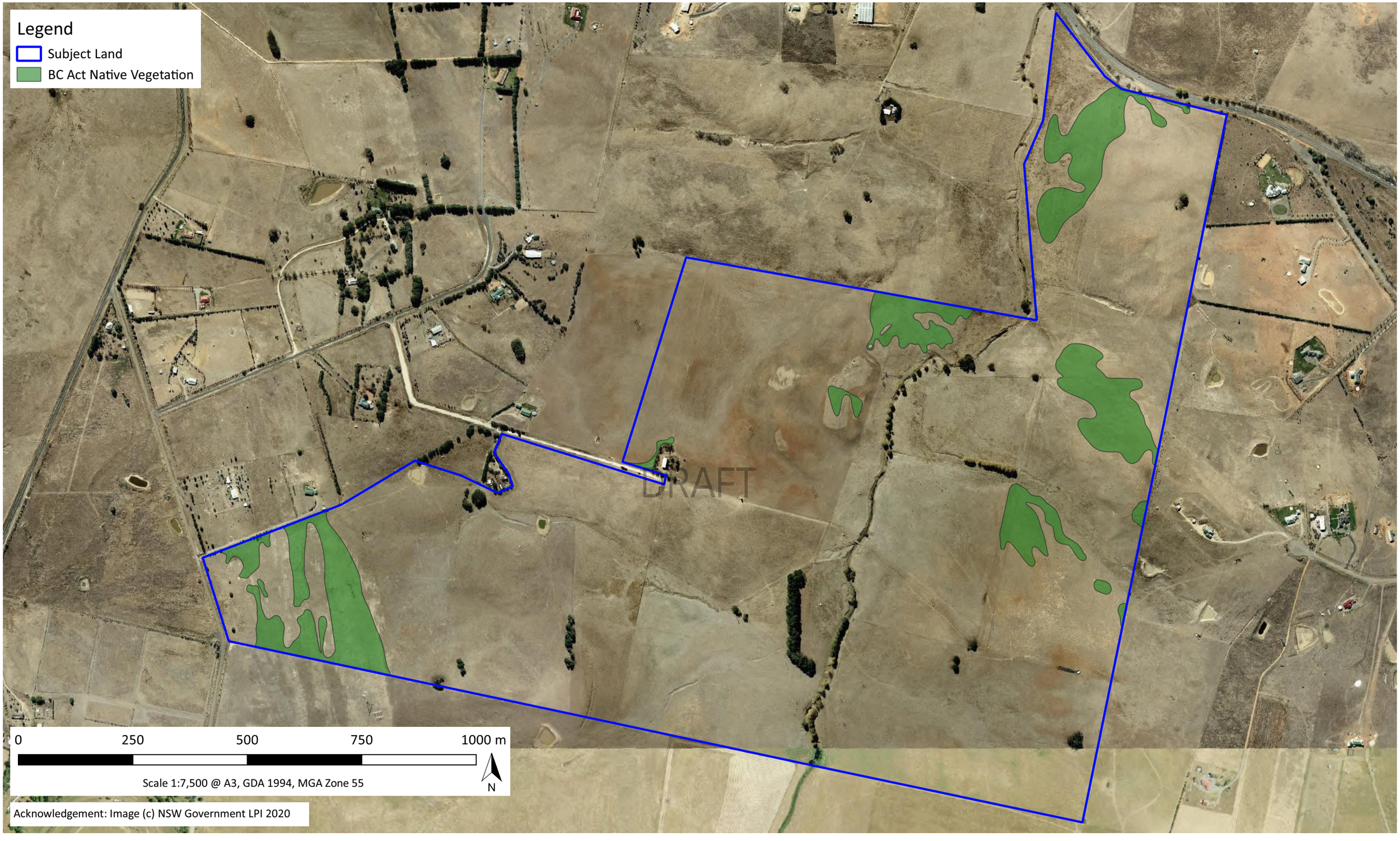

Figure 7. BC Act Native Vegetation

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Date: 13 July 2020

2.2.5 Threatened Ecological Communities

2.2.5.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

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' (EPBC Act Box-Gum Woodland). Based on the recorded vegetation types, plant species, landscape position, and the vegetation on adjoining and nearby properties, only Natural Temperate Grassland is considered to have the potential to occur in the subject land.

Natural Temperate Grassland of the South Eastern Highlands – listed as critically endangered pursuant to the EPBC Act

Description – As detailed in Commonwealth of Australia (2016[22]), the Natural Temperate Grassland threatened ecological community is characterised by grassy vegetation dominated by moderately tall (25–50cm) to tall (50–100cm), dense to open tussock grasses in the genera *Austrodanthonia* (note: now *Rytidosperma*), *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*. Up to 70% of all plant species may be forbs. The community may be treeless or contain up to 10% cover of trees, shrubs or sedges.

The *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community* (Commonwealth of Australia 2016) provides the key diagnostic characteristics and condition thresholds for determining whether a patch is the listed community. A patch is the listed community, assessed via a standard sampling plot of 400 m^2 (i.e. 20x20 m), if it meets either of the following scenarios.

Scenario A – The patch is characterised by at least 50 % foliage cover of the ground of either Themeda triandra, Poa labillardierei, or Carex bichenoviana.

Scenario B – When the cover of the grassland is not evidently dominated by the species highlighted under Scenario A:

1. *The percentage cover of native vascular plants (including annual and perennial species) in the patch is greater than the percentage cover of perennial exotic species.*

   And

2. *When assessed during favourable sampling times (i.e. spring-summer), the patch has:*
   - *At least 8 non-grass native species*

     OR
   - *At least 2 indicator species*

     OR
   - *A floristic value score (FVS) of at least 5.*

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

Presence in the subject land – Absent – While the subject land would have historically supported this TEC, as described below the vegetation has been modified and degraded to the extent that it no longer occurs.

- Neither PCT1289 Zone 1 or PCT1289 Zone 2 support at least 50 % foliage cover of the ground of either *Themeda triandra, Poa labillardierei*, or *Carex bichenoviana*.
- PCT1289 Zone 1 is highly modified native pasture. While native dominant, PCT1289 Zone 1 currently supports a low diversity of disturbance tolerant native species. One native non-grass species was recorded, no indicator species were recorded, and the FVS is < 5.
- PCT1289 Zone 2 is highly modified exotic pasture. Low-lying areas along the creek and tributaries are largely dominated by Phalaris. The remainder is dominated by common annual grass pasture species (such as Barley Grass, Brome, and Perennial Ryegrass), and exotic forbs (such as Clover).

As such, the subject land does not support Natural Temperate Grassland of the South Eastern Highlands.

In light of the above, the subject land does not support any of the EPBC Act listed threatened ecological communities with the potential to occur in the locality.

2.2.5.2 Biodiversity Conservation Act 2016 (NSW)

Three 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); 'Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion'; and 'Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions'.

Based on the recorded vegetation types, plant species, landscape position, and the vegetation on adjoining and nearby properties, none of the BC Act listed ecological communities are considered to have the potential to occur in the subject land.

In light of the above, the subject land does not support any of the BC Act listed threatened ecological communities with the potential to occur in the locality.

2.2.6 High threat weeds

Table 10 lists the three high threat weeds that occur in the subject land.

Table 10. High threat weeds.

Species Name	Common Name	Status
Tree		
Pinus sp.	Pine	-
Salix sp.	Willow	WoNS, AP, LM
Forb		
Carthamus lanatus	Saffron Thistle	-

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

2.3 Habitat Suitability for Threatened Species

2.3.1 Fauna habitat

The habitat features in the subject land were identified during the field surveys and assessed regarding their potential value to native fauna species, both threatened and common. The fauna habitat features of the subject land are described in Table 11. It is important to note that the information presented in Table 11 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).

Table 11. Fauna habitat features.

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Native pasture	Approximately 8% of the subject land supports low diversity native pasture (i.e. PCT1289 Zone 1) dominated by Tall Speargrass, Rough Speargrass, and/or Wallaby Grasses.	As detailed in Section 2.3.4.2, portions of PCT1289 Zone 1 support the threatened Golden Sun Moth. The native dominant pasture would provide a limited grazing resource for common birds, reptiles, and herbivorous mammals. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Exotic pasture	Approximately 92% of the subject land supports a highly modified pasture dominated by exotic grasses and forbs. The low-lying areas along the creek and tributaries are largely dominated by Phalaris. The remainder is dominated by common exotic annual and perennial pasture species.	The groundstorey along O'Briens Creek and one of its tributaries is characterised by high herbage mass and a defined tussock structure. As detailed in Section 2.3.4.2, these portions of PCT1289 Zone 2 support habitat for the threatened Striped Legless Lizard. The exotic dominant pasture would provide a foraging resource of limited value for common birds, reptiles, and herbivores. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Creeks, streams, dams	O'Briens Creek passes through the centre of the subject land and joins the Yass River 500 m to the north of the subject land. Three tributaries, which either originate in or to the west of the subject land, join O'Briens Creek. At the time of survey, O'Briens Creek and its tributaries were dry and are only likely to convey water following substantial rain events. The riparian vegetation in the subject land is largely charactered by exotic pasture grasses, especially Phalaris. The only woody riparian vegetation is restricted to a few small patches of Willow and Elm. There are two moderately sized farm dams in the subject land, both of which held a small amount water at the time of survey.	The lack of reliable water flows, standing pools, and native riparian vegetation indicates that O'Briens Creek and its tributaries are unlikely to provide habitat of significance to aquatic/riparian flora or fauna. The two moderately sized farm dams do not support any fringing vegetation and are only likely to be of limited value to the common native water birds, reptiles, and amphibians which occur in the locality.

2.3.2 Threatened Biodiversity Data

2.3.2.1 Definitions of conservation significance

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

- National – Listed as threatened (critically endangered, endangered, vulnerable or conservation dependent) pursuant to the EPBC Act; and
- State (NSW) – Listed as threatened (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), the BAM Calculator, listing determinations, and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. This information is used to assess the presence/absence of habitat constraints and/or microhabitats for species flagged by the BAM as ecosystem credits species (Section 2.3.3) and species credit species (species credit species).

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

- a list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the subject land obtained using the Department of the Environment's online EPBC Act Protected Matters Search Tool (PMST) on 9 July 2019 and updated on 21 April 2021; and
- ecological point data from the NSW Wildlife Atlas (BioNet), downloaded on 11 September 2019 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 8).

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

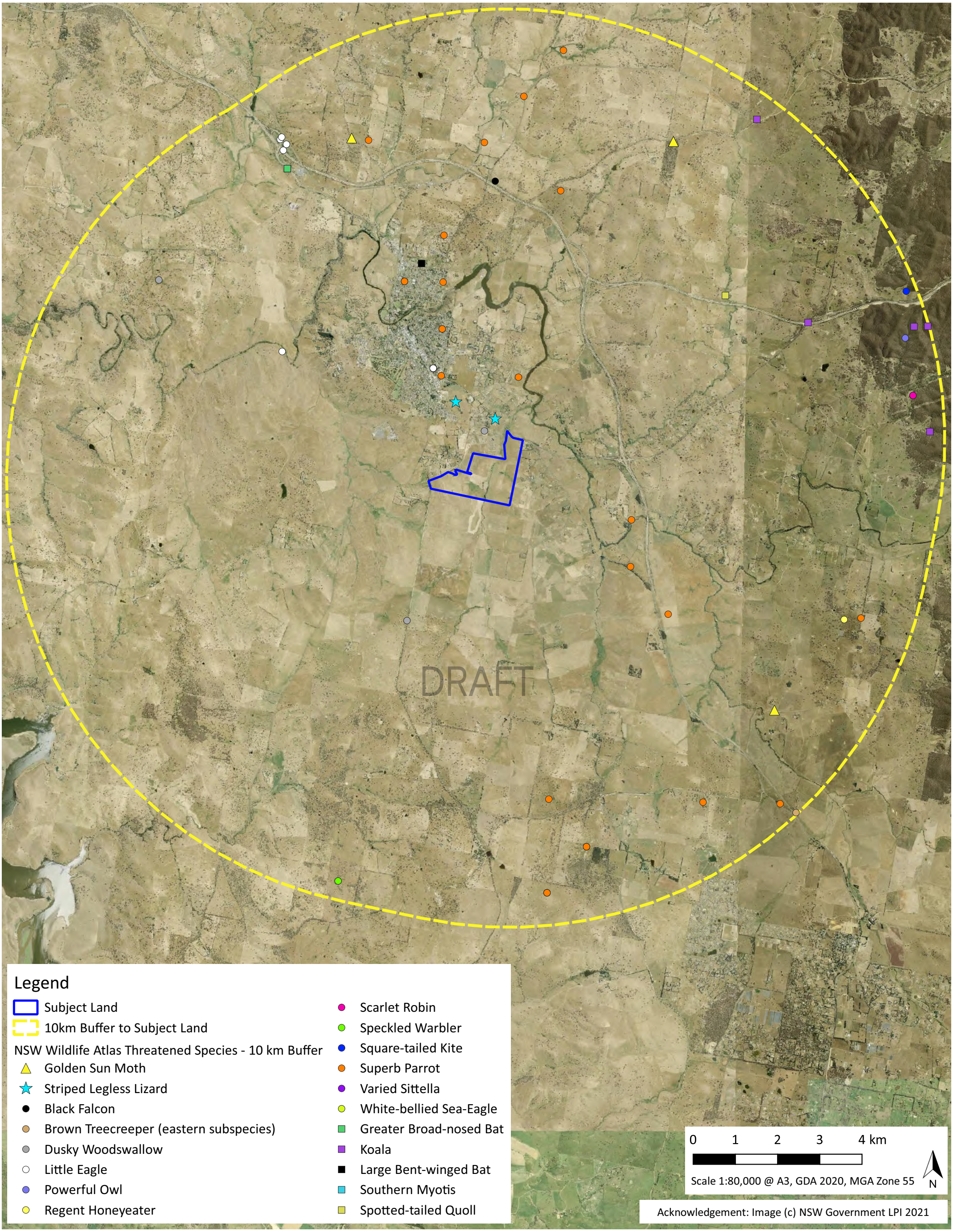

Figure 8. NSW Wildlife Atlas Threatened Species Search

capital ecology

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 23 April 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 12. 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 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 12. 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
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	-	Yes – assumed	-
Chthonicola sagittata Speckled Warbler	Vulnerable	-	Yes – assumed	-
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	Endangered	Yes – assumed	-
Epthianura albifrons White-fronted Chat	Vulnerable	-	Yes – assumed	-
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	Vulnerable	-	Yes – assumed	-
Miniopterus orianae oceanensis Large Bent-winged Bat (Foraging)	Vulnerable	-	Yes – assumed	-
Petroica boodang Scarlet Robin	Vulnerable	-	Yes – assumed	-
Petroica phoenicea Flame Robin	Vulnerable	-	Yes – assumed	-
Stagonopleura guttata Diamond Firetail	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 13. 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 13. 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
Ammobium craspedioides Yass Daisy	Vulnerable	Vulnerable	The Yass Daisy is a perennial herb that bears large yellow flowerheads, with each flowerhead supported by a 30-60 cm stem. It is found from Crookwell (north of Goulburn) to near Wagga Wagga, with most populations occurring in the Yass District. The Yass Daisy occurs in dry forest, Box-Gum Woodland, and secondary derived grassland of these communities. It tolerates light grazing and areas that are irregularly mown or slashed. Flowering occurs from October to November. The BAM Calculator lists *'west of the Federal Highway'* as a geographic limitation for this species Some of the main threats to this species listed in the TBDC are habitat loss through vegetation clearing for agricultural purposes (e.g. pasture modification and cropping), overgrazing by domestic stock, and invasion of weeds including pasture grasses.	No – habitat degraded, microhabitat features	The subject land does not support dry forest or Box-Gum Woodland, or secondary derived grassland of these communities. Furthermore, approximately 92% of the subject land has been pasture improved or tilled and cropped. The remaining 8%, while native dominant, has been substantially modified and currently supports a low diversity of disturbance tolerant native species. Finally, the subject land has been heavily grazed over a prolonged period. Conclusion - the subject land lacks the primary microhabitat features required for this species and the habitat has been degraded to the extent that the species is considered unlikely to occur.
Aprasia parapulchella Pink-tailed Legless Lizard	Vulnerable	Vulnerable	This species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. The TBDC lists *'rocky areas or within 50 m of rocky areas'* as a habitat constraint for this species. Some of the main threats to this species listed in the TBDC are habitat loss through bush-rock removal and vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), overgrazing by domestic stock, and invasion of habitat by weeds.	No – habitat constraint, habitat degraded	All of the rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. As a result, the subject land does not support rocky areas and is not within 50 m of rocky areas. In addition, the groundstorey across approximately 92% of the subject land has been pasture improved or tilled and cropped. The remaining 8%, while native dominant, has been substantially modified and currently supports a low diversity of disturbance tolerant native species. Conclusion - the subject land lacks the habitat constraints required for this species and the habitat has been degraded to the extent that the species is considered unlikely to occur.
Delma impar Striped Legless Lizard	Vulnerable	Vulnerable	Striped Legless Lizard is mainly found in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. It is also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is characterised by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda triandra*, Speargrasses *Austrostipa* spp., Poa Tussocks *Poa* spp., and occasionally Wallaby Grasses *Rhytidosperma* spp.. The species can sometimes be found in modified grasslands with a significant content of exotic grasses, and in grasslands with significant amounts of surface rocks (used for shelter). Some of the main threats to this species listed in the TBDC are habitat loss through vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), habitat degradation through invasion by weeds or escaped pasture species, and overgrazing by domestic stock.	Yes – surveyed	The species was detected in PCT1289 Zone 2 during targeted surveys. As detailed in Section 2.3.4.2, habitat is restricted to the low-lying areas associated with O'Briens Creek and one of its smaller tributaries. Conclusion - the subject land supports habitat for this species.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Eucalyptus aggregata Black Gum	Vulnerable	Vulnerable	Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler, and higher parts of the tablelands (e.g. in the Blayney, Crookwell, Goulburn, Braidwood, and Bungendore districts). The species grows on alluvial soils in the lowest parts of the landscape (i.e. on cold and poorly drained flats and hollows adjacent to creeks and small rivers). It often grows with other cold-adapted eucalypts (e.g. Snow Gum *E. pauciflora*, RIbbon Gum *E. viminalis*, Candlebark *E. rubida*, Black Sallee *E. stellulata*, and Swamp Gum *E. ovata*). Black Gum usually occurs in an open woodland formation with few shrubs and a grassy groundlayer dominated by either River Tussock *Poa labillardierei* or Kangaroo Grass *Themeda triandra*. Black Gum can occur as isolated paddock trees in modified native or exotic pastures.	No – surveyed	Surveys confirmed that the subject land does not support any naturally occurring remnant trees. The only woody vegetation is restricted to a few small patches of Willow and Elm. Conclusion - this species does not occur in the subject land.
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Vulnerable	-	Caves are the primary roosting habitat, but the species also use derelict mines, storm-water tunnels, buildings, and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. Breeding or roosting colonies can number from 100 to 150,000 individuals. The TBDC list the following breeding habitat constraint, *'Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave", observation type code "E nest-roost", with numbers of individuals >500.'*	No – habitat constraint	The subject land does not contain potential breeding habitat (caves, tunnels, mines, culverts, etc.). Conclusion – the subject land lacks the breeding habitat constraints required for this species.
Myotis macropus Southern Myotis	Vulnerable	-	The Southern Myotis 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/stretches 3 m wide or greater[23]), 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	There are no naturally occurring trees in the subject land and no 'bridges, caves or artificial structures' within 200 m of a riparian zone. However, there are three windrows comprised largely of planted exotic trees (e.g. Elm and Pine). None of the planted trees in the subject land support functional hollows. Conclusion - the subject land lacks the habitat constraints required for this species.
Prasophyllum petilum Tarengo Leek Orchid	Endangered	Endangered	Natural populations are known from a total of five sites in NSW. These are near Boorowa, Queanbeyan area, Ilford, Delegate and a newly recognised population c.10 km west of Muswellbrook. The species also occurs at Hall in the Australian Capital Territory. The species grows in open sites within Natural Temperate Grassland or Box-Gum Woodland. It often grows in associateion with River Tussock *Poa labillardieri*, Black Gum *E. aggregata,* Tea-tree *Leptospermum* spp., and Kangaroo Grass *Themeda triandra*. The species is highly susceptible to grazing, being retained only at little-grazed travelling stock reserves and in cemeteries. Some of the main threats to this species listed in the TBDC are: 1) vegetation clearing for agricultural purposes; 2) overgrazing by domestic stock; 3) competition from native species; and 4) encroachment of herbaceous perennial weeds such as St John's wort and Paterson's curse competing for space and resources.	No – habitat degraded	Approximately 92% of the subject land has been pasture improved or tilled and cropped. The remaining 8%, while native dominant, has been substantially modified and currently supports a low diversity of disturbance tolerant native species. Finally, the subject land has been heavily grazed over prolonged period. Conclusion - the subject land has been degraded to the extent that the species is considered unlikely to occur.

[23] 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.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Swainsona sericea Silky Swainson-pea	Vulnerable	-	This species is found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes. It is sometimes found in association with Cypress-pines *Callitris* spp.. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat and/or populations for: 1) residential developments; 2) invasion of weeds; 3) intensification of grazing regimes; and 4) agricultural developments.	No – habitat degraded	Approximately 92% of the subject land has been pasture improved or tilled and cropped. The remaining 8%, while native dominant, has been substantially modified and currently supports a low diversity of disturbance tolerant native species. Finally, the subject land has been heavily grazed over prolonged period. Conclusion - the subject land has been degraded to the extent that the species is considered unlikely to occur.
Synemon plana 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 *Rhytidosperma* spp.. Grasslands dominated by Wallaby grasses are typically low and open and the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several Wallaby grass species, which are typically associated with other grasses particularly Speargrasses *Austrostipa* spp. or Kangaroo Grass *Themeda australis*. The TBDC lists '*Wallaby grass Rytidosperma sp., Chilean needlegrass Nassella nessiana or Serrated Tussock N. trichotoma*' as a habitat constraint. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat by urban, residential, infrastructure, and agricultural development, modifications to agricultural practices (e.g. fertiliser application, ploughing, and inappropriate grazing), overgrazing by domestic stock, and invasive grasses.	Yes – surveyed	As detailed in Section 2.3.4.2, the species was detected in portions of PCT1289 Zone 1 during targeted surveys. Conclusion - the subject land supports habitat for this species.
Thesium australe Austral Toadflax	Vulnerable	Vulnerable	This species is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern tablelands. It occurs in grassland and grassy woodland. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is therefore often found in association with Kangaroo Grass. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat and/or populations by: 1) residential, infrastructure, and agricultural developments; 2) intensification of grazing regimes; and 3) invasion of weeds.	No – habitat degraded, microhabitat features	The subject land does not support grassy woodlands, coastal headlands, or areas dominated by Kangaroo Grass. Furthermore, approximately 92% of the subject land has been pasture improved or tilled and cropped. The remaining 8%, while native dominant, has been substantially modified and currently supports a low diversity of disturbance tolerant native species. Finally, the subject land has been heavily grazed over prolonged period. Conclusion - the subject land lacks the primary microhabitat features required for this species and the habitat has been degraded to the extent that the species is considered unlikely to occur.

2.3.4.2 BAM targeted survey results

As described in Table 13, targeted surveys were completed to confirm the occurrence and/or habitat potential for the species credit species flagged by the BAM as having the potential to occur in the relevant PCT of the subject land.

Threatened flora

As detailed in Table 13, all of the threatened flora species credit species flagged by the BAM are considered highly unlikely to occur in the subject land.

A total of 41 flora species were recorded in the subject land during the field survey, comprising 14 native species and 27 exotic species (Appendix B). No threatened species were recorded.

In light of the above, none of the relevant threatened flora species credit species are considered likely to occur in the subject land.

Threatened fauna

A total of 24 native fauna species were recorded in the subject land during field surveys, comprising 18 bird species, 3 reptile species, 1 amphibian species, 1 mammal species, and 1 invertebrate species (Appendix D). Striped Legless Lizard and Golden Sun Moth were the only threatened fauna species detected during field surveys (see below for further information).

As detailed in Table 13, all of the remaining threatened fauna species credit species flagged by the BAM are considered highly unlikely to occur in the subject land

Striped Legless Lizard *Delma impar*

Striped Legless Lizards were recorded a total of 11 times between 19 September 2019 and 18 November 2019 (Table 14, Appendix D, Plate 1). Striped Legless Lizards were recorded in four of the 10 survey grids, and were primarily recorded in Grid 9 (Table 15, Figure 9).

Five of the recorded Striped Legless Lizards were not captured and one record was inferred from a sloughed skin. Based on head scale analysis, the remaining five captured Striped Legless Lizards were identified as unique individuals. When combined with the date of capture, between 7 and 11 unique individuals were recorded over the entire survey program. The low capture rate and small number of individuals recorded over 10 weeks indicates that the density of Striped Legless Lizards in the subject land is very low.

Table 14. Striped Legless Lizard captures.

Date	Grid	Tile	SVL (cm)	Total L (cm)	Tail (F/R)	SLL ID	Comments
2/10/2019	4	D5	7.0	21	F	SLL-401	
16/10/2019	6	C5	7.5	23	F	SLL-601	
16/10/2019	8	A1	7.5	24	F	SLL-801	
16/10/2019	9	D5	-	-	F	SLL-901	Not captured
21/10/2019	9	E9	-	-	F	SLL-902	Not captured
21/10/2019	9	A5	-	-	F	SLL-903	Not captured
29/10/2019	8	B2	8.0	27	F	SLL-802	
07/11/2019	9	A9	10.5	31	F	SLL-904	
07/11/2019	9	C3	-	-	F	SLL-905	Not captured

Date	Grid	Tile	SVL (cm)	Total L (cm)	Tail (F/R)	SLL ID	Comments
07/11/2019	9	D5	-	-	F	SLL-906	Not captured
07/11/2019	6	D5	-	-	-	SLL-6Skin1	Sloughed skin

SVL = Snout to vent length, Total L = total length, F = Full Tail, R = Regrowth

Table 15. Total Striped Legless Lizard captures per grid.

Grid	Total Number of Captures
1	0
2	0
3	0
4	1
5	0
6	2
7	0
8	2
9	6
10	0

Photo Plate 1. Striped Legless Lizard individual recorded in the subject land.

The habitat surrounding the grids where Striped Legless Lizards were recorded is generally characterised by tussock-forming exotic pasture grasses (notably Phalaris) with high herbage mass, a defined tussock structure, and a low-lying position in the landscape (along O'Briens Creek and one of its tributaries). The species was not detected in the remainder of the exotic dominant areas and it is highly unlikely to occur in the paddocks which have been recently or historically cultivated. Apart from Grid 6, Striped Legless Lizard do not appear to be persisting in the native dominant patches (i.e.

PCT1289 Zone 1). The habitat surrounding Grid 6 is different to the remainder of PCT1289 Zone 1 as it contains a small stretch of embedded rock and it is connected to native dominant vegetation that extends into the adjoining property to the south (refer to Figure 5). The native dominant areas to the south support more appropriate Striped Legless Lizard habitat as they contain a moderate cover of loose surface rock, which is listed in the TBDC as an indicator of potential habitat. It is likely that the small number of individuals recorded in Grid 6 have been able to persist in the subject land due the presence of embedded rock and the direct connectivity with expanses of more suitable habitat to the south.

The estimated extent of Striped Legless Lizard habitat in the subject land was developed with consideration of the following factors.

1. The results of the targeted surveys (i.e. recorded presence/absence).
2. The presence of suitable grass tussock structure and herbage mass (recorded during the vegetation assessment and/or estimated through recent aerial imagery).
3. Direct connectivity with appropriate Striped Legless Lizard habitat outside of the subject land.
4. Evidence of past cultivation and sowing of pasture or crops (recorded during the vegetation assessment and/or estimated through recent and historic aerial imagery). A process of elimination was undertaken by reviewing each paddock / patch and excluding any areas that showed signs of recent or historic cultivation.

Although the entirety of the subject land would likely have historically supported Striped Legless Lizard habitat, the history of cultivation for pasture improvement and/or cropping has largely reduced the current extent of suitable Striped Legless Lizard habitat to the low-lying areas associated with O'Briens Creek and its smaller tributary drainage lines (Figure 9). These areas have not been cultivated and are likely to have retained at least moderate grass herbage mass (primarily Phalaris) even during extended dry periods, thereby allowing the Striped Legless Lizard to persist.

In total, the subject land is estimated to support 17.10 ha of Striped Legless Lizard habitat (Figure 9). Of that, 1.81 ha (11%), all of which occurs in PCT1289 Zone 2, will be impacted by the proposed development. The remaining 15.29 ha (89%) will be protected and managed in accordance with the measures detailed in Section 3.1.

Golden Sun Moth *Synemon plana*

Surveys were conducted through all patches of suitable habitat (Figure 10) during suitable survey conditions when Golden Sun Moth activity was confirmed at other ACT/NSW sites (Table 5).

A total of 373 Golden Sun Moths (5 females and 368 males) were recorded in the subject land across the four surveys (Figure 10, Plates 2 and 3). Two hundred and sixty-four (264) were recorded on 31 October 2019, 49 were recorded on 12 November 2019, 39 were recorded on 18 November 2019, and 21 were recorded on 29 November 2019.

As shown in Figure 10, Golden Sun Moths were recorded at moderate to high density across much of PCT1289 Zone 1 (i.e. native dominant grassland/pasture). The portions of PCT1289 Zone 1 where individuals were recorded were generally flat or gently sloping, dominated by a mix of Tall Speargrass and Wallaby Grasses, and were characterised by low herbage mass and extensive patches of bare ground. With the exception of the patch of habitat in the south-west of the subject land, all of the remaining patches of habitat are functionally isolated from one another and from

potential habitat outside of the subject land. As shown in Figure 5 and Figure 10, the patch of Golden Sun Moth habitat in the south-west of the subject land is connected to an expanse of native dominant grassland that extends over 100 ha to the south. This larger patch of native vegetation is likely to support Golden Sun Moth as it occurs in a similar landscape position and possesses a similar composition and structure to the Golden Sun Moth habitat that occurs in the subject land.

As the extent of Golden Sun Moth habitat in the subject land could not simply be estimated based on the extent of PCT1289 Zone 1 (i.e. Golden Sun Moth were not recorded in all areas of PCT1289 Zone 1, Figure 10), habitat extent was estimated by applying a 50 m buffer to all Golden Sun Moth records and refining the subsequent boundary based on its intersection with PCT1289 Zone 1. Following this method, the subject land has been assessed as supporting 11.64 ha of Golden Sun Moth habitat (Figure 10). The greatest number of Golden Sun Moths were recorded in the northern-most two patches of habitat, which, while making up 40% (4.62 ha) of the assessed extent of Golden Sun Moth habitat in the subject land, accounted for 77% (289 of 373) of the recorded Golden Sun Moth individuals.

The proposed development will impact 2.88 ha (25%) of the Golden Sun Moth habitat that occurs in the subject land. The remaining 8.76 ha (75%), which includes the two patches of habitat which recorded the greatest number of Golden Sun Moth, will be protected and managed in accordance with the measures detailed in Section 3.1.

Plate 2. Golden Sun Moth recorded in the subject land.

Plate 3. Golden Sun Moth habitat in the subject land.

Legend

Subject Land

PCT1289 - Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland

PCT1289 Zone 1 – NativeDom - LowDiversity

PCT1289 Zone 2 – ExoticDom - LowDiversity

Striped Legless Lizard Survey

Striped Legless Lizard - Tile Survey Grid

Grids where Striped Legless Lizard were NOT recorded

Grids where Striped Legless Lizard were recorded

Estimated Striped Legless Lizard habitat

Grid 1

Grid 2

Grid 3

Grid 4

Grid 5

Grid 6

Grid 7

Grid 8

Grid 9

Grid 10

DRAFT

0 250 500 750 1000 m

Scale 1:7,500 @ A3, GDA 1994, MGA Zone 55

N

Figure 9. Striped Legless Lizard Survey Results

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 13 July 2020

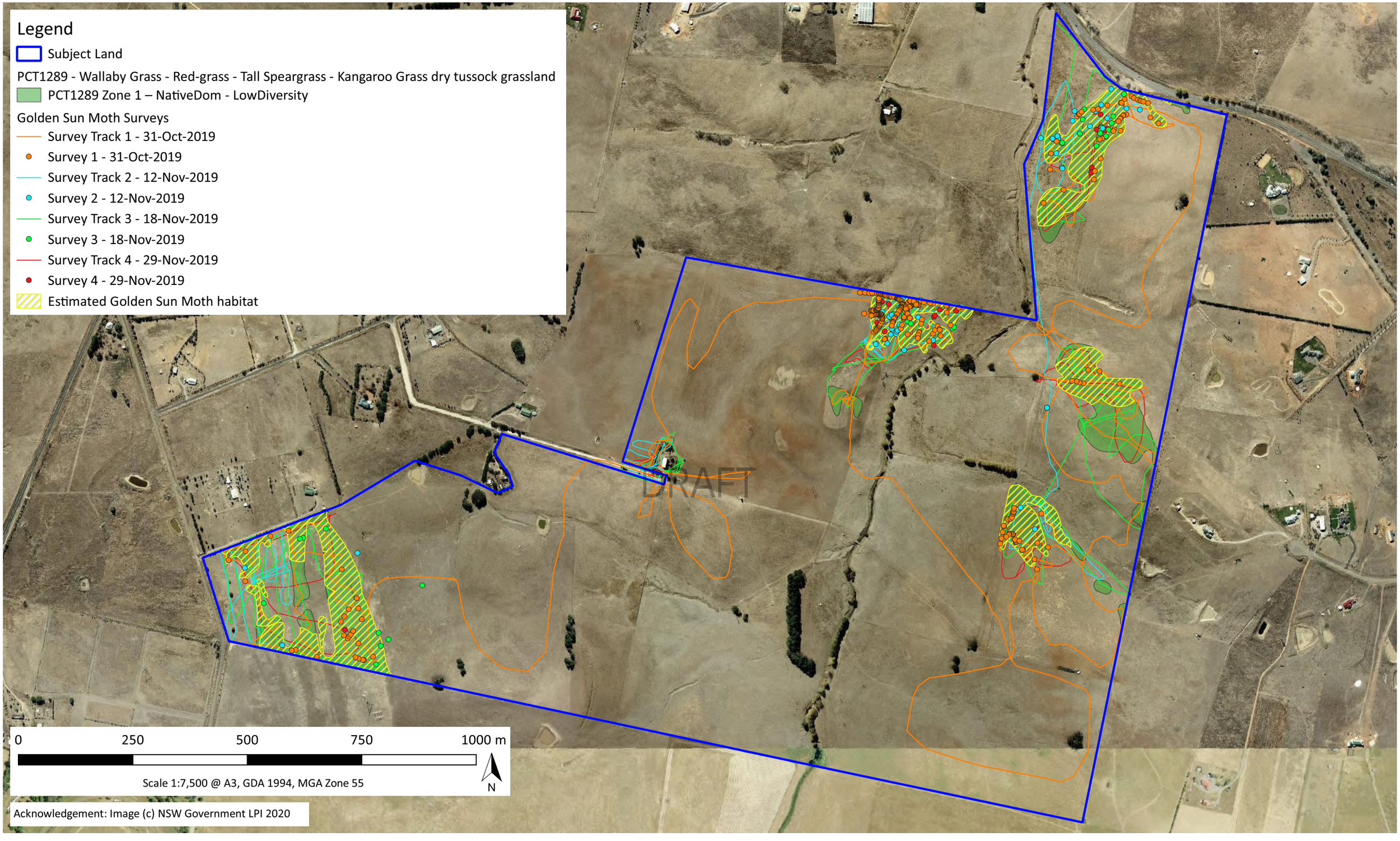

Figure 10. Golden Sun Moth Survey Results

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 13 July 2020

3 Part 2 – Impact Assessment (BAM Stage 2)

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

3.1 Avoidance and Minimisation of Impacts on Biodiversity Values

In accordance with 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, this section outlines the avoidance and minimisation measures that have been incorporated into the project design of the proposed development. Please note that the below measures have also been designed to avoid and minimise the prescribed biodiversity impacts identified in Section 3.2.3 (i.e. impacts to exotic vegetation that supports habitat for the threatened Striped Legless Lizard).

3.1.1 Location

3.1.1.1 Locating the project where there are no biodiversity values

The subject land has been substantially modified by its current and past land use, which has primarily been grazing and cropping. Approximately 92% of the subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. More recently, all of the small rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. As a result, the vast majority of the subject land has a disturbed soil profile and a groundstorey dominated by exotic perennial and annual pasture species.

The proposed development has therefore been located in an area that largely lacks biodiversity values. This is highlighted by the fact that 82% (141.59 ha) of the subject land does not support any significant biodiversity values (i.e. no threatened ecological community, threatened species habitat, or BC Act native vegetation). Furthermore, as shown in Figure 11, the proposed development has been designed to avoid, protect, and manage 77% (24.34 ha) of the remaining 31.74 ha of the subject land that does support significant biodiversity values (i.e. Golden Sun Moth habitat, Striped Legless Lizard habitat, or BC Act native vegetation).

In total, 95% (132.71 ha) of the impacts associated with the proposed development are therefore located in areas that support no biodiversity values.

3.1.1.2 Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition

In comparison the earlier designs of the proposed development, the current design has been changed in order to avoid and minimise impacts to the significant ecological values of the subject land (Figure 2, Figure 3, and Figure 11). This has been achieved by increasing the area of the proposed Community Title Lot from 9.1 ha to 24.9 ha, moving and/or reducing the size of Building Envelopes (BEs), by protecting and managing the retained habitat and values in the Community Title Lot though specific environmental protection by-laws and an associated Biodiversity Management Plan (BMP) to be written as part of a Community Management Statement, and by protecting and managing the retained habitat and values in the large residential lot via establishing a Conservation Agreement under the BC Act.

As described below, the Community Title Lot and large residential lot were located to avoid, protect, and manage those areas in the subject land that were identified as supporting the more important patches of threatened species habitat and BC Act native vegetation (Figure 11).

- The proposed development avoids, protects, and manages 89% (15.29 ha) of the Striped Legless Lizard habitat that occurs in the subject land. The size and location of the protected areas were selected with the aim of ensuring that a viable population of Striped Legless Lizard can persist in the subject land and that connectivity is maintained with potential habitat to both the north and south of the subject land.

- The proposed development avoids, protects, and manages 75% (8.76 ha) of the Golden Sun Moth habitat that occurs in the subject land. These protected areas include the more significant northern-most two patches of Golden Sun Moth habitat, which, while making up 40% (4.62 ha) of the estimated extent of Golden Sun Moth habitat in the subject land, account for 77% (289 of 373) of the recorded Golden Sun Moth individuals.

- The proposed development impacts 140.11 ha of vegetation (i.e. 5.59 ha of PCT1289 Zone 1 and 134.52 ha of PCT1289 Zone 2). Of that, 96% (134.52) supports highly modified vegetation dominated by a variety of exotic perennial and annual pasture species (i.e. PCT1289 Zone 2). Of the 14.72 ha of BC Act native vegetation that occurs in the subject land (i.e. PCT1289 Zone 1), 62% (9.13 ha) will be avoided, protected, and managed.

As demonstrated by the above, the proposed development has been designed and located to avoid, protect, and manage those areas in the subject land that support higher quality and/or otherwise important patches Golden Sun Moth habitat, Striped Legless Lizard habitat, and BC Act native vegetation.

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

As detailed in the ACT Government's Golden Sun Moth Action Plan (ACT Government 2017)[24], populations of Golden Sun Moth that are separated by 200 metres or more are likely to be isolated and are therefore treated as separate sites. The majority of the Golden Sun Moth habitat in the subject land occurs as scattered, isolated patches. As each patch is separated by over 200 m, they are likely to be functionally isolated from one another and from any potential surrounding patches of habitat. However, as shown by Figure 5 and Figure 10, the patch of Golden Sun Moth habitat in the south-west of the subject land (which will be avoided, protected, and managed, Figure 11) is connected to an expanse of native dominant grassland that extends over 100 ha to the south. This larger patch of native vegetation is likely to support Golden Sun Moth as it occurs in a similar landscape position and possesses a similar composition and structure to the Golden Sun Moth habitat that occurs in the subject land. As such, by protecting this patch of habitat in the south-west of the subject land, the proposed development has been located to ensure that Golden Sun Moth habitat connectivity enabling movement of individuals and genetic material between areas of adjacent or nearby habitat is maintained.

The Striped Legless Lizard habitat in the subject land is connected to potential habitat outside of the subject land to the north, south, and east (i.e. areas that occur in a similar landscape position and possesses a similar composition and structure to the Striped Legless Lizard habitat in the subject land). While connectivity to the east of the subject land will be severed by the proposed

[24] ACT Government (2017). *ACT native grassland conservation strategy and action plans*. Environment, Planning and Sustainable Development, Canberra.

development, the connectivity of the Striped Legless Lizard habitat protected and managed in the 24.9 ha Community Title Lot will be maintained to both the north and south of the subject land (Figure 11). By protecting the habitat present in the Community Title Lot, the proposed development has been located to ensure that Striped Legless Lizard habitat connectivity enabling movement of individuals and genetic material between areas of adjacent or nearby habitat is maintained.

3.1.2 Design

3.1.2.1 Reducing the clearing footprint of the project

As mentioned previously, in comparison the earlier designs of the proposed development, the current design has been changed in order to avoid and minimise impacts to the significant ecological values of the subject land (Figure 2, Figure 3, and Figure 11). This has been achieved by increasing the area of the proposed Community Title Lot from 9.1 ha to 24.9 ha and by moving and/or reducing the size of Building Envelopes (BEs). By reducing the clearance footprint, the proposed development avoids, protects, and manages:

- 89% (15.29 ha) of the Striped Legless Lizard habitat that occurs in the subject land;
- 75% (8.76 ha) of the Golden Sun Moth habitat that occurs in the subject land; and
- 62% (9.13 ha) of the BC Act native vegetation that occurs in the subject land.

3.1.2.2 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

Given that the proposed development is located within 3 km of the centre of Yass township and immediately adjacent to recently developed large lot subdivisions, many of the biodiversity impacts associated with a new development will be reduced (i.e. impacts related to services, roads, bushfire protection, flood planning, etc.). In addition, all ancillary facility associated with the construction and operation of the proposed development will be located to avoid all of the significant biodiversity values that will be retained by the proposed development.

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

As mentioned previously, the proposed development avoids, protects, and manages the significant ecological values that occur in the subject land by creating a 24.9 ha Community Title Lot and 9.3 ha large residential lot that, in combination, encompass the majority of the Golden Sun Moth and Striped Legless Lizard habitat (Figure 2, Figure 3, and Figure 11). These measures avoid, protect, and manage:

- 89% (15.29 ha) of the Striped Legless Lizard habitat that occurs in the subject land;
- 75% (8.76 ha) of the Golden Sun Moth habitat that occurs in the subject land; and
- 62% (9.13 ha) of the BC Act native vegetation that occurs in the subject land.

The retained vegetation and threatened species habitat in the Community Title Lot will be protected and managed in-perpetuity through specific environmental protection by-laws and an associated BMP to be written as part of a Community Management Statement. The BMP, to be endorsed by Yass Valley Council and DPIE-BCD, will stipulate the conservation-focused management measures that will be implemented. At a minimum, this will include actions such as targeted weed control,

feral animal control, grazing control, biomass control, and protection of native vegetation and threatened species habitat. The key aims of the management measures will be to protect the retained significant ecological values and reduce the impact of known threatening processes.

The retained vegetation and threatened species habitat in the large residential lot will be protected and managed in-perpetuity via a Conservation Agreement established under the BC Act. The purpose of the Conservation Agreement will be to protect and manage the significant ecological values the large residential lot supports, in particular the Golden Sun Moth. Management actions will be directed towards protecting threatened species habitat, reducing the impact of known threatening processes, and improving the condition of the groundstorey vegetation. To that end, a management plan endorsed by Yass Valley Council and the DPIE-BCD will be developed for the large residential lot.

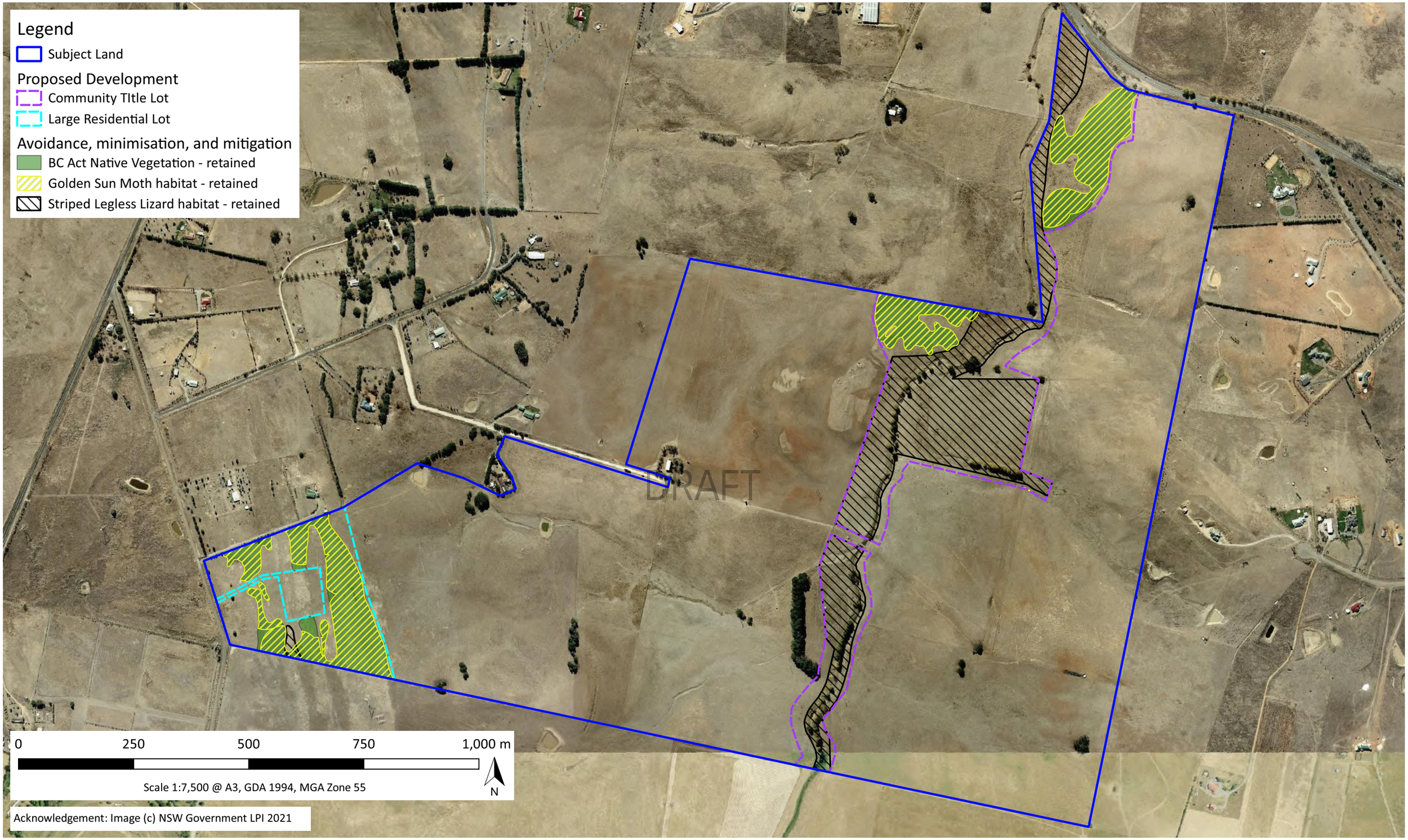

Figure 11. Avoidance, minimisation, and mitigation measures

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 23 April 2021

3.2 Residual Biodiversity Impacts of the Proposed Development

3.2.1 Direct impacts on native vegetation and habitat

As shown in Figure 12, the proposed development will result in the clearance of:

- 5.59 ha of PCT1289 Zone 1 – low diversity native pasture (BC Act native vegetation);
- 2.88 ha of Golden Sun Moth habitat (BC Act endangered, EPBC Act critically endangered), located in PCT1289 Zone 1; and
- 1.81 ha of Striped Legless Lizard habitat (BC Act and EPBC Act vulnerable), located in PCT1289 Zone 2.

The proposed development will not result in any other direct impacts on native vegetation or habitat.

As shown in Figure 12, the proposed development will also result in the clearance of:

- 134.52 ha of PCT1289 Zone 2 – low diversity exotic pasture, 1.81 ha of which supports Striped Legless Lizard habitat.

The 132.71 ha of PCT1289 Zone 2 that does not support Striped Legless Lizard habitat is clearly dominated by exotic grasses and forbs, does not meet the definition of BC Act native vegetation, and is not identified as habitat for threatened species. Therefore, as per Chapter 10.4 of the BAM, this portion of PCT1289 Zone 2 does 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 retained or adjacent native vegetation and habitat. Potential indirect impacts are listed below.

- Increased sedimentation of receiving waterways (i.e. O'Briens Creek and then the Yass River) during construction.
- Increased noise, 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.

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 12.
- Striped Legless Lizard and Golden Sun Moth (i.e. the threatened species protected in retained habitat).

However, the proposed development reduces the likelihood of indirect impacts by enacting the following principles detailed in Section 3.1 to avoid and minimise impacts to native vegetation and habitat.

- Locating the project where there are no biodiversity values.
- Locating the project 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.

In addition, potential indirect impacts will be minimised and mitigated during construction by the measures outlined in Section 3.3 and during occupation by the measures outlined in Section 3.1 and Section 3.3. These measures:

- control potential sedimentation of receiving waterways during construction;
- control noise, vibration, and dust spill during construction;
- control weed introduction and/or spread during construction and occupation;
- control incidental damage of retained native vegetation and habitat during construction and occupation; and
- control pest animal populations as a result of 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 indirect impacts on native vegetation or habitat.

3.2.3 Prescribed biodiversity impacts

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.

3.2.3.1 Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation

The only prescribed biodiversity impact identified during the development of this BDAR arises due to "*impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation*".

As detailed in Section 2.3.4.2, Striped Legless Lizards were recorded across portions of the subject land. In total, it is estimated that the subject land supports 17.10 ha of Striped Legless Lizard habitat. Of that, 99.5% (17.02 ha) occurs in the portions of PCT1289 Zone 2 characterised by tussock-forming exotic pasture grasses (notably Phalaris) with high herbage mass, a defined tussock structure, and a low-lying position in the landscape (generally along O'Briens Creek and one of its tributaries). The remaining 0.5% (0.08 ha) occurs in native pasture (i.e. PCT1289 Zone 1).

The proposed development will impact 1.81 ha of Stripped Legless Lizard habitat, all of which occurs in non-native vegetation (i.e. PCT1289 Zone 2). Accordingly, this impact is identified as a prescribed biodiversity impact.

In accordance with 9.3 of the BAM, the proposed development employs the measures detailed in Section 3.1 and Section 3.3 to avoid, minimise, and mitigate this prescribed biodiversity impact to Striped Legless Lizard habitat. These measures include protecting and maintaining 89% (15.29 ha) of the Striped Legless Lizard habitat that occurs in the subject land. The size and location of the protected areas were chosen with the aim of ensuring that a viable population of Striped Legless Lizard can persist in the subject land and that connectivity is maintained with potential habitat to both the north and south of the subject land.

As detailed in Section 3.5.2.3, the impact of the proposed development on 1.81 ha of Striped Legless Lizard habitat will be offset by calculating the monetary value of the credit obligation that would be generated if the impact to the species were to occur in low diversity native pasture (i.e. PCT1289 Zone 1) and the credit obligation met by paying into the Biodiversity Conservation Fund. The resultant calculated amount will be dedicated by the proponents of the proposed development to the management of the 24.9 ha Community Title Lot that will be established to protect the retained Striped Legless Lizard habitat.

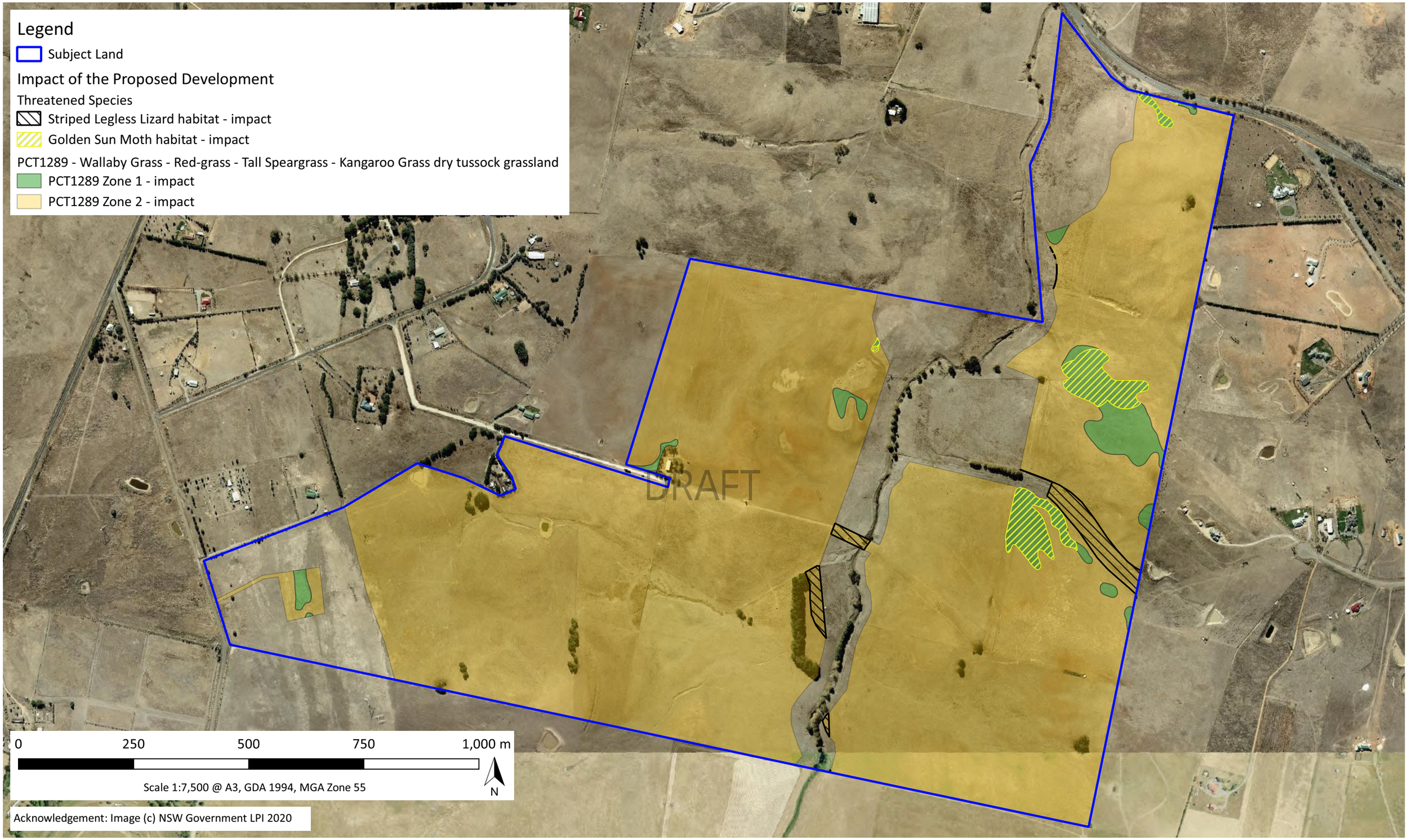

Figure 12. Residual Biodiversity Impacts of the Proposed Development

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 13 July 2020

3.3 Mitigation of Residual Impacts on Biodiversity Values

The following mitigation techniques will be implemented to address the residual impacts on biodiversity values during and after the construction phase of the proposed development. Please note that the below measures are also designed to mitigate the residual prescribed impacts identified in Section 3.2.4 (i.e. impacts to exotic vegetation that support habitat for the threatened Striped Legless Lizard). In combination, these mitigation measures are considered sufficient to reduce the risk of residual impacts to an acceptably low level.

3.3.1 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 around sensitive values;
- buffer zones around sensitive values;
- clearing procedures;
- weed management procedures;
- sediment and erosion controls to prevent site run-off;
- noise, vibration, and dust control;
- flow controls;
- pollution and waste management;
- water treatment standards before release; and
- monitoring, reporting, and compliance requirements.

Best practice sediment and erosion control, such as the use of sediment traps, sediment interception ponds, silt fences and haybale fences, will be implemented as required during construction to minimise the flow of water and associated material into the surrounding areas and water sources

The key potential risk to the biodiversity values of the subject land and adjoining areas during construction and operation of the proposed development is the facilitated spread of the high threat weeds currently occurring in the locality and/or the introduction of new weeds. Therefore, at a minimum, the following weed management measures will be implemented.

- Appropriate vehicle hygiene will be maintained. Vehicles and machinery entering the subject land will be clean of weed seed or propagules.
- Only sterile materials such as hessian/jute or rice straw will be used for soil stabilisation or similar purposes.
- High threat weeds will be prevented from establishing on newly created road verges, landscaped areas, and other open space.

3.3.2 Occupation

As mentioned in Section 3.1, the proposed development avoids, protects, and manages the significant ecological values that occur in the subject land by creating a 24.9 ha Community Title Lot and 9.3 ha large residential lot that, in combination, encompass the majority of the Golden Sun Moth and Striped Legless Lizard habitat (Figure 2, Figure 3, and Figure 11).

The retained vegetation and threatened species habitat in the Community Title Lot will be protected and managed in-perpetuity through specific environmental protection by-laws and an associated BMP to be written as part of a Community Management Statement. The BMP, to be endorsed by Yass Valley Council and DPIE-BCD, will stipulate the conservation-focused management measures that will be implemented. At a minimum, this will include actions such as targeted weed control, feral animal control, grazing control, biomass control, and protection of native vegetation and threatened species habitat. The key aims of the management measures will be to protect the retained significant ecological values and reduce the impact of known threatening processes.

The retained vegetation and threatened species habitat in the large residential lot will be protected and managed in-perpetuity via a Conservation Agreement established under the BC Act. The purpose of the Conservation Agreement will be to protect and manage the significant ecological values the large residential lot supports, in particular the Golden Sun Moth. Management actions will be directed towards protecting threatened species habitat, reducing the impact of known threatening processes, and improving the condition of the groundstorey vegetation. To that end, a management plan endorsed by Yass Valley Council and the DPIE-BCD will be developed for the large residential lot.

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, especially 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.

3.4 Serious and irreversible impacts

The guidance to assist a decisionmaker to determine a serious and irreversible impact (NSW Government 2017b[25]) provides a list of threatened species and ecological communities which are likely to be the subject of serious and irreversible impacts (SAII). The potential for a project to impact these SAII entities must be assessed in the BDAR.

The subject land does not contain habitat of potential significance to any flora species or ecological community listed as a SAII entity. However, the subject land does support the Golden Sun Moth *Synemon plana* which is listed as a SAII entity.

The proposed development will result in the removal of a total of 2.88 ha of Golden Sun Moth habitat, located entirely within PCT1289 Zone 1.

The DPIE Biodiversity Conservation Division (BCD) have advised that a decision has been made not to develop entity specific thresholds for SAII. 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 2.88 ha of Golden Sun Moth habitat constitutes an SAII.

However, as detailed in the following sections, the substantial avoidance, minimisation, and mitigation measures incorporated into the proposed development reduce the likelihood of a SAII on either the Golden Sun Moth or BC Act Box-Gum Woodland.

3.4.1 Golden Sun Moth

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.

- NSW Wildlife Atlas (BioNet) Golden Sun Moth records, downloaded on 3 March 2021.
- ACT Government's ACTmapi *Significant Species, Vegetation Communities & Registered Trees*[26] Golden Sun Moth habitat spatial data, accessed on 3 March 2021.
- NSW Government Saving Our Species (SOS) Golden Sun Moth species profile[27] and project report[28].
- NSW Government Office of Environment & Heritage Golden Sun Moth profile[29].
- *ACT native grassland conservation strategy and action plans* (ACT Government 2017[30]).
- *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana)* (Commonwealth of Australia 2009b[31]).

[25] 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

[26] http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt

[27] https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10791

[28] https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=839&ReportProfileID=10791

[29] https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10791

[30] ACT Government (2017). *ACT native grassland conservation strategy and action plans*. Environment, Planning and Sustainable Development, Canberra.

[31] Commonwealth of Australia (2009b). *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana). Nationally threatened species and ecological communities EPBC Act policy statement 3.12.* Department of the Environment, Water, Heritage and the Arts.

- *Background paper to Significant impact guidelines for the critically endangered golden sun moth (Synemon plana)* (Commonwealth of Australia 2009a).
- *Approved Conservation Advice for Synemon plana (golden sun moth)* (Commonwealth of Australia 2013b[32]).

3.4.2 Estimating Golden Sun Moth Extent of Occurrence (EOO) and occupied habitat

The NSW Wildlife Atlas contains 940 Golden Sun Moth records. For the purposes of this SAII assessment, the single record located near Tumut has been excluded as it is separated by over 60 km from the main body of Golden Sun Moth records and is therefore treated as an outlier. The remaining 939 Golden Sun Moth records span from 1993 to 2020 and represent at least 5,206 individuals (Figure 13).

ACTmapi identifies 1,831 ha of Golden Sun Moth habitat in the ACT (Figure 13). As stated in ACT Government (2017) *'Based on the known former distribution of lowland Temperate Grassland in the ACT and areas surveyed for S. plana, it is unlikely any significant populations of the species remain undiscovered.'* As such, the spatial data from ACTmapi is likely to be an accurate reflection of the currently occupied Golden Sun Moth habitat in the ACT.

The NSW Wildlife Atlas (BioNet) Golden Sun Moth records and ACTmapi Golden Sun Moth habitat mapping have been combined to estimate the Golden Sun Moth Extent of Occurrence (EOO) (Figure 13). The EOO was calculated according to International Union for Conservation of Nature (IUCN) Standards and Petitions Subcommittee (2017)[33] and represents '*the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon*'. Based on this, the EOO for Golden Sun Moth is estimated to be 414,022 ha (Figure 13, Table 16). The EOO in Figure 13 agrees well with previous estimates that the species in the ACT/NSW is occurs in a narrow band that is 100 km long and 30 km wide, extending from the Queanbeyan district in the south-east to the Boorowa area in the north-west (Commonwealth of Australia 2009a, ACT Government 2017).

It is difficult to accurately determine the extent of habitat currently occupied by the Golden Sun Moth in the EOO. This is because most populations are small, the species is very patchily distributed across its range, and only certain areas have been appropriately surveyed. However, as mentioned previously, the spatial data from ACTmapi is likely to be an accurate reflection of the currently occupied Golden Sun Moth habitat in the ACT. Therefore, this high-resolution data can be used to determine the proportion of the EOO in the ACT that is currently occupied by Golden Sun Moth. This finding can then be extrapolated to estimate the area of currently occupied habitat in the EOO as a whole.

[32] Commonwealth of Australia (2013b). *Approved Conservation Advice for Synemon plana (golden sun moth).* Approved by the delegate of the Minister on 17 December 2013.
[33] IUCN Standards and Petitions Subcommittee (2017). *Guidelines for Using the IUCN Red List Categories and Criteria. Version 13.* Prepared by the Standards and Petitions Subcommittee. Available at: http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf

As detailed in Table 16, the ACT accounts for 52,293 ha (12.63%) of the EOO. Within this area, there is 1,831 ha of Golden Sun Moth habitat (Figure 13). Therefore, 3.50% of the 52,293 ha of EOO in the ACT supports occupied Golden Sun Moth habitat. Using this value, the following estimates are made.

- NSW supports an estimated 14,497.67 ha of occupied Golden Sun Moth habitat, based on the assumption that 3.50% of the EOO supports Golden Sun Moth habitat. This finding agrees well with a previous estimate of 150 km^2 (15,000 ha) (ACT Government 2017).
- The Murrumbateman IBRA subregion supports an estimated 9,916.59 ha of occupied Golden Sun Moth habitat, based on the assumption that 3.50% of the EOO in the Murrumbateman IBRA subregion supports Golden Sun Moth habitat.

The data and estimates detailed above and presented in Table 16 are referred to throughout the following SAII assessment.

Table 16. Golden Sun Moth Extent of Occurrence (EOO) and estimated occupied habitat.

ID	Specific Matter	Area (ha)	Percent	Description
A	Golden Sun Moth EOO.	414,022	-	
B	ACT and EOO intersection.	52,293	12.63% (B/A)*100	The ACT accounts for 52,293 ha (12.63%) of the EOO.
C	Murrumbateman IBRA subregion and EOO intersection.	283,216	68.43% (C/A)*100	The Murrumbateman IBRA subregion accounts for 283,216 ha (68.41%) of the EOO.
D	ACTmapi Golden Sun Moth habitat in the ACT.	1,831	3.50% (D/B)*100	There is 1,831 ha of Golden Sun Moth habitat in the ACT. Therefore, 3.50% of the 52,293 ha of the EOO in the ACT supports Golden Sun Moth habitat.
E	Estimated extent of currently occupied Golden Sun Moth habitat in the EOO.	14,496.67 (A*0.035)	-	NSW supports an estimated 14,496.67 ha of occupied Golden Sun Moth habitat, based on the assumption that 3.50% of the EOO supports Golden Sun Moth habitat.
F	Estimated extent of currently occupied Golden Sun Moth habitat in the Murrumbateman IBRA subregion.	9,916.59 (C*0.035)	-	The Murrumbateman IBRA subregion supports an estimated 9,916.59 ha of occupied Golden Sun Moth habitat, based on the assumption that 3.50% of the EOO in the Murrumbateman IBRA subregion supports Golden Sun Moth habitat.

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

The proposed development enacts the following principles detailed in Section 3.1 to avoid and minimise impacts to Golden Sun Moth habitat.

- Locating the project where there are no biodiversity values.

- Locating the project 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.

Importantly, the proposed development avoids, protects, and manages the main patches of Golden Sun Moth habitat in the subject land (Figure 11).

The Golden Sun Moth habitat in the Community Title Lot will be protected and managed in-perpetuity through specific environmental protection by-laws and an associated BMP to be written as part of a Community Management Statement. The BMP, to be endorsed by Yass Valley Council and DPIE-BCD, will stipulate the conservation-focused management measures that will be implemented. At a minimum, this will include actions such as targeted weed control, feral animal control, grazing control, biomass control, and protection of native vegetation and threatened species habitat. The key aims of the management measures will be to protect the retained significant ecological values and reduce the impact of known threatening processes.

The Golden Sun Moth habitat in the large residential lot will be protected and managed in-perpetuity via a Conservation Agreement established under the BC Act. The purpose of the Conservation Agreement will be to protect and manage the significant ecological values the large residential lot supports, in particular the Golden Sun Moth. Management actions will be directed towards protecting threatened species habitat, reducing the impact of known threatening processes, and improving the condition of the groundstorey vegetation. To that end, a management plan endorsed by Yass Valley Council and the DPIE-BCD will be developed for the large residential lot.

Potential indirect impacts, including indirect impacts to Golden Sun Moth habitat, will be minimised and mitigated by the measures outlined in Section 3.3. These measures include the following.

- A CEMP to guide the proposed development from when construction commences until construction is completed.
- Best practice sediment and erosion control.
- Weed management measures.
- A Community Management Statement and associated BMP over the Community Title Lot.
- A Conservation Agreement over the large residential lot.

b. *the size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification*

As outlined in ACT Government (2017), the following difficulties arise when attempting to estimate population size in the Golden Sun Moth.

- Flying adult males are the only stage and sex that are readily detected and counted, but they are short-lived and emerge across a season of many weeks.
- Counts on any particular day only reflect a single emergence cohort, and daily emergence is strongly affected by weather conditions.
- More adults emerge on hot dry days, making it difficult to differentiate between short-term weather effects and the actual size of a population.
- The length of the larval period is unclear, and it is unknown what proportion of the standing population is represented by the number of adults that fly in a given season.
- Seasonal conditions have a large effect on overall Golden Sun Moth numbers (e.g. there is a tendency for seasons to result in high, moderate, or low abundance of flying males at most sites across a large geographic area). Therefore, it is difficult to make an accurate assessment of population size based on one season of survey.

Given these difficulties, measures of relative abundance and/or maximum daily abundance combined with habitat size, condition, and connectivity are likely to be a more appropriate measure of a population than the absolute number of recorded individuals.

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

- 11.64 ha of Golden Sun Moth habitat.
- Moderate to high abundance in the two northern-most patches of habitat (both of which will be retained in the Community Title Lot) and low to moderate abundance in all other patches of habitat.
- Scattered, isolated patches of habitat. As each patch is separated by over 200 m, they are likely to be functionally isolated from one another and from any potential surrounding patches of habitat. The exception to this is the patch of habitat in the south-west of the subject land (which will be retained in a large lot) that is connected to an expanse of native dominant grassland that extends over 100 ha to the south. This larger patch of native vegetation is likely to support Golden Sun Moth as it occurs in a similar landscape position and possesses a similar composition and structure to the Golden Sun Moth habitat that occurs in the subject land.

The proposed development will directly impact 2.88 ha (25%) of the local Golden Sun Moth habitat. The remaining 8.76 ha (75%), including all patches with moderate to high abundance or habitat connectivity, will be protected and managed in large lots. Potential indirect impacts to retained habitat will be mitigated by the measures detailed in Section 3.3.

c. the extent to which the impact exceeds any 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 SAII. Instead, decisions will be made on a case-by-case basis.

d. the likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:

(i) an estimate of the change in habitat available to the local population as a result of the proposed development

(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and

(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.

(BioNet Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development)

(i) and (ii). The proposed development will directly impact 2.88 ha (25%) of the local Golden Sun Moth habitat. As the remaining 8.76 ha (75%), including all patches with moderate to high abundance or habitat connectivity, will be protected and managed in the Community Title Lot and large residential lot, the proposed development is unlikely to increase habitat fragmentation in the subject land or immediate locality.

More widely, Golden Sun Moth are known to occur from the Queanbeyan district in the south-east to the Boorowa area in the north-west (Section 3.4.1, Figure 13). NSW supports an estimated 14,496.67 ha of occupied Golden Sun Moth habitat, and the Murrumbateman IBRA subregion supports an estimated 9,916.59 ha of occupied Golden Sun Moth habitat (Section 3.4.1, Table 16). The impact to 2.88 ha of Golden Sun Moth habitat in the subject land will therefore reduce the available habitat in NSW by 0.02% and in the Murrumbateman IBRA subregion by 0.03%.

(iii). The proposed development will impact 2.88 ha (25%) of the local Golden Sun Moth habitat. All of these patches of habitat are scattered, isolated, support a low to moderate abundance of moths, and only represent a small proportion of the estimated habitat in the locality. The habitat in the subject land that will be impacted by the proposed development is therefore unlikely to be important to the species' life cycle, genetic diversity, or long-term evolutionary development.

e. the likely impact on the ecology of the local population. At a minimum, address the following:

(i) for fauna:

– breeding

– foraging

– roosting, and

– dispersal or movement pathways

The proposed development will directly impact 2.88 ha (25%) of the local Golden Sun Moth habitat. These patches of habitat are scattered, isolated, support a low to moderate abundance of moths, and only represent a small proportion of the estimated habitat in the locality. The remaining 8.76 ha (75%), including all patches with moderate to high abundance or habitat connectivity, will be protected and managed in the Community Title Lot and large residential lot. As such, the proposed development is unlikely to have a significant impact on the local population's breeding, foraging, movement pathways, or long-term viability.

f. a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development

The proposed development will directly impact 2.88 ha (25%) of the local Golden Sun Moth habitat. These patches of habitat are scattered, isolated, support a low to moderate abundance of moths, and only represent a small proportion of the estimated habitat in the locality. The remaining 8.76 ha (75%), including all patches with moderate to high abundance or habitat connectivity, will be protected and managed in the Community Title Lot and large residential lot. As such, the proposed development is unlikely to further fragment or isolate the local population.

g. the relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range

Golden Sun Moth are known to occur from the Queanbeyan district in the south-east to the Boorowa area in the north-west (Figure 13). As shown in Figure 13, the local population in the subject land is located approximately in the centre of the estimated EOO for Golden Sun Moth and is therefore not at the limit of the species' range.

As detailed in ACT Government (2017) *'Five major genetic clusters have been identified, one encompassing the populations from the ACT and nearby NSW'.* The local population in the subject land is therefore likely to form part of this ACT/NSW genetic cluster.

Largely due to large-scale, historic habitat destruction or modification, extant populations of Golden Sun Moth are known to be fragmented. This is true of the local population in the subject land where the majority of habitat is scattered and isolated. The exception to this is the patch of habitat in the south-west of the subject land that is connected to an expanse of native dominant grassland that extends over 100 ha to the south. This larger patch of native vegetation is likely to support Golden Sun Moth as it occurs in a similar landscape position and possesses a similar composition and structure to the Golden Sun Moth habitat that occurs in the subject land. As such, it is likely that a small proportion of the habitat in the subject land forms part of a population that occurs outside of the subject land. As detailed in section 3.1 and shown in Figure 10 and Figure 11, this patch of connected habitat in the subject land will be protected and managed under a Conservation Agreement established under the BC Act.

Consideration of the above information indicates that it is unlikely that the local population has a wider importance to other populations for factors such as breeding, dispersal, and genetic viability/diversity.

h. the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

The documents referenced at the start of Section 3.4.1 identify the following direct and indirect threats to Golden Sun Moth.

- Loss and degradation of habitat by urban, residential, infrastructure, and agricultural development.
- Modifications to agricultural practices (e.g. fertiliser application, ploughing, and inappropriate grazing).
- Overstocking that results in modification of soil structure through compaction, increased nutrient loads, and proportion of weeds
- Invasion of habitat by weeds (particularly St John's Wort *Hypericum perforatum* and exotic pasture species such as Phalaris *Phalaris aquatica*, Paspalum *Paspalum dilatatum*, and Oats *Avena* spp.).
- Fragmentation and small size of remnant populations.
- Rank growth of vegetation, leading to an increase in herbage mass and a decrease in inter-tussock bare ground.

As detailed throughout this BDAR, the subject land has been impacted by a number of these threats in the past as approximately 92% of the subject land has been pasture improved or tilled and cropped in order to improve pastoral productivity. More recently, all of the small rocky areas in the subject land have been cleared, the rocks removed, and the surrounding area sown with exotic grasses. At the time of survey, the whole of the subject land was also heavily grazed by stock. As a result, the vast majority of the subject land has a disturbed soil profile, a groundstorey dominated by exotic perennial and annual pasture species, and is grazed by stock.

When assessing the likely impacts of the proposed development on the viability of the local population, it is useful to also consider the likely future biodiversity values under the non-development scenario. Under the non-development scenario, it is very likely that the current land management regime will continue unchanged. This is likely to mean that the subject land will continue to experience set stocking and be ploughed, cropped, and pasture improved. These activities, over time, are likely to encroach upon or entirely destroy the remain patches of Golden Sun Moth habitat.

While the proposed development will directly impact 2.88 ha (25%) of the local Golden Sun Moth habitat, these patches are scattered, isolated, support a low to moderate abundance of moths. The remaining 8.76 ha (75%), including all patches with moderate to high abundance or habitat connectivity, will be protected and managed in the Community Title Lot or large residential lot.

The Golden Sun Moth habitat in the Community Title Lot will be protected and managed in-perpetuity through specific environmental protection by-laws and an associated BMP to be written as part of a Community Management Statement. The BMP, to be endorsed by Yass Valley Council and DPIE-BCD, will stipulate the conservation-focused management measures that will be implemented. At a minimum, this will include actions such as targeted weed control, feral animal control, grazing control, biomass control, and protection of native vegetation and threatened species habitat. The key aims of the management measures will be

to protect the retained significant ecological values and reduce the impact of known threatening processes.

The Golden Sun Moth habitat in the large residential lot will be protected and managed in-perpetuity via a Conservation Agreement established under the BC Act. The purpose of the Conservation Agreement will be to protect and manage the significant ecological values the large residential lot supports, in particular the Golden Sun Moth. Management actions will be directed towards protecting threatened species habitat, reducing the impact of known threatening processes, and improving the condition of the groundstorey vegetation. To that end, a management plan endorsed by Yass Valley Council and the DPIE-BCD will be developed for the large residential lot.

As such, given the current management regime, the proposed development is unlikely to lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population. Indeed, if the measures in Section 3.1 and Section 3.3 are implemented, it is likely that the proposed development will lead to an increase in the long-term viability of the local population.

i. an estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion

Within the Golden Sun Moth EOO (Figure 13), the following reserves and offsets (all of which occur within the Murrumbateman IBRA subregion) are known to support the Golden Sun Moth.

- Queanbeyan Nature Reserve (area = 67 ha).
- Mcleods Creek Nature Reserve (area = 204 ha).
- Goorooyarroo Nature Reserve (area = 829 ha).
- Dunlop Grassland Nature Reserve (area = 103 ha).
- Jerrabomberra Grasslands (East and West) (combined area = 360 ha).
- Crace Grasslands Nature Reserve (area = 159 ha).
- Mulligans Flat Nature Reserve (area = 1,253 ha).
- Mulanggari Nature Reserve and Offset (combined area = 163 ha).
- Gungaderra Nature Reserve and Offset (combined area = 330 ha).
- Kinleyside Nature Reserve and Offset (combined area = 518 ha).
- Jarramlee/West Macgregor Offset (combined area = 145 ha).
- Majura West Grasslands Offset (area = 95 ha).
- Throsby North Offset (area = 172 ha).
- Throsby East Offset (area = 104 ha).
- Woolshed Creek Offset (area = 60 ha).

In total, the above reserves and offsets protect 4,562 ha of land.

j. the measure/s proposed to contribute to the recovery of the species in the IBRA subregion

The documents referenced at the start of Section 3.4 recommend the following management actions to protect, manage, and maintain/improve Golden Sun Moth habitat.

- Carry out targeted survey across private land and map habitat to identify priority areas for landholder engagement.
- Minimise impacts of commercial activities / agricultural practices by negotiating conservation arrangements, management agreements, and covenants on private land.
- Reduce and maintain weed densities at low levels by site-based weed control.
- Modify agricultural practices (e.g. grazing, ploughing, fertiliser application, etc.).

While the proposed development will directly impact 2.88 ha (25%) of the local Golden Sun Moth habitat, the remaining 8.76 ha (75%), including all patches with moderate to high abundance or habitat connectivity, will be protected and managed in the Community Title Lot and large residential lot.

The Golden Sun Moth habitat in the Community Title Lot will be protected and managed in-perpetuity through specific environmental protection by-laws and an associated BMP to be written as part of a Community Management Statement. The BMP, to be endorsed by Yass Valley Council and DPIE-BCD, will stipulate the conservation-focused management measures that will be implemented. At a minimum, this will include actions such as targeted weed control, feral animal control, grazing control, biomass control, and protection of native vegetation and threatened species habitat. The key aims of the management measures will be to protect the retained significant ecological values and reduce the impact of known threatening processes.

The Golden Sun Moth habitat in the large residential lot will be protected and managed in-perpetuity via a Conservation Agreement established under the BC Act. The purpose of the Conservation Agreement will be to protect and manage the significant ecological values the large residential lot supports, in particular the Golden Sun Moth. Management actions will be directed towards protecting threatened species habitat, reducing the impact of known threatening processes, and improving the condition of the groundstorey vegetation. To that end, a management plan endorsed by Yass Valley Council and the DPIE-BCD will be developed for the large residential lot.

The proposed development will therefore contribute to the recovery of the species through the implementation of the above measures.

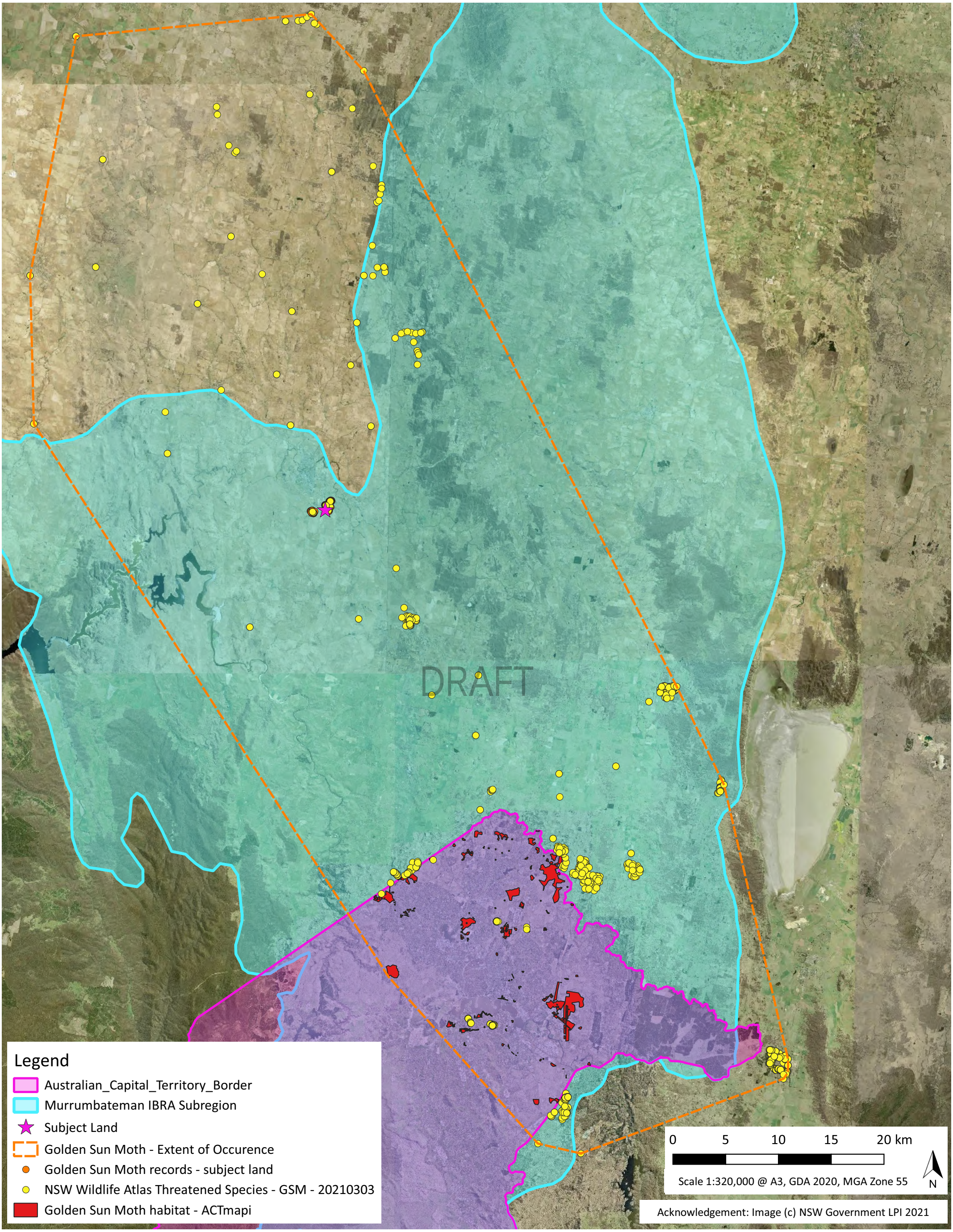

Figure 13. Golden Sun Moth Extent of Occurrence and Estimated Occupied Habitat

Capital Ecology Project No: 2909
Drawn by: S. Reid
Date: 23 April 2021

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;

However, as detailed in Section 2.3.4, the subject land does support habitat for EPBC Act listed threatened species (i.e. Golden Sun Moth habitat and Striped Legless Lizard habitat). Based on Capital Ecology's experience with similar projects and the corresponding Significant Impact Criteria (SIC) assessments, once the proposed avoidance, minimisation, and mitigation measures are taken into account, the residual impacts to 2.88 ha of Golden Sun Moth habitat and 1.81 ha of Striped Legless Lizard habitat are unlikely to constitute a significant impact on either species. Nevertheless, for legal certainty, referral of the future proposed action to the Commonwealth Minister for Agriculture, Water and the Environment is recommended.

3.5.2 NSW BC Act – Biodiversity Offset Requirements

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

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. 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.

- PCT1289 – Biodiversity risk rating of 1.75.
- *Delma impar* Striped Legless Lizard – Biodiversity risk rating of 1.50.
- *Synemon plana* Golden Sun Moth – Biodiversity risk rating of 3.00.

3.5.2.2 Ecosystem credit requirements

The results of the BAM ecosystem credit calculations completed for the proposed development are provided in Table 17. As shown in Table 17, only one of the vegetation zones in the subject land has a vegetation integrity score sufficient for its 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 does generate an ecosystem credit obligation, as determined by the BAM Calculator on 21 April 2021.

Table 17. Ecosystem credit requirements.

PCT & Vegetation Zone	Vegetation Integrity Score	Proposed Clearance Area (ha)	Credits Required
PCT1289 Zone 1	25.9	5.59	63
PCT1289 Zone 2	0	141.56	0

3.5.2.3 Species credit requirements

The subject land supports habitat of potential significance to the Golden Sun Moth and Striped Legless Lizard, both of which are species credit species. Accordingly, as detailed in Table 18, the proposed development does generate a species credit obligation, as determined by the BAM Calculator on 21 April 2021.

Table 18. Species credit requirements.

Species	PCT & Vegetation Zone	Habitat Condition (Vegetation Integrity) Loss	Proposed Clearance Area (ha)	Credits Required
Delma impar Striped Legless Lizard	PCT1289 Zone 2	0	1.81	1
Synemon plana Golden Sun Moth	PCT1289 Zone 1	25.9	2.88	56

As shown in Table 18, the impact to 1.81 ha of Striped Legless lizard habitat only generates a 1 species credit. This arises as the vegetation throughout PCT1289 Zone 2 is low diversity exotic pasture that lacks both composition and structure (Table 9) and, because of this, results in a vegetation integrity that is too low to generate a greater number of species credits. As detailed in Section 3.2.3, the impact to 1.81 ha of Striped Legless lizard habitat in non-native vegetation is classified as a prescribed biodiversity impact. Accordingly, it is proposed that the impact to the 1.81 ha of Striped Legless lizard habitat will be offset by the measures detailed in Section 3.5.2.4.

3.5.2.4 Prescribed impact offset requirements

As stated in 2.5.4 of the *Biodiversity Assessment Method Operation Manual – Stage 2*[34]:

> *Prescribed impacts are difficult to quantify compared to direct, or even indirect, impacts. The BAM does not calculate biodiversity credits to offset a prescribed impact. The consent authority has the discretion to increase the number of biodiversity credits to be retired (or other conservation measures to be undertaken), if the justification is due to environmental, social and economic impacts of the proposed development (see section 7.13(4) BC Act and clause 6.1.2 (b) BC Regulation). If mitigation measures or adaptive management are not applicable, the assessor and proponent should consider options to compensate for unavoidable prescribed impacts. Given there is no set method for determining a suitable quantum of credits to offset a prescribed impact, the assessor should clearly document the decision pathway and justification for suggested credit numbers or other compensatory actions in the BDAR or BCAR. Any biodiversity credits proposed are then additional to the baseline number of biodiversity credits determined by the BAM and will not be part of the credit report generated by the BAM-C.*

Accordingly, if acceptable to Council and the Biodiversity Conservation Trust, the impact of the proposed development on 1.81 ha of Striped Legless Lizard habitat will be offset by calculating the monetary value of the credit obligation that would be generated assuming that the impact to the species were to occur in low diversity native pasture (i.e. PCT1289 Zone 1) and the obligation met by paying into the Biodiversity Conservation Fund. The resultant calculated amount will be dedicated by the proponents of the proposed development to the management of the 24.9 ha Community Title Lot that will be established to protect the retained Striped Legless Lizard habitat.

As detailed in Table 19 and Table 20, the prescribed biodiversity impact on Striped Legless Lizard generates 18 species credits and would cost $13,418.56 if the obligation were met by paying into the Biodiversity Conservation Fund (calculated on 21 April 2021). As such, $13,418.56 will be dedicated to the management of the Striped Legless Lizard habitat retained in the 24.9 ha Community Title Lot.

Table 19. Prescribed impact credit requirements, calculated on 9 July 2020.

Species	PCT & Vegetation Zone	Habitat Condition (Vegetation Integrity) Loss	Proposed Clearance Area (ha)	Credits Required
Delma impar Striped Legless Lizard	PCT1289 Zone 2	25.9	1.81	18

Table 20. Prescribed impact offset estimation, calculated on 9 July 2020.

Species profile ID	Species	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10211	*Delma impar* Striped Legless Lizard	$495.24	20.69%	$80.00	18	$12,198.69
					Subtotal (excl. GST)	$12,198.69
					GST	$1,219.87
					Total species credits (incl. GST)	$13,418.56

[34] https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-operational-manual-stage-2-190512.pdf

3.5.2.5 Credit obligation options

As detailed by the NSW Department of Planning, Industry and Environment[35], the proponent can address the estimated offset obligation outlined 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 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 is determined at the time the proponent applies for an invoice from the Biodiversity Conservation Trust. A risk premium is included in that calculation to account for fact that the risks and costs involved in securing the offset have effectively been transferred to the Biodiversity Conservation Trust. 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 Biodiversity Conservation Fund, 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

Regarding the application of the *State Environmental Planning Policy (Koala Habitat Protection) 2021* (the 'Koala Habitat Protection SEPP') for the proposed development of the subject land, the following points are noted.

5. The subject land is located within the Yass Valley Council Local Government Area (LGA), which is an LGA to which he Koala Habitat Protection SEPP applies as listed in Schedule 1.

6. The subject land has an area of greater than 1 hectare and there is no approved Koala Plan of Management.

[35] https://www.environment.nsw.gov.au/biodiversity/offsetsscheme.htm

7. The subject land is comprised entirely of naturally occurring grassland and does not support any naturally occurring native trees. Accordingly, the subject land does not support 'potential koala habitat'.

8. 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 Yass Valley Council LGA. The closest Koala record is approximately 7 km to the north-east of the subject land.

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land is therefore considered 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 because of the Koala Habitat Protection SEPP from granting consent to a development application within the subject land.

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- *Land Zoning Map - Sheet LSN_001H and LSN_002B.*
- *Lot Size Map - Sheet LSZ_001H and LSZ_002B.*
- *Natural Resources Sensitivity Map - Sheet NRB_001 and Sheet NRB_002.*

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
1289	1	1	0	0	2	0	0	0
		2	0	0	3	1	0	0
		3	0	0	3	1	0	0
	2	1	0	0	0	0	0	0
		2	0	0	1	1	0	0
		3	0	0	0	1	0	0
		4	0	0	0	0	0	0
		5	0	0	0	1	0	0
		6	0	0	0	1	0	0

PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
1289	1	1	0	0	35	0	0	0
		2	0	0	67	0.1	0	0
		3	0	0	50.1	0.1	0	0
	2	1	0	0	0	0	0	0
		2	0	0	0.1	0.1	0	0
		3	0	0	0	0.1	0	0
		4	0	0	0	0	0	0
		5	0	0	0	0.1	0	0
		6	0	0	0	0.1	0	0

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					
1289	1	1	-	-	-	-	-	0	0	0.8	0	0
		2	-	-	-	-	-	0	0	7	0	0
		3	-	-	-	-	-	0	0	14	0	0
	2	1	-	-	-	-	-	0	0	60	0	0
		2	-	-	-	-	-	0	0	9	0	0.1
		3	-	-	-	-	-	0	0	25	0	1
		4	-	-	-	-	-	0	0	42	0	0
		5	-	-	-	-	-	0	0	23	0	1
		6	-	-	-	-	-	0	0	86	0	0

Appendix B. Flora Species Recorded by Plot and Percent Cover

Species List	Common Name	PCT1289.1.1	PCT1289.1.2	PCT1289.1.3	PCT1289.2.1	PCT1289.2.2	PCT1289.2.3	PCT1289.2.4	PCT1289.2.5	PCT1289.2.6
Exotic										
Acetosella vulgaris	Sheep's Sorrel						1.0		1.0	
Avena sp.	Wild Oats					9.0	0.5			
Bromus sp.	Brome Grass	1.0	1.0	2.0	1.0		30.0		5.0	
Carthamus lanatus	Saffron Thistle					0.1				
Chondrilla juncea	Rush Skeleton-weed			0.1						
Cirsium vulgare	Spear Thistle						0.2			
Echium plantagineum	Paterson's Curse			0.1						
Hirschfeldia incana	Buchan Weed		0.1							
Hordeum sp.	Barley Grass	0.5				30.0		5.0	20.0	
Hypochaeris radicata	Flatweed	1.0	0.2	0.2		0.1				
Lolium perenne	Perennial Ryegrass			0.2	1.0		30.0	3.0	5.0	
Malva sp.	Mallow Weed							0.1		
Onopordum acanthium	Scotch Thistle							0.2		
Phalaris aquatica	Phalaris				90.0		5.0	85.0	1.0	75.0
Rumex crispus	Curly Dock							0.1		
Trifolium sp.	Clover	5.0	5.0	3.0	1.0	20.0	20.0	3.0	40.0	3.0
Vulpia sp.	Rat's Tail Fescue	2.0		2.0			5.0		2.0	
Native										
Austrostipa bigeniculata	Tall Speargrass		2.0	45.0						
Austrostipa scabra	Rough Spear-grass	20.0	40.0							
Elymus scaber	Common Wheat Grass			0.1						
Rumex brownii	Swamp Dock		0.1	0.1		0.1	0.1		0.1	0.1
Rytidosperma carphoides	Short Wallaby Grass	15.0	25.0							
Rytidosperma sp.	Wallaby Grass			5.0		0.1				
	Number of Species	7	8	11	4	7	9	9	8	4
	Number of Native Species	2	4	4	0	2	1	0	1	1
	Number of Exotic Species	5	4	7	4	5	8	9	7	3
	No. Native Non-grass Species	0	1	1	0	1	1	0	1	1
	% Native Ground Cover	78.7	91.4	86.9	0.0	0.3	0.1	0.0	0.1	0.1

Appendix C. Fauna Species Recorded

Class	*Scientific Name*	Common Name	BC Act Status
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	Protected
Aves	*Acrocephalus australis*	Australian Reed-Warbler	Protected
Aves	*Anas superciliosa*	Pacific Black Duck	Protected
Aves	*Anthus novaeseelandiae*	Australian (Richard's) Pipit	Protected
Aves	*Cacatua galerita*	Sulphur-crested Cockatoo	Protected
Aves	*Calyptorhynchus funereus*	Yellow-tailed Black-cockatoo	Protected
Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	Protected
Aves	*Corvus coronoides*	Australian Raven	Protected
Aves	*Egretta novaehollandiae*	White-faced Heron	Protected
Aves	*Eolophus roseicapilla*	Galah	Protected
Aves	*Falco berigora*	Brown Falcon	Protected
Aves	*Falco cenchroides*	Nankeen Kestrel	Protected
Aves	*Gymnorhina tibicen*	Australian Magpie	Protected
Aves	*Hirundo neoxena*	Welcome Swallow	Protected
Aves	*Lalage sueurii*	White-winged Triller	Protected
Aves	*Malurus cyaneus*	Superb Fairy-wren	Protected
Aves	*Petrochelidon nigricans*	Tree Martin	Protected
Aves	*Platycercus elegans*	Crimson Rosella	Protected
Aves	*Rhipidura leucophrys*	Willy Wagtail	Protected
Insecta	***Synemon plana***	**Golden Sun Moth**	**Endangered**
Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo	Protected
Reptilia	*Carlia tetradactyla*	Southern Rainbow Skink	Protected
Reptilia	*Ctenotus robustus*	Eastern Striped Skink	Protected
Reptilia	***Delma impar***	**Striped Legless Lizard**	**Vulnerable**

Appendix D. Striped Legless Lizard Survey Results

CHECK	DATE	START Time	END Time	START Temp	END Temp	CLOUD	WIND	GRID	TILE_ID	SVL (mm)	Total L (mm)	Full Tail (Y/N/C)	SPECIES	COMMON NAME	OBS_TYPE	NUMBER	NOTES	SLL ID
1	19/09/2019	10:00:00 AM	11:30:00 AM	17	18	6/8	none	9	-	-	-	-	*Carlia tetradactyla*	Southern Rainbow-skink	Individual	1	-	-
2	26/09/2019	9:30:00 AM	2:40:00 PM	14	15	3/8	slight breeze	-	-	-	-	-	-	-	-	-	No fauna recorded	-
3	2/10/2019	8:05:00 AM	9:45:00 AM	11	17	0	slight breeze	4	D5	7	21	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-401
								8		-	-	-	-	Unidentified Skink	Individual	1	-	-
4	8/10/2019	9:10:00 AM	10:30:00 AM	10	14	6/8	light wind	8		-	-	-	-	Unidentified Skink	Individual	1	Possibly Ctenotus sp.	-
5	16/10/2019	8:40:00 AM	10:15:00 AM	16	18	1/8	none	6	C5	7.5	23	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-601
								8	A1	7.5	24	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-801
								9	D5	-	-	Y	*Delma impar*	Striped Legless Lizard	Individual	1	Not Captured	SLL-901
6	21/10/2019	8:40:00 AM	9:50:00 AM	11	12.8	0	none	9	E9	-	-	Y	*Delma impar*	Striped Legless Lizard	Individual	1	Not Captured	SLL-902
								9	A5	-	-	Y	*Delma impar*	Striped Legless Lizard	Individual	1	Not Captured	SLL-903
7	29/10/2019	7:45:00 AM	9:10:00 AM	10	15	0	none	8	-	-	-	-	-	Unidentified Skink	Individual	1	Possibly Ctenotus sp.	-
								8	B2	8	27	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-802
8	7/11/2019	9:10:00 AM	10:20:00 AM	12.7	13	3/8	strong gusts	9	A9	10.5	31	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-904
								9	C3	-	-	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-905
								9	D5	-	-	Y	*Delma impar*	Striped Legless Lizard	Individual	1	-	SLL-906
								8	-	-	-	-	*Carlia tetradactyla*	Southern Rainbow-skink	Individual	1	-	SLL-803
								6	D5	-	-	-	*Delma impar*	Striped Legless Lizard	Skin	1	-	SLL-6Skin1
9	12/11/2019	8:20:00 AM	9:40:00 AM	16	19	2/8	slight breeze	-	-	-	-	-	-	-	-	-	No fauna recorded	-
10	18/11/2019	8:55:00 AM	10:10:00 AM	11.5	15.2	2/8	light wind	-	-	-	-	-	-	-	-	-	No fauna recorded	-

Table key: SVL = Snout to vent length, Total L = total length.

Appendix E. BAM Summary Reports

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BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00019241/BAAS17089/20/00019242	2909 HughDennett - 7 Iceton Place Yass - BDAR	29/03/2021
Assessor Name	**Report Created**	**BAM Data version ***
	21/04/2021	38
Assessor Number	**Assessment Type**	**BAM Case Status**
	Part 4 Developments (General)	Open
Assessment Revision	**Date Finalised**	**BOS entry trigger**
0	To be finalised	BOS Threshold: Area clearing threshold

* 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	1289_Zone1	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	Zone1	5.59	3	
2	1289_Zone2	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	Zone2	134.52	6	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019241/BAAS17089/20/00019242	2909 HughDennett - 7 Iceton Place Yass - BDAR	29/03/2021
Assessor Name	**Report Created**	**BAM Data version ***
	21/04/2021	38
Assessor Number	**Assessment Type**	**BAM Case Status**
	Part 4 Developments (General)	Open
Assessment Revision	**BOS entry trigger**	**Date Finalised**
0	BOS Threshold: Area clearing threshold	To be finalised

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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)
Diamond Firetail	Stagonopleura guttata	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Flame Robin	Petroica phoenicea	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Scarlet Robin	Petroica boodang	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion

Speckled Warbler	Chthonicola sagittata	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
White-fronted Chat	Epthianura albifrons	1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the 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

BAM Candidate Species Report

Proposal Details

Assessment Id 00019241/BAAS17089/20/00019242	Proposal Name 2909 HughDennett - 7 Iceton Place Yass - BDAR	BAM data last updated * 29/03/2021
Assessor Name	Report Created 21/04/2021	BAM Data version * 38
Assessor Number	Assessment Type Part 4 Developments (General)	BAM Case Status Open
Assessment Revision 0	Date Finalised To be finalised	BOS entry trigger BOS Threshold: Area clearing threshold

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List of Species Requiring Survey

Name	Presence	Survey Months
Delma impar Striped Legless Lizard	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus aggregata Black Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Synemon plana Golden Sun Moth	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Austral Toadflax	Thesium australe	Habitat degraded
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Pink-tailed Legless Lizard	Aprasia parapulchella	Habitat degraded Habitat constraints Geographic limitations
Silky Swainson-pea	Swainsona sericea	Habitat degraded
Southern Myotis	Myotis macropus	Habitat constraints
Tarengo Leek Orchid	Prasophyllum petilum	Habitat degraded
Yass Daisy	Ammobium craspedioides	Habitat degraded

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019241/BAAS17089/20/00019242	2909 HughDennett - 7 Iceton Place Yass - BDAR	29/03/2021
Assessor Name	**Report Created**	**BAM Data version ***
	21/04/2021	38
Assessor Number	**BAM Case Status**	**Date Finalised**
	Open	To be finalised
Assessment Revision	**Assessment Type**	**BOS entry trigger**
0	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

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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 SAII	Ecosystem credits
Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion											
1	1289_Zone 1	Not a TEC	25.9	25.9	5.6			High Sensitivity to Potential Gain	1.75		63

2	1289_Zone 2	Not a TEC	0	0.0	134.5			High Sensitivity to Potential Gain	1.75	0
									Subtotal	**63**
									Total	**63**

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 SAII	Species credits
Delma impar / Striped Legless Lizard (Fauna)								
1289_Zone2	0.0	0.0	1.8	Vulnerable	Vulnerable	1.5	False	1
							Subtotal	**1**
Synemon plana / Golden Sun Moth (Fauna)								
1289_Zone1	25.9	25.9	2.9	Endangered	Critically Endangered	3	True	56
							Subtotal	**56**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00019241/BAAS17089/20/00019242

Proposal Name
2909 HughDennett - 7 Iceton Place Yass - BDAR

BAM data last updated *
29/03/2021

Assessor Name

Assessor Number

BAM Data version *
38

Proponent Names

Report Created
21/04/2021

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
To be finalised

BOS entry trigger
BOS Threshold: Area clearing threshold

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Synemon plana / Golden Sun Moth

Additional Information for Approval

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
1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	Not a TEC	140.1	0	63	63

BAM Biodiversity Credit Report (Like for like)

1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Temperate Montane Grasslands This includes PCT's: 586, 894, 895, 896, 1110, 1185, 1186, 1187, 1202, 1288, 1289, 1298	Temperate Montane Grasslands >=50% and <70%	1289_Zone1	No	63	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Temperate Montane Grasslands This includes PCT's: 586, 894, 895, 896, 1110, 1185, 1186, 1187, 1202, 1288, 1289, 1298	Temperate Montane Grasslands >=50% and <70%	1289_Zone2	No	0	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Like for like)

Species	Vegetation Zone/s	Area / Count	Credits
Delma impar / Striped Legless Lizard	**1289_Zone2**	1.8	1.00
Synemon plana / Golden Sun Moth	**1289_Zone1**	2.9	56.00

Credit Retirement Options

Like-for-like credit retirement options

Delma impar / Striped Legless Lizard	Spp	IBRA subregion
	Delma impar / Striped Legless Lizard	Any in NSW
Synemon plana / Golden Sun Moth	Spp	IBRA subregion
	Synemon plana / Golden Sun Moth	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00019241/BAAS17089/20/00019242

Proposal Name
2909 HughDennett - 7 Iceton Place Yass - BDAR

BAM data last updated *
29/03/2021

Assessor Name

Assessor Number

BAM Data version *
38

Proponent Name(s)

Report Created
21/04/2021

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
To be finalised

BOS entry trigger
BOS Threshold: Area clearing threshold

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Synemon plana / Golden Sun Moth

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Variations)

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
1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	Not a TEC	140.1	0	63	63.00

1289-Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Temperate Montane Grasslands This includes PCT's: 586, 894, 895, 896, 1110, 1185, 1186, 1187, 1202, 1288, 1289, 1298	Temperate Montane Grasslands >=50% and <70%	1289_Zone 1	No	63	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Temperate Montane Grasslands This includes PCT's: 586, 894, 895, 896, 1110, 1185, 1186, 1187, 1202, 1288, 1289, 1298	Temperate Montane Grasslands >=50% and <70%	1289_Zone 2	No	0	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. 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

	Grasslands	Tier 3 or higher threat status	1289_Zone 1	No	63	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grasslands	Tier 3 or higher threat status	1289_Zone 2	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Delma impar / Striped Legless Lizard	**1289_Zone2**	1.8	1.00
Synemon plana / Golden Sun Moth	**1289_Zone1**	2.9	56.00

Credit Retirement Options

Like-for-like options

Delma impar/ Striped Legless Lizard	Spp	IBRA region	
	Delma impar/Striped 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	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Synemon plana/ Golden Sun Moth	Spp	IBRA region	
	Synemon plana/Golden Sun Moth	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	Endangered	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00019241/BAAS17089/20/00019242		0	21/04/2021

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		2909 HughDennett - 7 Iceton Place Yass - BDAR	Open

Assessment Type	Date Finalised	BOS entry trigger
Part 4 Developments (General)	To be finalised	BOS Threshold: Area clearing threshold

PCT list

Price calculated	PCT common name	Credits
Yes	**1289 -** Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	63

Species list

Price calculated	Species	Credits
Yes	***Delma impar*** (Striped Legless Lizard)	1
Yes	***Synemon plana*** (Golden Sun Moth)	56

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

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
Murrumbateman	**1289 -** Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion	No	Temperate Montane Grasslands >=50% and <70%	20.69%	$643.48	2.0318	$ 20,058.85	63	$ 1,263,707.52

Subtotal (excl. GST) **$1,263,707.52**

GST **$126,370.75**

Total ecosystem credits (incl. GST) **$1,390,078.27**

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
10211	***Delma impar*** (Striped Legless Lizard)	Vulnerable	$495.24	20.6900%	$80.00	1	$677.71
10791	***Synemon plana*** (Golden Sun Moth)	Endangered	$5,974.37	20.6900%	$238.97	56	$417,168.75

Subtotal (excl. GST) **$417,846.46**

	GST	**$41,784.65**
Total species credits (incl. GST)		**$459,631.11**
	Grand total	**$1,849,709.38**