New High School in Jerrabomberra, NSW

Biodiversity Development Assessment Report

Final 2.3 – 18 February 2022
Prepared for the NSW Department of Education

Document Information

Report for:	NSW Department of Education
Prepared by:	Sam Reid, Shannon Thompson, and Robert Speirs
Capital Ecology project no.:	3036

Citation: Capital Ecology (2022). *New High School in Jerrabomberra, NSW – Biodiversity Development Assessment Report*. Final 2.3 – 18 February 2022. Prepared for the NSW Department of Education. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 3036.

Version Control

Version	Internal reviewer	External reviewer	Date of issue
Draft version 1.1	Robert Speirs	Chris Daly	17/09/2020
Final version 1.1	Robert Speirs	Chris Daly School Infrastructure NSW	29/10/2020
Draft version 2.1	Robert Speirs	TSA Management Pty Ltd	17/05/2021
Draft version 2.2	Robert Speirs	TSA Management Pty Ltd	24/08/2021
Final version 2.1	Robert Speirs	TSA Management Pty Ltd DPIE-BCD	15/09/2021
Final version 2.2	Robert Speirs	DPIE-BCD	04/02/2022
Final version 2.3	Robert Speirs	-	18/02/2022

Acknowledgements

Capital Ecology gratefully acknowledges the contributions and/or assistance of the following people and organisations in undertaking this study.

- Chris Daly – Director, Black Mountain Construction Assurance Pty Ltd.

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

Table of Contents

List of Figures

List of Tables

Preamble

1. Introduction

This Biodiversity Development Assessment Report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of an application for a State Significant Development (SSD No 24461956). The SSDA is for a new high school located at Jerrabomberra.

This report addresses the Secretary's Environmental Assessment Requirements (SEARs), notably:

SEARs Requirement	Response
11. Biodiversity • Provide a Biodiversity Development Assessment Report (BDAR), that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017 and Biodiversity Assessment Method, except where a BDAR waiver has been issued in relation to the development or the development is located on biodiversity certified land. • Where a BDAR is not required, because a BDAR waiver has been issued, in relation to the development, provide: ○ a copy of the BDAR waiver and demonstrate that the proposed development is consistent with that covered in BDAR waiver. ○ an assessment of flora and fauna impacts where significant vegetation or flora and fauna values would be affected by the proposed development.	This Biodiversity Development Assessment Report addresses SEARs Requirement "11. Biodiversity".

2. Proposal

The proposed development is for the construction of a new high school in Jerrabomberra. The proposal will meet community demand and to ensure new learning facilities are co-located near existing open space infrastructure. The proposal generally includes the following works:

- Site preparation;
- Construction of a series of buildings up to three storeys including administration/staff areas, library, hall and general learning spaces;
- Construction of new walkways, central plaza and outdoor games courts;

- Construction of a new at-grade car park;
- Associated site landscaping and open space.

The proposal has been designed to accommodate approximately 500 students with Stream 3 teaching spaces, however the core facilities will be future proofed to a Stream 5 to enable possible future expansion to meet projected demand.

The proposal will include site preparation works, such as clearing and levelling to accommodate the proposed buildings and play areas. The proposal will involve the construction of a series of buildings housing general learning spaces, administration and staff wings, outdoor learning areas, a library and assembly hall.

The proposal will include construction of a new driveway and hardstand with access proposed off the northern stub road east of Environa Drive. Pedestrian access is proposed off Environa Drive and the northern stub road.

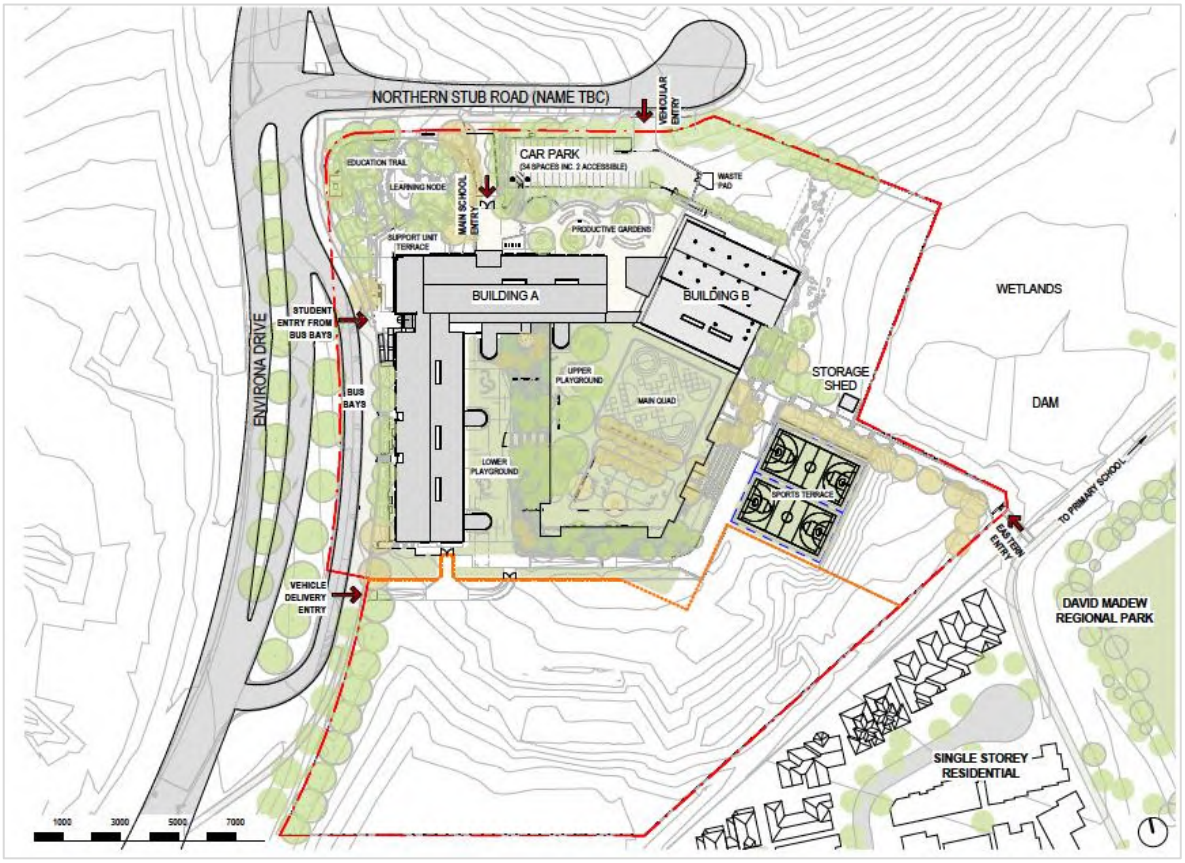


Figure 1. Proposed site plan
Source: TKD Architects

3. Site Description

The proposed development is located within the South Jerrabomberra Innovation Precinct, also referred as the Poplars Innovation Hub, in the local government area of Queanbeyan-Palerang Regional Council.

The school site is part of an existing lot (Lot 1 in DP 1263364), which is approximately 65.49 ha in area and will be characterised by a mix of business park and open space uses and a new north-south connector road named Environa Drive.

Delivery of the Precinct is underway with Environa Drive currently under construction. Most of the lot, however, remains undeveloped.

The school site is subject to a proposed lot (Lot 2 in DP 1263364), which was approved by Council under DA332-2015 on 10 March 2021 but is not yet registered. The approved lot is irregular in shape, is largely cleared and is approximately 4.5 ha in area. A small dam is located adjacent to the south eastern boundary of the site, which forms part of a broader wetland.

The site is located in excellent proximity to existing open space facilities. It adjoins David Madew Regional Park to the south east and is located 100 m east of an existing recreational field associated with Jerrabomberra Public School.

A description of the site is provided in the table below.

Table 1. New High School in Jerrabomberra Site Description

Item	Description
Site address	School address yet to be determined however, it is located within the Jerrabomberra Innovation Precinct at 300 Lanyon Drive, Jerrabomberra.
Legal description	Lot 1 in DP 1263364 (existing) Lot 2 in DP 1263364 (proposed, but not registered)
Total area	Lot 1 – 65.49 ha Lot 2 – 4.5 ha
Frontages	The site provides frontage to Environa Drive and the northern stub road, both currently under construction.
Existing use	The site is undeveloped and contains a series of small vegetation clusters scattered across the site.
Existing access	Existing access is via an informal unsealed driveway off Tompsitt Drive along the northern boundary of the existing lot. The site will be accessed via Environa Drive and a secondary access road (North Road), which is currently under construction.

Table 1. New High School in Jerrabomberra Site Description	
Item	Description
Context	Land to the south is primarily residential in nature. Jerrabomberra Public School and David Madew Regional Park are located to the east/south-east, while land to the west is undeveloped and features Jerrabomberra Creek. The site is located within the South Jerrabomberra Innovation Precinct, which is currently under construction. The areas north and west of the site are currently undeveloped but the site is currently undergoing a transition from rural to business park uses. Development further north on the opposite side of Tompsitt Drive and along Edwin Land Parkway includes retail and commercial uses. Development immediately to the south includes existing low density residential development. Land in the south west has been identified for future low density residential, light industrial and business park uses.

Figure 2. Site aerial depicting the land subject to the proposed High School.
Source: TKD Architects

Executive Summary

This Biodiversity Development Assessment Report (BDAR) accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of an application for a State Significant Development (SSD No 24461956). The SSDA is for a new high school located at Jerrabomberra, NSW (the 'proposed development'). This report addresses the Secretary's Environmental Assessment Requirements (SEARs), notably SEARs Requirement "11. Biodiversity".

The proposed development is situated in a portion of Lot 1 DP1263364, Jerrabomberra, NSW (the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned to complete the necessary biodiversity surveys and prepare this BDAR to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

Background

The property known as "The Poplars" occupies land to the north (known as the "North Poplars") and south (known as the "South Poplars") of Tompsitt Drive, Jerrabomberra, NSW. The ecological values of "The Poplars" property have been investigated since the early 1990s. Each study identified the western portions of the land as supporting significant ecological values and recommended conservation of the land, and each study also identified the eastern portions of the land as supporting highly degraded vegetation of little conservation significance and noted the suitability of the land for development. Consistent with these findings, the *Queanbeyan Local Environmental Plan (West Jerrabomberra) 2013* (West Jerrabomberra LEP) allocated land to either conservation or development in a manner that protected the vast majority of the land supporting significant biodiversity conservation values. This land has since been formally conserved under two BioBanking Agreements.

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 2020 (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 the assessment of the potential impact 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). Please note that the impact of all stages of the Poplars Development on MNES (the 'proposed action') was referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved by DAWE on 13 September 2021, subject to certain conditions.

The Subject Land and Development Footprint

As defined in the BAM, the subject land is '*land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal*'. Accordingly, the 'subject land' for this BDAR is 87.00 ha and encompasses the whole of Lot 1 DP1243031 and portions of Lot 1 DP1126721, Lot 6 DP1246134, and Lot 1 DP1263364, Jerrabomberra, NSW. The northern and southern sections of the subject land are bisected by Tompsitt Drive, and the southern section is

bisected by Environa Drive (currently under construction with the proponent being Queanbeyan-Palerang Regional Council).

As defined in the BAM, the development footprint is '*the area of land that is directly impacted by a proposed development, including access roads and areas used to store construction materials. The term development footprint is also taken to include clearing footprint, except where the reference is to a small area development or a major project development'.* Accordingly, the development footprint for this BDAR, located in the south-eastern corner of Lot 1 DP1263364 and encompassing an area of 4.50 ha, relates only to the portion of the subject land that will be impacted by the proposed development.

Survey Overview

Vegetation and potential flora/fauna habitat were surveyed and mapped in accordance with the BAM. This involved the following nine ecological surveys performed by Capital Ecology between 27 September 2019 and 23 July 2020.

- Plant Community Type and Vegetation Zone assessment and mapping.
- BAM plots.
- A remnant tree survey.
- Threatened flora surveys via transect surveys, surveys of rocky areas, and opportunistic observations.
- Threatened bird surveys via areas searches and opportunistic observations.
- A fauna nesting survey via inspections of each tree for signs of fauna breeding in hollows or nests.
- 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.
- Surveys for the Pink-tailed Legless Lizard *Aprasia parapulchella* via an intensive rock turning survey consistent with the Commonwealth guidelines.
- A full program of targeted Golden Sun Moth *Synemon plana* surveys involving belt transects on four separate days following methodology consistent with the Commonwealth guidelines.

Results

Native vegetation

The subject land supports two Plant Community Types (PCT).

- PCT320 – *Kangaroo Grass - Redleg Grass forb-rich temperate tussock grassland of the northern Monaro, ACT and upper Lachlan River regions of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion.*
- PCT1334 – *Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion.*

Before European occupation, the whole of the subject land would have been characterised by an open grassy woodland PCT (i.e. PCT1334), merging with grassland lower in the landscape to the west (i.e. PCT320).

The subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 97% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The areas which retain some of the original canopy occur as isolated paddock trees or small, scattered patches of vegetation. The majority of the subject land has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris *Phalaris aquatica*) and a variety of weeds. There is a severe infestation of Serrated Tussock *Nassella trichotoma* in the low-lying land in the south-western corner of the subject land.

Some portions of the groundstorey across the subject land have a dominance of native grasses and forbs; these areas are largely restricted to the northern section of the subject land, the northern boundary of the southern section, and the south-western corner of the southern section. However, the prolonged period of stock grazing combined with historic pasture improvement has greatly depleted the native species diversity in the groundstorey across these areas.

The riparian vegetation in the subject land is generally dominated by exotic pasture grasses along the wet, low-lying areas bordering the drainage line in the south-east.

The majority of the vegetation in the subject land is therefore largely characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.

Finally, the subject land is bordered to the east and south-east by urban development, to the south by Jerrabomberra Creek, and to the north and west by relatively intact grassland and woodland vegetation (i.e. two BioBanking Sites).

Threatened ecological communities

EPBC Act Natural Temperate Grassland of the South Eastern Highlands

PCT320 is identified as the potential EPBC Act listed threatened ecological community (TEC) *Natural Temperate Grassland of the South Eastern Highlands*. PCT320 Zone 1 meets the listing criteria for NTG-SEH as it is characterised by a native groundstorey with moderate to high native forb diversity. PCT320 Zone 1 does not occur in the development footprint and so will not be impacted by the proposed development. PCT320 Zone 2 does not meet the listing criteria for NTG-SEH as it is characterised by a clearly exotic groundstorey. PCT320 Zone 2 does not occur in the development footprint and so will not be impacted by the proposed development. As such, while the wider subject land supports Natural Temperate Grassland of the South Eastern Highlands in the areas defined by PCT320 Zone 1, the development footprint does not.

EPBC Act Box-Gum Woodland

PCT1334 is identified as the potential EPBC Act listed TEC *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. PCT1334 Zone 1 meets the criteria for the EPBC Act listed TEC. However, PCT1334 Zone 1 does not occur in the development footprint and so will not be impacted by the proposed development. PCT1334 Zones 2 to 5 do not meet the listing criteria. As such, while the wider subject land supports EPBC Act Box Gum Woodland in the areas defined by PCT1334 Zone 1, the development footprint does not.

BC Act Box-Gum Woodland

PCT1334 is identified as the potential BC Act listed TEC *White Box – Yellow Box – Blakely's Red Gum Woodland* (BC Act Box-Gum Woodland). PCT1334 Zone 1, Zone 2, and Zone 3, support vegetation which meets the criteria for this TEC in moderate to high condition, and PCT1334 Zone 4 supports vegetation which meets the criteria for this TEC in low condition. PCT1334 Zone 5 lacks a native overstorey and has a groundstorey that is highly modified and dominated by perennial exotic grasses and herbaceous weeds. As such, PCT1334 Zone 5 does not support vegetation which meets the criteria for this TEC under the BC Act.

PCT1334 Zone 1, Zone 2, and Zone 3 do not occur in the development footprint and so will not be impacted by the proposed development. However, PCT1334 Zone 4 does occur in the development footprint. The proposed development will therefore impact 1.46 ha of low condition BC Act Box-Gum Woodland (i.e. 1.46 ha of PCT1334 Zone 4).

Threatened species

Threatened flora

One EPBC Act threatened species, Hoary Sunray *Leucochrysum albicans* var. *tricolor* (EPBC Act endangered) was recorded in the northern-most corner of the subject land. Approximately 130 plants were recorded in 700 m^2 of the relatively intact PCT1334 Zone 1 located immediately adjacent to the Poplars North BioBanking Site. However, this area does not occur in the development footprint and so will not be impacted by the proposed development.

None of the remaining threatened flora species credit species were recorded in the subject land and none are considered likely to occur.

Threatened fauna

The historic activities which have occurred across the development footprint have substantially degraded the habitat value for native fauna. As a result, the majority of the threatened fauna species credit species identified by the BAM were considered unlikely to occur in the development footprint. However, targeted surveys did detect Golden Sun Moth (EPBC Act vulnerable, BC Act endangered).

A total of 188 Golden Sun Moths were recorded in the subject land across the four surveys. Golden Sun Moths were recorded at low to moderate density across those zones with a native dominant groundstorey (i.e. PCT320 Zone 1 and PCT1334 Zones 1, 2, and 4). The exception to this is the patch of Golden Sun Moth habitat immediately to the north-east of Environa Drive, which supported a greater density of moths. With respect to the Golden Sun Moth habitat that occurs in the development footprint, only 2 (1%) of the 188 Golden Sun Moth sightings were recorded in or adjacent to this area.

The areas of confirmed habitat are generally flat or gently sloping, dominated by a mix of Tall Speargrass and Wallaby Grasses, and contain low herbage mass and extensive patches of bare ground. The three patches of habitat to the east of Environa Drive, which includes the Golden Sun Moth habitat that occurs in the development footprint, are likely to be functionally isolated from all other patches of habitat. In contrast, the remaining patches of habitat to the west of Environa Drive are likely to be functionally connected to the 83.48 ha of known habitat outside of the subject land (i.e. in the BioBanking Sites).

The extent of habitat in the subject land is based on the extent of the zones that possess a native dominant groundstorey (i.e. PCT320 Zone 1 and PCT1334 Zones 1, 2, and 4). Following this method,

the subject land was assessed as supporting 22.40 ha of Golden Sun Moth habitat, 3.33 ha of which has been subsequently removed by the construction of Environa Drive. Of the remaining 19.07 ha of Golden Sun Moth habitat in the subject land, 1.46 ha occurs in the development footprint and will be impacted by the proposed development. This equates to an impact of 8% of the remaining habitat in the subject land, and an impact of 1.4% when the 83.48 ha of habitat in the adjoining BioBanking Sites is also considered.

Avoidance and Minimisation

The proposed development will clear the entire development footprint, thus no substantial avoidance is specifically proposed for the current action. However, it is important to consider that planning for "The Poplars", both for development and conservation, has been a process that has progressed over more than three decades, and which has been informed by a substantial number of ecological studies. The end result of this process was the formal establishment and in-perpetuity management of large grassland reserves containing the vast majority of the land of high biodiversity value in "The Poplars" (i.e. the Poplars North and South BioBanking Sites). These large and highly significant conservation measures have been implemented on the understanding that they constitute the primary avoidance measures for the overall development at "The Poplars".

The establishment of the 'The Poplars North' and 'The Poplars South' BioBanking Sites protects approximately 50% (98.46 ha) of "The Poplars" property, including the vast majority of the identified significant biodiversity values. Protected values include:

- 87.42 ha of grassland vegetation (i.e. MR631/PCT1202 and PC686/PCT1289), 57.35 ha of which meets the listing criteria for EPBC Act listed Natural Temperate Grassland or the South Eastern Highlands (NTG-SEH);
- 10.65 ha of woodland vegetation (i.e. MR648/PCT1330), 8.48 ha of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 83.48 ha of Golden Sun Moth habitat;
- 61.86 ha of Grassland Earless Dragon habitat; and
- 18.63 ha of Pink-tailed Legless Lizard habitat.

In addition, the BioBanking Sites protect habitat for threatened flora (i.e. Button Wrinklewort *Rutidosis leptorrhynchoides* and Hoary Sunray), a variety of threatened birds, and ACT listed and 'rare and uncommon species' (i.e. Perunga Grasshopper *Perunga ochracea*, Canberra Raspy Cricket *Cooraboorama canberrae*, and Key's Matchstick Grasshopper *Keyacris scurra*).

Impacts

Native vegetation

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

- 1.46 ha of PCT1334 Zone 4 – low diversity native pasture (BC Act native vegetation, BC Act Box-Gum Woodland).

The proposed development will also result in the clearance of highly disturbed exotic vegetation that supports a small native component.

- 1.79 ha of PCT1334 Zone 5 – low diversity exotic pasture that supports a small native component.

In total, the proposed development will result in the clearance of 1.46 ha of BC Act native vegetation, all of which meets the listing criteria for BC Act Box-Gum Woodland, and 1.79 ha of exotic pasture that supports a small native component.

PCT1334 Zone 4 and PCT1334 Zone 5 do not have a vegetation integrity score that requires offsetting for impacts on ecosystem credits.

- PCT1334 Zone 4 – vegetation integrity score of 8.3.
- PCT1334 Zone 5 – vegetation integrity score of 1.3.

PCT1334 is listed as a serious and irreversible impacts (SAII) entity ('BC Act Box-Gum Woodland'). 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 1.46 ha of low-quality BC Act Box-Gum Woodland (i.e. PCT1334 Zone 4) is unlikely to constitute a SAII.

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.

- 1.46 ha of Golden Sun Moth habitat (EPBC Act vulnerable, BC Act endangered), located in PCT1334 Zone 4.

The clearance of 1.46 ha of Golden Sun Moth in PCT1334 Zone 4 requires offsetting for impacts on species credits.

- Golden Sun Moth – habitat condition (vegetation integrity) loss of 8.3.

Golden Sun Moth is listed as a 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 1.46 ha of Golden Sun Moth habitat is unlikely to constitute a SAII.

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 development footprint does not:

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

However, the proposed development will impact 1.46 ha of Golden Sun Moth habitat, a threatened species listed under the EPBC Act. As mentioned previously, the impact of all stages of the Poplars Development on MNES was referred to DAWE on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved by DAWE on 13 September 2021, subject to certain conditions.

NSW BC Act – Biodiversity offset credit calculations

The development footprint does not support vegetation with a vegetation integrity score sufficient for its clearance to result in generation of ecosystem credits. Accordingly, the proposed development does not generate an ecosystem credit obligation.

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

- Golden Sun Moth *Synemon plana* – clearance of 1.46 ha generates 9 species credits.

Important note – It is important to note that the school site is to become a newly created lot (Lot 2 DP1263364), the creation of which was approved by Council under DA332-2015 on 10 March 2021 but is not yet registered. As part of this process, Condition 4 of the conditions of consent required evidence of the retirement of credits or payment to the Biodiversity Conservation Fund for 9 Golden Sun Moth credits prior to the issue of Subdivision Certificate. To address Condition 4, the required offset obligation was addressed by The Village Building Co. Ltd who purchased and retired the required 9 Golden Sun Moth credits. **The entire offset obligation for the proposed development has therefore been met.**

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.

1. The subject land is located within the Queanbeyan-Palerang 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 support a number of the tree species listed in Schedule 2 of the Koala Habitat Protection SEPP. Accordingly, the subject land supports 'potential koala habitat'.

4. “The Poplars” property is separated by over 6 km from the nearest Koala records, all of which occur in intact vegetation to the west; the intervening areas are characterised by urban development and include a substantial number of significant impediments to Koala movement (e.g. large roads, urban expanses, human disturbance).

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land is therefore considered unlikely to support Koala habitat and as such is unlikely to constitute important or occupied Koala habitat now or in the future.

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

1 Introduction

This Biodiversity Development Assessment Report (BDAR) accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of an application for a State Significant Development (SSD No 24461956). The SSDA is for a new high school located at Jerrabomberra, NSW (the 'proposed development'). This report addresses the Secretary's Environmental Assessment Requirements (SEARs), notably that which is listed in Table 2.

Table 2. SEARs Requirement

SEARs Requirement

11. Biodiversity
• Provide a Biodiversity Development Assessment Report (BDAR), that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017 and Biodiversity Assessment Method, except where a BDAR waiver has been issued in relation to the development or the development is located on biodiversity certified land.
• Where a BDAR is not required, because a BDAR waiver has been issued, in relation to the development, provide:
  ○ a copy of the BDAR waiver and demonstrate that the proposed development is consistent with that covered in BDAR waiver.
  ○ an assessment of flora and fauna impacts where significant vegetation or flora and fauna values would be affected by the proposed development.

The proposed development is situated in a portion of Lot 1 DP1263364, Jerrabomberra, NSW (the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned to complete the necessary biodiversity surveys and prepare this 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 2020 (BAM) (NSW Government 2020a[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 includes the assessment of the potential impact 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). Please note that the impact of all stages of the Poplars Development on MNES (the 'proposed action') was referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved by DAWE on 13 September 2021, subject to certain conditions. A previous version of this BDAR (Capital Ecology 2020b[2]), combined with additional assessments of the impact of the Poplars Development on MNES

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

[2] Capital Ecology (2020b). *Jerrabomberra High School, Jerrabomberra, NSW – Biodiversity Development Assessment Report.* Final 01 – October 2020. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2990.

(Capital Ecology 2020a[3],c[4], 2021a[5]), were the primary reports that informed the preliminary documentation (Capital Ecology 2021b[6]).

1.1 The Proposed Development

The proposed development is for the construction of a new high school in Jerrabomberra (Figure 3 and Figure 4). The proposal will meet community demand and to ensure new learning facilities are co-located near existing open space infrastructure. The proposal generally includes the following works:

- site preparation;
- construction of a series of buildings up to three storeys including administration/staff areas, library, hall, and general learning spaces;
- construction of new walkways, central plaza, and outdoor games courts;
- construction of a new at-grade car park; and
- associated site landscaping and open space.

The proposal has been designed to accommodate approximately 500 students with Stream 3 teaching spaces, however the core facilities will be future proofed to a Stream 5 to enable possible future expansion to meet projected demand.

The proposal will include site preparation works, such as clearing and levelling to accommodate the proposed buildings and play areas. The proposal will involve the construction of a series of buildings housing general learning spaces, administration and staff wings, outdoor learning areas, a library, and assembly hall.

The proposal will include construction of a new driveway and hardstand with access proposed off the northern stub road east of Environa Drive. Pedestrian access is proposed off Environa Drive and the northern stub road.

1.2 Subject Land and Development Footprint

As shown in Figure 5, the property known as "The Poplars" property occupies land to the north (known as the "North Poplars") and south (known as the "South Poplars") of Tompsitt Drive, Jerrabomberra, NSW.

As defined in the BAM, the subject land is '*land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal*'. Accordingly, the 'subject land' for this BDAR is 87.00 ha and encompasses the whole of Lot 1 DP1243031 and portions of Lot 1

[3] Capital Ecology (2020a). *Poplars Innovation Precinct (Stage 1), Jerrabomberra, NSW – Biodiversity Development Assessment Report*. Final 01 – August 2020. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2971.

[4] Capital Ecology (2020c). "The Poplars", Jerrabomberra, NSW – *Matters of National Environmental Significance Assessment Report*. Final 01 – September 2020. Prepared for Poplars Developments Pty Ltd. Authors: R. Speirs and S. Reid. Project no. 2971.

[5] Capital Ecology (2021a). *The Poplars Development, Jerrabomberra, NSW – Biodiversity Certification Assessment Report*. Draft 02 – May 2021. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 3027.

[6] Capital Ecology (2021b). *The Poplars Development – EPBC Act Preliminary Documentation*. Final 01 – July 2021. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid and R. Speirs. Project no. 3027.

DP1126721, Lot 6 DP1246134, and Lot 1 DP1263364, Jerrabomberra, NSW (Figure 3, Figure 4, and Figure 5). As shown in Figure 5, the northern and southern sections of the subject land are bisected by Tompsitt Drive, and the southern section is bisected by Environa Drive (currently under construction with the proponent being Queanbeyan-Palerang Regional Council).

As defined in the BAM, the development footprint is '*the area of land that is directly impacted by a proposed development, including access roads and areas used to store construction materials. The term development footprint is also taken to include clearing footprint, except where the reference is to a small area development or a major project development'.* Accordingly, the development footprint for this BDAR, located in the south-eastern corner of Lot 1 DP1263364 and encompassing an area of 4.50 ha, relates only to the portion of the subject land that will be impacted by the proposed development (Figure 3, Figure 4, and Figure 5).

For the purposes of this BDAR, it is assumed that the proposed development will clear all of the 4.50 ha development footprint's currently remaining vegetation. As such, this does not include the vegetation which has already been cleared by the construction of Environa Drive, which extends across the northern, western, and southern boundaries of the development footprint (Figure 5).

The subject land, as shown in Figure 3 and Figure 5, is bordered by:

- urban development to the east and south-east;
- 'E2 – Environmental Conservation' zoned land to the north and west that supports relatively intact grassland and woodland vegetation (i.e. the BioBanking Sites, see Section 1.3); and
- Jerrabomberra Creek to the south, beyond which lies B7, IN2, and RU2 zoned land that supports moderately to highly disturbed grassland vegetation.

Located in the Queanbeyan-Palerang Local Government Area (LGA), pursuant to the *Queanbeyan Local Environmental Plan (West Jerrabomberra) 2013* (West Jerrabomberra LEP), the development footprint is zoned[7] 'B7 –Business Park' and 'RE2 – Private Recreation' (Figure 6), with a minimum lot size[8] of 'W – 4,000 m^2'. The remainder of the subject land is zoned 'B1 – Neighbourhood Centre', 'B7 – Business Park', and 'RE2 – Private Recreation' (Figure 6).

The subject land is not identified on the *Queanbeyan Local Environmental Plan 2012* (Queanbeyan LEP) Terrestrial Biodiversity Map[9] or NSW Government Biodiversity Values Map[10]. The adjoining E2 zoned land immediately to the west of the subject land (i.e. the BioBanking Sites) and Jerrabomberra Creek immediately to the south of the subject land are identified on the NSW Government Biodiversity Values Map.

The topography across the southern section of the subject land falls steadily from 625 m Australian Height Datum (AHD) in approximately the centre to 580 – 590 m AHD along the southern boundary adjoining Jerrabomberra Creek. The topography across the northern section of the subject land is relatively flat, ranging from approximately 610 – 620 m AHD.

As mentioned previously, the northern and southern sections of the subject land are bisected by Tompsitt Drive, and the southern section is bisected by Environa Drive (currently under construction with the proponent being Queanbeyan-Palerang Regional Council) (Figure 5). Otherwise, the built

[7] Queanbeyan Local Environmental Plan (West Jerrabomberra) 2013. *Land Zoning Map - Sheet LZN_001.*
[8] Queanbeyan Local Environmental Plan (West Jerrabomberra) 2013. *Lot Size Map - Sheet LSZ_001.*
[9] Queanbeyan Local Environmental Plan 2012. *Terrestrial Biodiversity Map – Sheet BIO_001.*
[10] https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

infrastructure in the subject land is restricted to existing boundary and internal fences, which are in a generally functional condition.

The development footprint does not contain any tributaries or well-formed drainage lines (Figure 7). The wider subject land supports two tributaries which join Jerrabomberra Creek immediately to the south, and one drainage line that terminates in the south-east of the subject land. The tributaries were dry at the time of survey and are only likely to convey water following substantial rain events. The riparian vegetation in the subject land is generally dominated by exotic grasses along the wet, low-lying areas bordering the drainage line in the south-east. There are eight small to moderately sized dams in the subject land, none of which occur in the development footprint. All of the dams held a small to moderate amount water at the time of survey, and the two dams that occur along the drainage line in the south-east of the subject land are fringed by largely exotic vegetation.

Before European occupation, the subject land would have been characterised by an open grassy woodland that merges with grassland lower in the landscape to the west. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 97% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The areas which retain some of the original canopy occur as isolated paddock trees or small, scattered patches of vegetation. The majority of the subject land has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris *Phalaris aquatica*) and a variety of weeds. There is a severe infestation of Serrated Tussock *Nassella trichotoma* in the low-lying land in the south-western corner of the subject land. Some portions of the groundstorey across the subject land have a dominance of native grasses and forbs; these areas are largely restricted to the northern section of the subject land, the northern boundary of the southern section, and the south-western corner of the southern section. However, the prolonged period of stock grazing combined with historic pasture improvement has greatly depleted the native species diversity in the groundstorey across these areas.

The majority of the vegetation in the subject land is therefore characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.

1.3 Previous Studies

The ecological values of "The Poplars" property have been investigated since the early 1990s. As such, there are a large number of reports which describe the ecological values of the subject land and surrounding land. The reports of most relevance to the subject land include Davis (1991[11]), Kevin Mills & Associates (1994[12]), Biosis Research (2003[13]), Kevin Mills & Associates (2009[14]), Kevin Mills &

[11] Davis, M.S. (1991). *The Poplars, Queanbeyan. Preliminary Vegetation Survey and Delineation of Fauna Habitat.* Prepared for Scott & Furphy Pty Ltd, Belconnen, August.
[12] Kevin Mills & Associates (1994). *Fauna Survey and Assessment "The Poplars" Queanbeyan, NSW*. Prepared for Mr D.H.T. Larcombe.
[13] Biosis Research (2003). Final *Draft: Flora & Fauna Assessment at 300 Lanyon Drive, Queanbeyan*. Report for Queanbeyan City Council, June 2003. Project No. S3777/M3225
[14] Kevin Mills & Associates (2009). *Proposed New Road. The Poplars – North Tralee. City of Queanbeyan*. Prepared for The Village Building Company, August 2009.

Associates (2015[15]), Umwelt (2015[16]), Umwelt (2019[17]), Capital Ecology (2019[18]), and Capital Ecology (2020d[19]).

In combination, these reports have involved the following surveys across "The Poplars" property.

- Plant Community Type (PCT) and vegetation zone mapping.
- Vegetation plots and transects.
- Habitat assessment for threatened flora, fauna, and ecological communities.
- Threatened flora surveys.
- Grassland Earless Dragon *Tympanocryptis pinguicolla* spider-tube surveys.
- Pitfall trapping for Striped Legless Lizard *Delma impar* and Grassland Earless Dragon.
- Pink-tailed Legless Lizard *Aprasia parapulchella* rock-turning surveys.
- Active searches for threatened reptiles.
- Golden Sun Moth *Synemon plana* surveys (southern and central sections of North Poplars, west of the ridgeline of South Poplars).
- Threatened woodland bird surveys.
- Threatened microbat Anabat surveys.
- Spotlight surveys.
- Nocturnal frog call surveys.

The ecological/biodiversity values of "The Poplars" property have been identified and described in a generally consistent manner since the early 1990s. As the condition of the vegetation and flora/fauna habitat varies significantly across "The Poplars" property, the biodiversity values of distinct areas are summarised separately below (refer to Figure 5).

North Poplars – western and northern sections (i.e. the Poplars North BioBanking Site)

- Relatively intact native grassland, much of which meets the listing criteria for the EPBC Act listed 'Natural Temperate Grassland of the South Eastern Highlands' (NTG-SEH).
- Relatively intact woodland vegetation, much of which meets the listing criteria for the BC Act and EPBC Act listed 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (Box-Gum Woodland).

[15] Kevin Mills & Associates (2015). *Ecological Assessment. Northern Road Access Route. Stage 3, South Tralee, Queanbeyan. The Village Building Company, Canberra*. Prepared for The Village Building Company, December 2015.
[16] Umwelt (2015). *BioBanking Agreement for 'The Poplars', Jerrabomberra, NSW*. Prepared on behalf of Robin Pty Limited, March 2015.
[17] Umwelt (2019). *Briefing Note – Poplars Environmental Assessment.* 01 March 2019.
[18] Capital Ecology (2019). *Proposed modification of the approved layout for Stage 3 of the Poplars Northern Entry Road – Preliminary Ecological Impact Assessment*. Project No. 2921, 30 September 2019.
[19] Capital Ecology (2020d). *"The Poplars" – Review of previous ecological studies and rationale behind the allocation of land for development or conservation.* Project No. 2945, 18 June 2020.

- Threatened flora, specifically populations of Button Wrinklewort *Rutidosis leptorrhynchoides* and Hoary Sunray *Leucochrysum albicans* var. *tricolor*.
- Grassland Earless Dragon habitat.
- Golden Sun Moth habitat.
- Threatened woodland bird habitat. Threatened species recorded in or immediately adjacent to "The Poplars" property include Dusky Woodswallow *Artamus cyanopterus*, Gang-gang Cockatoo *Callocephalon fimbriatum*, Varied Sitella *Daphoenositta chrysoptera*, Little Eagle *Hieraaetus morphnoides*, Scarlet Robin *Petroica boodang*, Flame Robin *Petroica phoenicea*, Speckled Warbler *Pyrrholaemus sagittatus*, Diamond Firetail *Stagonopleura guttata*, and the migratory White-throated Needletail *Hirundapus caudacutus* and Rainbow Bee-eater *Merops ornatus.*
- Habitat for ACT listed species, including Perunga Grasshopper *Perunga ochracea*, or species considered' rare and uncommon' in the region, including Canberra Raspy Cricket *Cooraboorama canberrae* and Key's Matchstick Grasshopper *Keyacris scurra*.
- There are signs that portions of this area have historically been cultivated and/or pasture improved.

North Poplars – south-eastern section

- Scattered remnant trees.
- Signs of historic cultivation and/or pasture improvement, heavily grazed, and a highly disturbed understorey that is dominated by a variety of exotic grasses and weeds.
- Some areas are heavily infested with Serrated Tussock.
- This portion of "The Poplars" property does not contain any NTG-SEH or EPBC Act Box-Gum Woodland and was considered unlikely to support habitat of significance to any threatened flora or fauna species.
- Aerial photography shows that within this area a homestead, shearing shed, and a number of other structures once stood.

South Poplars – west of the central ridge line (i.e. the Poplars South BioBanking Site)

- Relatively intact native grassland, much of which meets the listing criteria for the EPBC Act listed NTG-SEH.
- Grassland Earless Dragon habitat.
- Golden Sun Moth habitat.
- Pink-tailed Legless Lizard habitat.
- Habitat for ACT listed species, including Perunga Grasshopper, or species considered 'rare and uncommon' in the region, including Canberra Raspy Cricket and Key's Matchstick Grasshopper.
- Scattered trees and disturbed woodland vegetation, some of which meets the listing criteria for BC Act Box-Gum Woodland.

- Large areas infested by a variety of by exotic shrubs.
- Substantial areas are heavily infested with Serrated Tussock.
- There are signs that portions of this area have historically been cultivated and/or pasture improved.

South Poplars – east of the central ridge line

- Scattered trees and disturbed woodland vegetation, some of which meets the listing criteria for BC Act Box-Gum Woodland.
- Large areas infested by a variety of by exotic shrubs.
- Signs of historic cultivation and/or pasture improvement, heavily grazed, and a highly disturbed understorey that is dominated by a variety of exotic grasses and weeds.
- Substantial areas are heavily infested with Serrated Tussock.
- This portion of "The Poplars" property did not contain any NTG-SEH or Box-Gum Woodland and was considered unlikely to support habitat of significance to any threatened flora or fauna species.

In summary, each study identified the western portions of the land as supporting significant ecological values and recommended conservation of the land, and each study also identified the eastern portions of the land as supporting highly degraded vegetation of little conservation significance and noted the suitability of the land for development.

Consistent with these findings, the West Jerrabomberra LEP allocated land to either conservation or development in a manner that protected the vast majority of the land supporting significant biodiversity conservation values. As shown in Figure 5 and discussed below, this land has since been formally conserved under two BioBanking Agreements.

1.3.1 BioBanking / BAM credits

The establishment of the 'The Poplars North' and 'The Poplars South' as BioBanking Sites under BioBanking Agreements provides a formal, legally binding, and audited conservation focussed management regime for the portions of "The Poplars" property recognised as supporting significant biodiversity values. In exchange for actively managing the land for these values, Robin Pty Ltd (the landowner) has obtained the stipulated credits which they may retire at their discretion (i.e. use to offset an impact elsewhere or sell to another party).

As described in the following two sections, 'The Poplars North' and 'The Poplars South' BioBanking Sites protect approximately 50% (98.46 ha) of "The Poplars" property, including the vast majority of the identified significant biodiversity values. Protected values include:

- 87.42 ha of grassland vegetation (i.e. MR631/PCT1202 and PC686/PCT1289), 57.35 ha of which meets the listing criteria for EPBC Act listed NTG-SEH;
- 10.65 ha of woodland vegetation (i.e. MR648/PCT1330), 8.48 ha of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 83.48 ha of Golden Sun Moth habitat;
- 61.86 ha of Grassland Earless Dragon habitat; and
- 18.63 ha of Pink-tailed Legless Lizard habitat.

In addition, the BioBanking Sites also protect habitat for threatened flora (i.e. Button Wrinklewort and Hoary Sunray), threatened birds (i.e. Dusky Woodswallow, Gang-gang Cockatoo, Varied Sitella, Little Eagle, Scarlet Robin, Flame Robin, Speckled Warbler, Diamond Firetail, and the migratory White-throated Needletail and Rainbow Bee-eater), and ACT listed or 'rare and uncommon species' (i.e. Perunga Grasshopper, Canberra Raspy Cricket, and Key's Matchstick Grasshopper).

1.3.1.1 North Poplars BioBanking Site

On 23 August 2018, a BioBanking Agreement was made between the NSW Minister for the Environment and Robin Pty Ltd to establish 'The Poplars North' biobank site[20]. The Poplars North biobank site encompasses 42.91 ha of "The Poplars" property and is roughly consistent with the area zoned 'E2 – Environmental Conservation'.

As determined via the completed assessment of reasonable equivalence[21], the BioBanking Credits generated by The Poplars North biobank site have been transformed into BAM credits under the current NSW Biodiversity Offset Scheme (BOS). The outcome of this is summarised in Table 3.

Table 3. Poplars North BioBanking / BAM Credits.

BioBanking Scheme			Biodiversity Offset Scheme		
Value	**Area (ha)**	**Credits**	**Value**	**Area (ha)**	**Credits**
MR631	10.27	71	PCT1202	10.27	57
MR686	22.34	103	PCT1289	22.34	102
MR648	9.91	46	PCT1330	9.91	38
Golden Sun Moth	38.10	174	Golden Sun Moth	38.10	111
Grassland Earless Dragon	20.27	215	Grassland Earless Dragon	20.27	145

1.3.1.2 South Poplars BioBanking Site

On 23 August 2018, a BioBanking Agreement was made between the NSW Minister for the Environment and Robin Pty Ltd to establish 'The Poplars South' biobank site[22]. The Poplars South biobank site encompasses 55.55 ha of "The Poplars" property and is roughly consistent with the area zoned 'E2 – Environmental Conservation'.

As determined via the completed assessment of reasonable equivalence[23], the BioBanking Credits generated by The Poplars South biobank site have been transformed into BAM credits under the current NSW Biodiversity Offset Scheme (BOS). The outcome of this is summarised in Table 4.

[20] NSW Office of Environment & Heritage (2018a). *BioBanking Agreement ID: BA310 – Poplars North.*

[21] *Biodiversity Credit Ownership Report – Biodiversity credits owned under the Biodiversity Banking and Offsets Scheme and reasonable equivalence to credits under the Biodiversity Offsets* Scheme (ref: DOC19/495776-4). Dated 12 September 2019.

[22] NSW Office of Environment & Heritage (2018b). *BioBanking Agreement ID: BA309 – Poplars South.*

[23] *Biodiversity Credit Ownership Report – Biodiversity credits owned under the Biodiversity Banking and Offsets Scheme and reasonable equivalence to credits under the Biodiversity Offsets Scheme* (ref: DOC19/495776-3). Dated 12 September 2019.

Table 4. Poplars South BioBanking / BAM Credits.

BioBanking Scheme			Biodiversity Offset Scheme		
Value	**Area (ha)**	**Credits**	**Value**	**Area (ha)**	**Credits**
MR631	16.42	120	PCT1202	16.42	68
MR686	38.39	271	PCT1289	38.39	173
MR648	0.74	5	PCT1330	0.74	2
Golden Sun Moth	45.38	322	Golden Sun Moth	45.38	201
Grassland Earless Dragon	41.59	295	Grassland Earless Dragon	41.59	187
Pink-tailed Legless lizard	18.63	132	Pink-tailed Legless Lizard	18.63	85

1.4 The Poplars Development

As detailed on the Poplars website[24]:

> *Positioned on the border of New South Wales and the ACT, Poplars takes full advantage of its proximity to Parliament House, Federal Government Departments, Canberra's CBD and the region's international airport. Poplars is positioned at the confluence of a number of key transport routes including the Monaro Highway and the soon to be completed Edwin Land Parkway/Ellerton Drive link. These transport links allow the business park to be a hub with convenient access for business travel and the movement of freight. The local council and NSW State Government have highlighted the Poplars area as a location for economic development and employment, while infrastructure grants have also been issued.*
>
> *Poplars has been designed to foster a centre of collaboration and out-of-the-box thinking. The development will provide a working environment where organisations can meet and explore concepts that change our future. By taking cues from the best workplaces, the Innovation Precinct provides for worker wellbeing with open greenspaces, landscaped verges and a masterplan based upon sustainable development practices.*

The Poplars development is designed around the following four precincts: Retail + Services Precinct (Stage 1 completed); Innovation Precinct; Learning Precinct; and Grasslands Reserve (i.e. the BioBanking Sites).

> ***Retail + Services Precinct***
>
> *Poplars Retail + Services precinct has opened the doors to local and national brands, which will service the Innovation Precinct and surrounding area. The marketplace style offering will provide a fun destination for people to meet, shop, eat and unwind.*
>
> ***Innovation Precinct***
>
> *The Innovation Precinct understands the advantages of co-locating with like-minded businesses. While Poplars will be a base for a range of organisations, we are focused on the following*

[24] https://www.poplars.com.au/

sectors: Space and Defence Sectors; Information and communication technologies; and Scientific Research Services.

Learning Precinct

The Poplars Learning Precinct is set to be a networking hub for Poplars residents, where knowledge is shared and ideas are formed. The precinct's innovation centre, for entrepreneurs, start-ups, businesses and investors, will sit between the existing primary school and the future STEM-based high school.

Grassland Reserve

The Poplars Grassland Reserve comprises over 100 ha of conservation area. The area is protected under a Biodiversity Stewardship agreement with the NSW Office of Environment and Heritage.

1.5 Assessment of the Current and Future stages of the Poplars Development

The Poplars has been highlighted as an economic development area by both the NSW State and Local Governments. In March 2021, the NSW Government announced that the area would be deemed a Regional Job Precinct. To trigger employment and educational opportunities at "The Poplars" property, the NSW Government has committed a grant of $23M to trunk infrastructure for the site with Queanbeyan-Palerang Regional Council contributing up to $8M. As part of this process, the developers are gifting land to the NSW Government under a voluntary planning agreement.

As described in Section 1.3, the ecological/biodiversity values of "The Poplars" property have been identified and described in a generally consistent manner since the early 1990s. Each study identified the western portions of the property as supporting significant ecological values and recommended conservation of the land (now BioBanking Sites, refer to Figure 5). Each study also identified the eastern portions of the property as supporting highly degraded vegetation of little conservation significance and noted the suitability of the land for development. Consistent with these recommendations, the allocation of land for either conservation (i.e. E2 zoned land across the BioBanking Sites, refer to Figure 5) or development (i.e. B1, B7, and RE2 zoned land) via the *Queanbeyan Local Environmental Plan (West Jerrabomberra) 2013* aligns with the known significant ecological values of "The Poplars" property. As such, from the early planning stages the Poplars development has been designed to avoid the known significant ecological values of the area.

Since that time, the first phase of the Retail + Services has been completed and Environa Drive is currently under construction. The Development Application (DA) for Stage 1 of the Innovation Precinct, which was the subject of a previous BDAR (Capital Ecology 2020a), has been approved and development is expected to commence in 2021/22. Commitments have also been made for a high school, which is the subject of this BDAR, to be constructed and operational by 2023 in the south-eastern corner of Lot 1 DP126134. The remainder of the Poplars Development, which is the subject of a separate Biodiversity Certification Report (BCAR, Capital Ecology 2021a), is expected to occur over a subsequent 10 to 20 year timeframe.

However, surveys performed for this BDAR recorded Golden Sun Moth across patches of native dominant vegetation in some of the areas earmarked for development (refer to Section 2.3.5.2 of this BDAR). This finding, which was unexpected given the modified condition of the vegetation in the subject land and the substantial number of previous ecological studies of "The Poplars" property, had the potential to substantially delay Stage 1 of the Innovation Precinct and the planned school.

Accordingly, Poplars Developments and Capital Ecology liaised with both DAWE and NSW Department of Planning, Industry, and Environment (DPIE) and proposed the following staged assessment and approval strategy.

- Proceed with a BDAR for Stage 1 of the Poplars Innovation Precinct (i.e. Capital Ecology 2020a).
- The BDAR for Stage 1 of the Poplars Innovation Precinct occurred concurrently with the EPBC Act referral (EPBC Act Referral No. 2020/8801) and assessment process for the broader development (i.e. the combined impact of current and future stages of the Poplars development). This ensures that the full impact of the entire Poplars development on MNES is appropriately assessed.
- Proceed with a second BDAR for the high school that is planned in the south-east corner of Lot 1 DP126134 (i.e. this BDAR).
- Develop a Biodiversity Certification Assessment Report (BCAR) and pursue biodiversity certification for the remainder of "The Poplars" property, incorporating the remainder of the proposed development area and the existing BioBanking Sites (i.e. Capital Ecology 2021a).

The suitability of this staged assessment has been discussed with representatives of DAWE and DPIE and in-principle support has been received. It is important to note that the biodiversity offset obligation (determined via the NSW Biodiversity Offsets Scheme) generated by the two initial developments will be addressed in a proportionate manner as a condition of consent for each DA. The remaining (majority) of the obligation will be addressed when Biodiversity Certification is conferred over the remaining land in "The Poplars" that is zoned for development. Accordingly, while occurring in an incremental manner, this approach will ensure that 100% of the offset obligation will be addressed.

Note that the land in the south-western corner of "The Poplars" may potentially be rezoned at a later point as this area is under consideration by Queanbeyan-Palerang Regional Council as a potential rail intermodal site. However, it is currently unknown:

- if such a development will occur; and
- the timeframes around any such possible development.

Furthermore, the land is currently owned by Robin Pty Ltd (not Poplars Developments Pty Ltd) and there is a Voluntary Planning Agreement registered on the title which requires the dedication of a 3.0 ha site to council for the purposes of a rail intermodal site.

Given the above uncertainties, the possible development of land in the south-western corner of "The Poplars" for a rail intermodal site is not considered as part of the proposed development of The Poplars. If any such development were to proceed in the future, further investigations and environmental assessments would be required.

1.6 Commonwealth and State Assessment and Approval Processes

1.6.1 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[25]). 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 his/her Delegate) will make a decision regarding whether the action requires assessment and approval under the EPBC Act and associated conditions and controls.

As mentioned previously, the impact of all stages of the Poplars Development on MNES was referred to DAWE on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved by DAWE on 13 September 2021, subject to certain conditions.

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

1.6.2 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).

[25] 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.

1.6.2.1 NSW Biodiversity Offset Scheme

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

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

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

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

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

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

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

1.6.2.2 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.

1.6.3 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[26] 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*

[26] Available at https://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Koala-Habitat-Protection-SEPP

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*

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).

1.7 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 the proposed development is classified as a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011*, it is therefore subject to assessment and determination by the NSW Minister for Planning. As stated in the Secretary's Environmental Assessment Requirements (SEARs), a BDAR is required to identify and document the biodiversity values of the subject land and assess the impacts of the proposed development upon these values. The resulting BDAR will be a key informing document for the subsequent Environmental Impact Statement (EIS).

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.

1.7.1 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.

1.7.2 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, BAM credit calculations, and report preparation.

- Shannon Thompson – Field Ecologist

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

- Kristy Lee – Field Ecologist

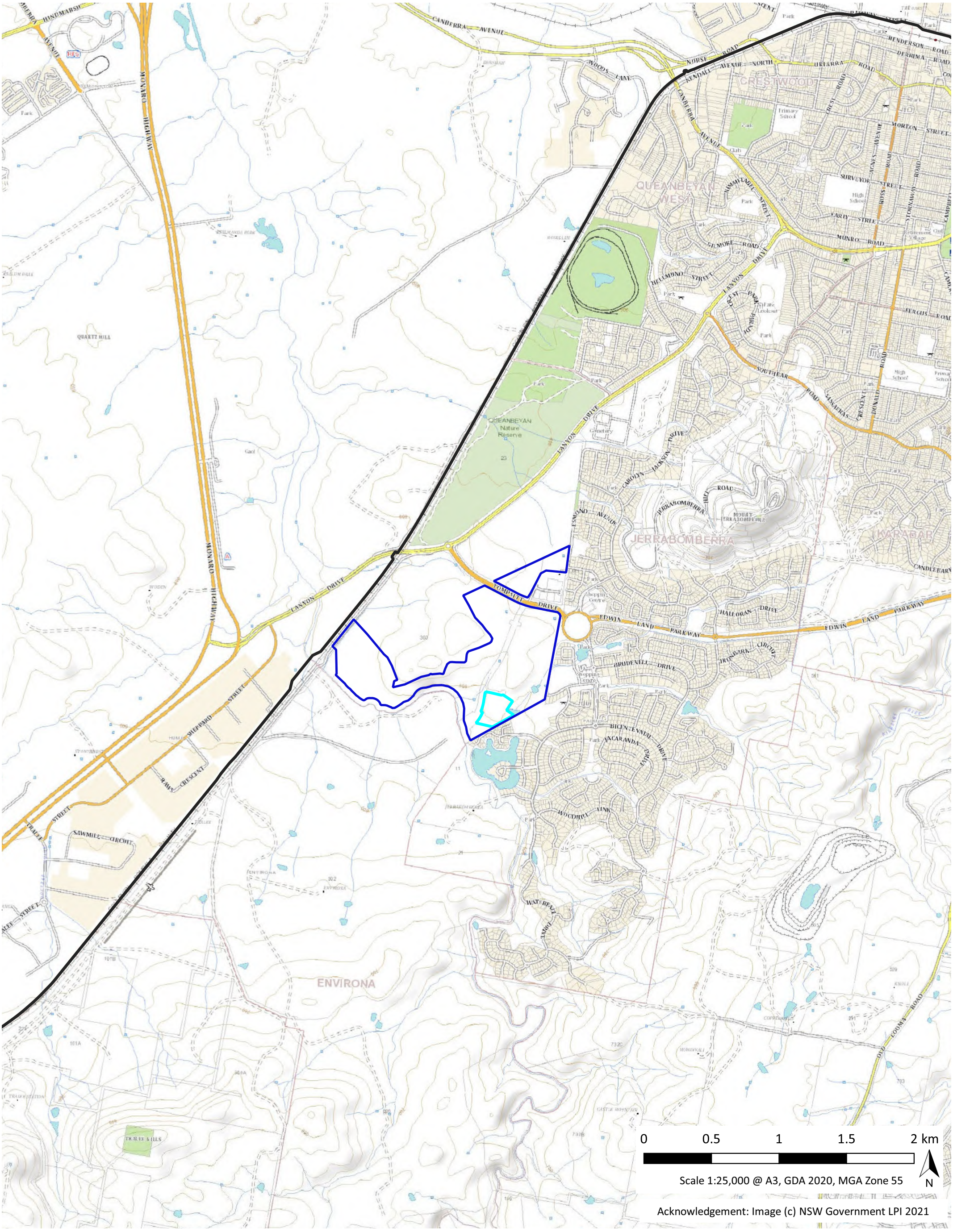
  BSc
  Kristy undertook field surveys and data entry.

- Matthew Gale – Field Ecologist

  BSc (Hons)
  Matthew undertook field surveys.

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

- Capital Ecology's (Robert Speirs – Principal Investigator) Animal Research Authority (ARA) granted under the NSW Animal Research Act 1985 by the NSW Department of Primary Industries Secretary's Animal Care and Ethics Committee (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).



Acknowledgement: Image (c) NSW Government LPI 2021

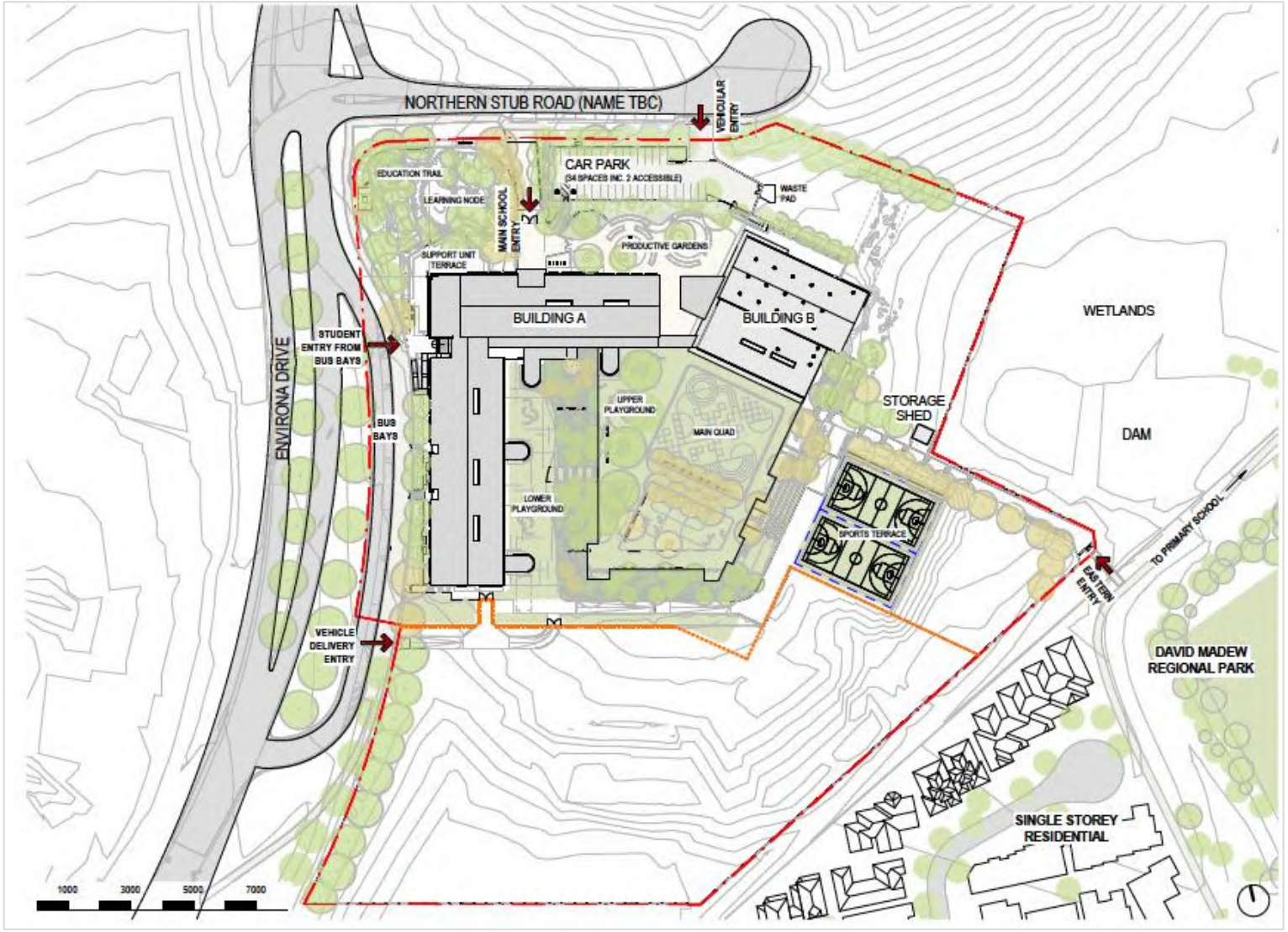
Figure 3. Locality Plan

Legend

- Subject Land
- Development Footprint
- ACT Border

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

Figure 4. The Proposed Development



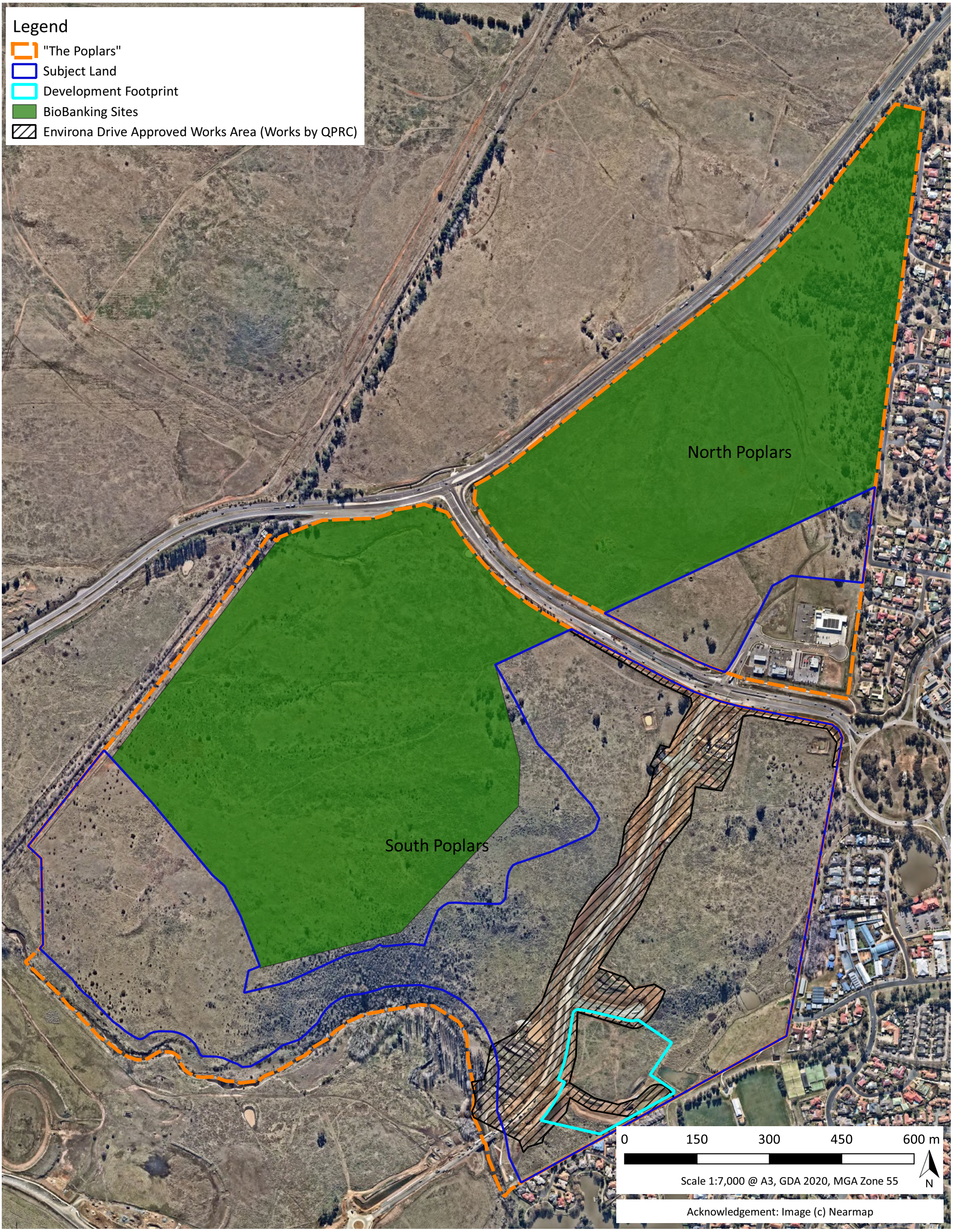


Figure 5. The Subject Land and Development Footprint on Aerial Imagery

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 25 August 2021

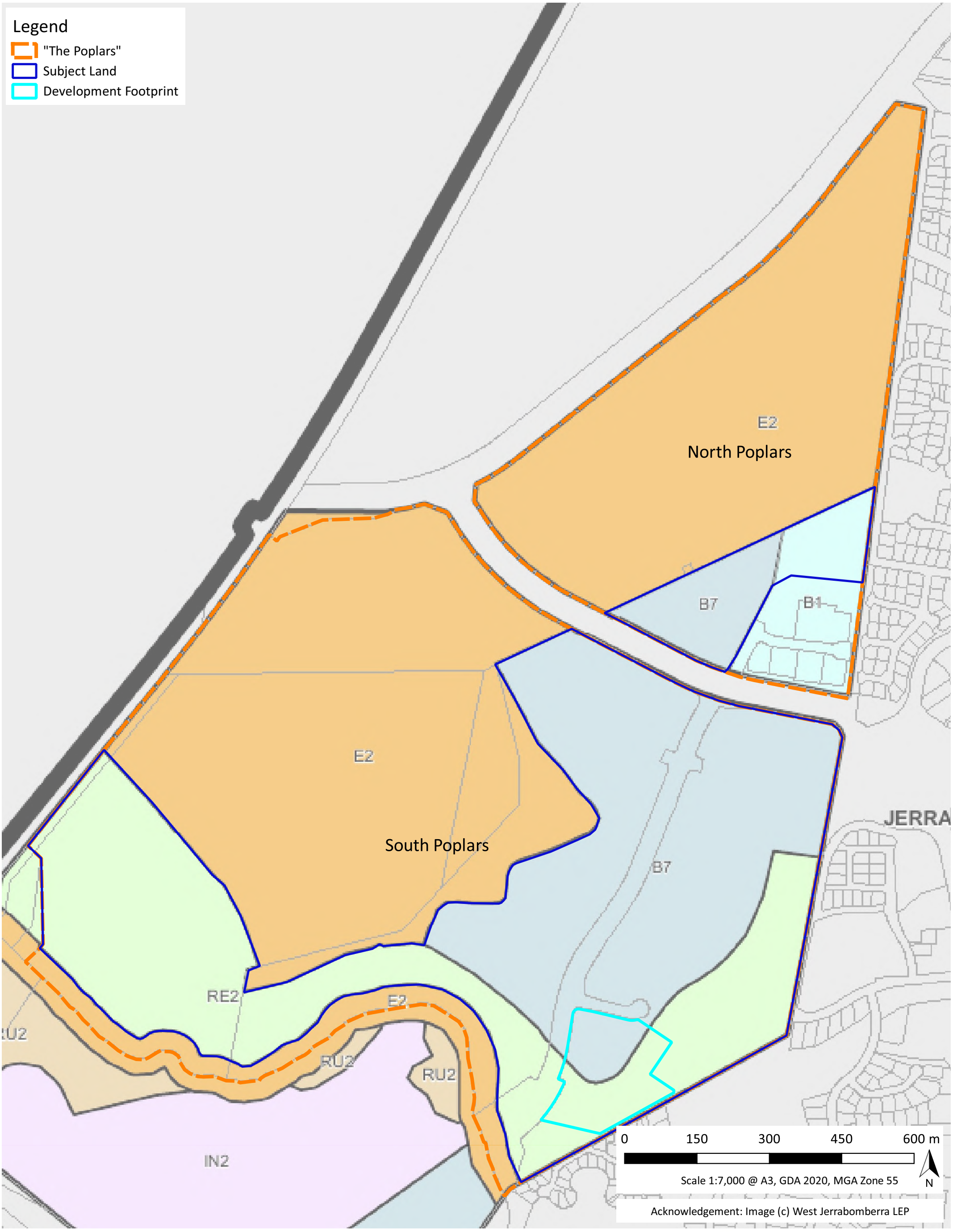


Figure 6. The Subject Land and West Jerrabomberra LEP

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 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 3 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 5 outlines the landscape features and overall landscape context of relevance to the subject land and wider subject land.

As stated in Section 1.2, the 'development footprint' only relates to the portions of the 'subject land' which will be impacted by the proposed development (Figure 4 and Figure 5).

Table 5. 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 one Mitchell Landscape: **Canberra Plains**.	Figure 3
Rivers, streams and estuaries (Strahler[27] stream order)	The development footprint does not contain any tributaries or well-formed drainage lines. The wider subject land supports two 1st order tributaries (defined based on the NSW LPI Hydrology Map and as per Appendix 3 of the BAM) which join Jerrabomberra Creek immediately to the south, and one 2nd order drainage line that terminates in the south-east of the subject land. The tributaries were dry at the time of survey and are only likely to convey water following substantial rain events. The riparian vegetation in the subject land is dominated by exotic grasses along the wet, low-lying areas bordering the drainage line in the south-east. The lack of native riparian vegetation indicates that the tributaries and drainage line are unlikely to provide habitat of significance to aquatic/riparian flora or fauna. There are eight small to moderately sized dams in the subject land, none of which occur in the development footprint. All of the dams held a small to moderate amount water at the time of survey, and the two dams that occur along the drainage line in the south-east of the subject land are fringed by largely exotic vegetation. The dams in the subject land are only likely to be of limited value to the common native water birds, reptiles, and amphibians which occur in the locality.	Figure 7 Figure 9

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

Landscape Feature	Description	Figure Reference
Wetlands (important wetlands)	The subject land does not contain any important wetlands as listed in the Directory of Important Wetlands in Australia (DIWA) or coastal wetlands protected under *State Environmental Planning Policy No 14*.	-
Connectivity	Before European occupation, the subject land would have been characterised by an open grassy woodland that merges with grassland lower in the landscape to the west. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 97% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The areas which retain some of the original canopy occur as isolated paddock trees or small, scattered patches of vegetation. The majority of the subject land has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris) and a variety of weeds. There is a severe infestation of Serrated Tussock in the low-lying land in the south-western corner of the subject land. Some portions of the groundstorey across the subject land have a dominance of native grasses and forbs; these areas are largely restricted to the northern section of the subject land, the northern boundary of the southern section, and the south-western corner of the southern section. However, the prolonged period of stock grazing combined with historic pasture improvement has largely depleted the native species diversity in the groundstorey across these areas. The riparian vegetation in the subject land is dominated by exotic pasture grasses along the wet, low-lying areas bordering the drainage line in the south-east. The lack of native riparian vegetation indicates that the tributary and drainage line are unlikely to provide habitat of significance to aquatic/riparian flora or fauna. The majority of the vegetation in the subject land is therefore characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds. Finally, the subject land is bordered to the east and south-east by urban development, to the south by Jerrabomberra Creek, and to the north and west by relatively intact grassland and woodland vegetation (i.e. the BioBanking Sites). In light of the above, while the remnant trees and native and exotic pasture in the subject land are likely to be of some habitat value to a variety of native fauna, the subject land is unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature. This is supported by the fact that the subject land does not contain 'Local Links' or 'Regional Linkage Value' on the ACT Government's ACTmapi[28].	Figure 8 Figure 9
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.	-

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

Landscape Feature	Description	Figure Reference
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 1,358 ha. This buffer area contains both woody PCTs (i.e. woodland, dry sclerophyll forest) and non-woody PCTs (i.e. natural grassland). Accordingly, the following two categories of native vegetation were defined to identify the total are of native vegetation in the buffer. 1. Woody vegetation – The areas which have a woody PCT and retain remnant woody vegetation or woody regrowth. 2. Non-woody vegetation – The areas which either: a. have a grassland PCT and retain at least a substantial proportionate cover (i.e. > 35%) of native groundstorey species; or b. have a woody PCT from which the woody vegetation has been cleared, yet at least a substantial proportionate cover (i.e. > 35%) of native groundstorey species remains (often referred to as derived or secondary grassland). Native vegetation cover was first identified and mapped via interpretation of the available aerial imagery (ACT Government aerial imagery and NSW LPI) and publicly available spatial datasets (ACTmapi[29]). The presence of remnant canopy trees, cultivation patterns in paddocks, unnaturally green and/or uniform groundstorey vegetation etc., were important factors considered during aerial interpretation. Field reconnaissance was then undertaken to ground truth and refine the mapping where possible. This field reconnaissance involved driving the publicly accessible roads within the buffer area and making observations across paddocks etc. from the roadside. 1. Woody vegetation cover – 282 ha (21%) of the buffer area was determined to support native woody vegetation cover. 2. Non-woody vegetation cover – 257 ha (19%) of the buffer area was determined to support native non-woody vegetation cover. ↓ Total native vegetation cover – the total area of native vegetation cover in the buffer area is 539 ha (40%). This falls into the >30–70% cover class in the BAM Calculator.	Figure 8

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

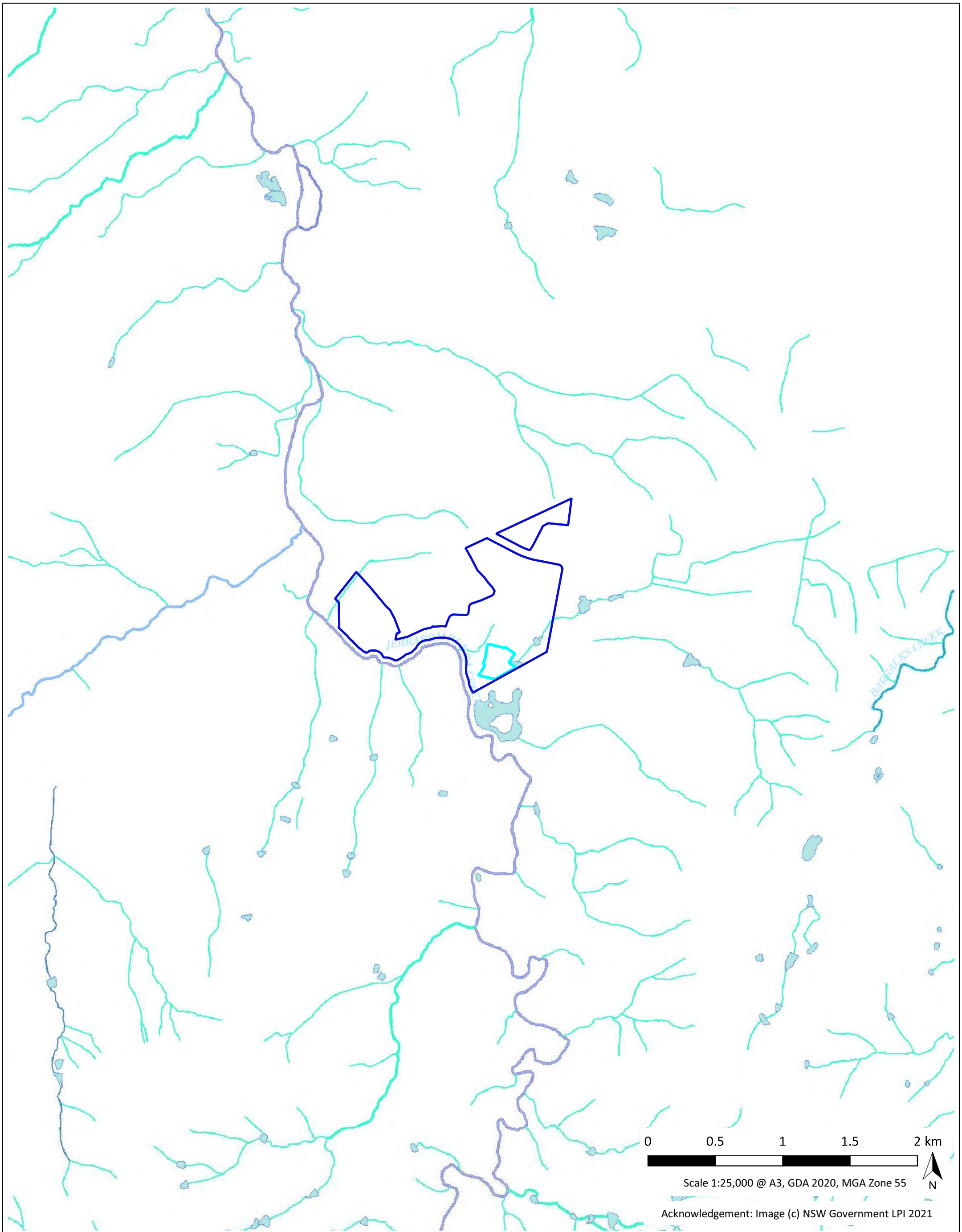


Figure 7. Hydrology

Legend

- Subject Land
- Development Footprint

capital ecology

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

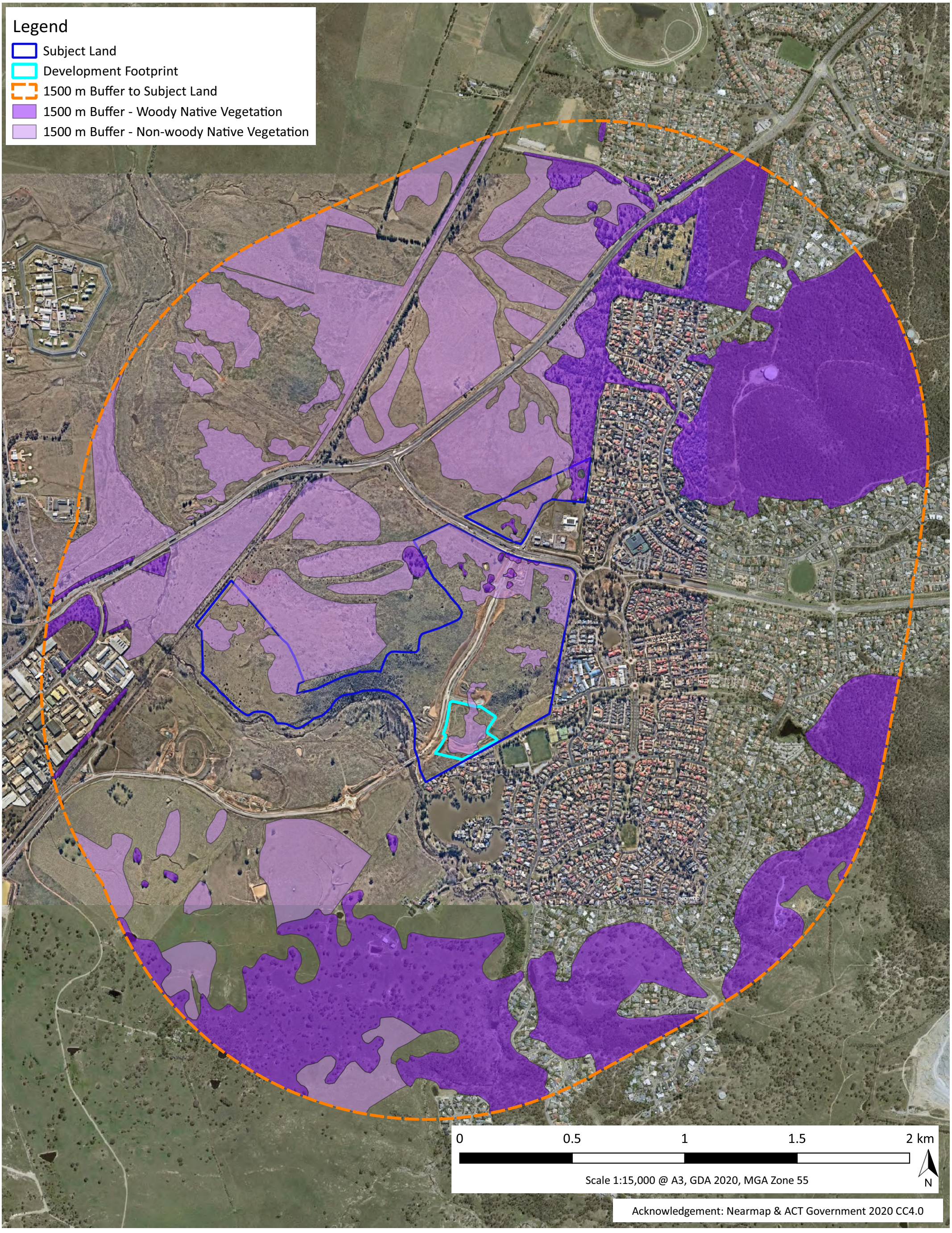


Figure 8. Site Map

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 25 August 2021

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[30,31], ACT Government[32], and previous NSW Government[33] 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 the 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.

[30] 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.
[31] Commonwealth of Australia (2016). Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.
[32] ACT Government (2010). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*. Environment and Sustainable Development Directorate – Conservation Planning and Research.
[33] 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 6. 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/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020.

It is important to note that the information and data collected during vegetation survey and mapping (Section 2.2.2.1 to 2.2.2.4) were also used to assess the subject land for the presence/absence of habitat constraints and/or microhabitats for EPBC Act only listed species (Section 2.3.3), ecosystem credits species (Section 2.3.4), and species credit species (Section 2.3.5).

Table 6. Vegetation survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
PCT and Zone mapping	Random meander	27/09/2019 28/10/2019	1 person 1 person	1 hour 8 hours
Vegetation assessment	BAM plot	05/11/2019	2 people	16 hours
Remnant tree survey	Tree assessment	05/11/2019 23/07/2020	2 people 2 people	8 hours 2 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 (2020b[34]), 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. As stated in Section 1.2, the 'development footprint' only relates to the portions of the 'subject land' area which will be impacted by the proposed development. BAM plot locations were spread throughout the entire subject land (refer to Figure 9). 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 3 of the BAM. As shown in Figure 9, a total of 16 plots were completed across seven vegetation zones.

The above approach resulted in the majority of the BAM plots being located outside the boundary of the development footprint (the exception to this being plot 1334.4.3 in PCT1334 Zone 4, Figure 9). However, as outlined in Section 1.4 and Section 1.5, the proposed development is a component of the larger Poplars development. In order to ensure consistency across the assessment of the whole Poplars development, the entire subject land was assessed at once.

In addition, for the following reasons, the BAM plot data collected across the entire subject land can reliably be used to determine the condition of the vegetation present within the development footprint.

1. Vegetation zones were defined based on a recognisable 'condition state'. In other words, the condition of the vegetation for a specific vegetation zone within the development footprint is analogous to the condition of the vegetation outside the development footprint.

2. As shown in Appendix B, the BAM plot data for the vegetation zones that occur within the development footprint (i.e. PCT1334 Zone 4 and PCT1334 Zone 5) were consistent in their species composition and cover across the subject land. This is reflected in similar summary statistics for composition, structure, and function scores across those plots (Appendix A).

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

These findings indicate that the vegetation zone mapping has correctly defined a consistent 'condition state' across the subject land.

3. If the development footprint were considered in isolation, only one plot would be required for each vegetation zone. Instead, three plots were conducted for PCT1334 Zone 4, and four plots were conducted for PCT1334 Zone 5. By collecting a greater amount of data across the wider subject land, the composition, structure, and function of each impacted vegetation zone within the development footprint was more accurately determined.

As stated in Section 4.1.2 of the BAM:

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

While PCT320 Zone 2 and PCT1334 Zone 5 are not classified as BC Act 'native vegetation' (refer to Section 2.2.1, Figure 9 and Figure 10), they still support a very small native component (Appendix A and Appendix B). As such, as per the BAM, all vegetation zones were assessed in this BDAR. In addition, surveying all zones ensured that the vegetation composition (including an accurate determination of BC Act native vegetation presence/absence) and potential threatened species habitat were accurately assessed across all of the vegetation condition types present in the development footprint and subject land.

It is important to note that all vegetation zones, regardless of whether or not they are classified as BC Act native vegetation and/or threatened species habitat, are used to determine the impact of the proposed development (refer to Section 2.2.4.4 and Section 3.2).

2.2.2.4 Remnant tree survey

All of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were assessed. During the tree assessment, all mature remnant trees were identified to species level and assessed for their value to native fauna. Particular attention was given to observations on the presence of stick nests, hollows, or fauna nesting in hollows. The location of each tree was recorded via hand-held GPS. Data collected for each tree are detailed in Appendix C and included:

- tree number;
- tree species;
- diameter at breast height DBH (cm);
- approximate height (m); and
- presence and characteristics of any hollows and other habitat values such as nests, mistletoe etc.

The data collected during this process is also used to determine the number of hollow bearing trees in each vegetation zone.

2.2.3 BAM targeted survey methods

A number of threatened flora and fauna species were identified by the BAM as potentially occurring in the subject land (referred to as 'species credit species', see Section 2.3.5). Some of these species were excluded from further consideration based on factors such as habitat constraints, degraded habitat, geographical limitations, or the absence of required microhabitat features (refer to Table 24). 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 7.

When combined with vegetation survey and mapping (Table 6), the survey effort for this BDAR totalled 126-person hours. Weather conditions for all survey dates are detailed in Table 8.

Table 7. Flora and fauna survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
Threatened flora survey	Transect Survey	28/10/2019	4 people	8 hours
	Survey of rocky areas	28/10/2019	4 people	28 hours
	Opportunistic observations[35]	-	1-4 people	25 hours
Threatened bird survey	Area search	27/09/2019 17/10/2019 28/10/2019	1 person 2 people 1 person	0.33 hours 3 hours 2 hours
	Opportunistic observations[36]	-	1-4 people	111 hours
Fauna nesting survey	Tree survey	05/11/2019 23/07/2019	2 people 2 people	8 hours 2 hours
Striped Legless Lizard tile survey	10-week tile survey program	27/09/2019 03/10/2019 10/10/2019 17/10/2019 22/10/2019 28/10/2019 05/11/2019 13/11/2019 22/11/2019 29/11/2019	2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people	4.5 hours 4.33 hours 4.33 hours 2.0 hours 2.33 hours 3.33 hours 2.0 hours 3.0 hours 3.0 hours 3.0 hours
Pink-tailed Legless Lizard survey	Rock turning survey	28/10/2019	4 people	28 hours
Golden Sun Moth survey	Random meander through likely habitat	30/10/2019 13/11/2019 22/11/2019 29/11/2019	2 people 2 people 2 people 2 people	3.0 hours 7.0 hours 4.5 hours 3.33 hours

[35] During PCT and Zone mapping and BAM plots.
[36] During PCT and Zone mapping, BAM plots, threatened flora surveys, Golden Sun Moth surveys, Striped Legless Lizard surveys, and Pink-tailed Legless Lizard surveys.

Table 8. Survey weather conditions (Canberra Airport, ACT).

Date	Temperature Min-Max	Wind @ 9am	Cloud (8th)	Rain
27/09/2019	0.7 – 20.8°C	7 km/h	0	0 mm
03/10/2019	4.2 – 28.0°C	2 km/h	0	0 mm
10/10/2019	1.0 – 19.2°C	9 km/h	0	0 mm
17/10/2019	9.5 – 16.1°C	26 km/h	8	4.8 mm
22/10/2019	5.8 – 28.5°C	6 km/h	0	0 mm
28/10/2019	3.7 – 22.9°C	9 km/h	0	0 mm
30/10/2019	8.8 – 29.3°C	6 km/h	0	0 mm
05/11/2019	8.6 – 19.0°C	24 km/h	2	0.2 mm
13/11/2019	6.7 – 20.8°C	20 km/h	0	0 mm
22/11/2019	16.9 – 34.9°C	15 km/h	8	0 mm
29/11/2019	12.6 – 33.1°C	2 km/h	0	0 mm
23/07/2020	-3.1 – 11.8°C	4 km/h	8	0 mm

2.2.3.1 Threatened flora survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened flora species. Some threatened flora species are identified by the BAM as a species credit species (refer to Section 2.3.5), which is a species for which presence/absence and habitat value cannot be reliably predicted by location, vegetation type, and vegetation condition. Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species.

Therefore, a targeted threatened flora transect survey was conducted across the portions of the subject land identified as potentially supporting threatened flora species, these being the less disturbed portions of PCT1334 Zones 1 to 4 (Figure 12). The transect survey involved four ecologists walking multiple transects across the identified areas (totalling 8 hours of effective survey effort), targeting threatened flora species. If detected, significant species identified were recorded via a GPS waypoint and, if a population, the population boundary was delineated via GPS.

In farmland which has been pasture improved, cultivated, and/or intensively grazed for a prolonged period, threatened flora are only likely to persist in those areas which are difficult to pasture improve/cultivate or which are subject to a low level of grazing pressure. Often, these areas are characterised by the presence of imbedded and/or loose surface rock. As such, targeted threatened flora surveys were conducted concurrently with Pink-tailed Legless Lizard surveys (Figure 12). These targeted searches involved one full day of surveys by four ecologists, totalling an additional 28 hours of effective survey effort.

Threatened flora surveys were timed to coincide with the flowering period for the significant flora species with the potential to occur in the subject land

A thorough inventory of the flora species occurring at a site on the NSW Southern Tablelands cannot be compiled from a small number of surveys undertaken at any particular time. For example, many groundstorey flora species, notably the orchids, lilies, and peas, are only readily identifiable during their short and seasonally variable flowering period. As such, an inventory of all species identified in the subject land was commenced during the preliminary field inspection (27 September 2019) and supplemented across all of the subsequent surveys undertaken until the final field survey (23 July

2020). This inventory is presented in Appendix B (flora). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

2.2.3.2 Threatened bird survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened bird species. Some threatened bird species are identified by the BAM as a species credit species (refer to Section 2.3.5). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species. Therefore, three targeted threatened bird surveys were conducted across the portions of the subject land identified as potentially supporting threatened bird habitat, these being areas with a moderate to high canopy cover or dense cover of exotic shrubs (Figure 13). As described in Section 5 of DEC (2004[37]), these surveys involved 'area searches' (Loyn 1986[38]) to identify and record the terrestrial birds occurring in the subject land (totalling 5.33 hours of effective survey effort). If detected, significant species identified were recorded via a GPS waypoint and notes were taken on any nesting/breeding activity.

Threatened bird surveys were timed to coincide with the nesting period for the significant bird species with the potential to occur in the subject land.

A thorough inventory of the bird species occurring at a site on the NSW Southern Tablelands cannot be compiled from a small number of surveys undertaken at any particular time. As such, an inventory of all species identified in the subject land was commenced during the preliminary field inspection (27 September 2019) and supplemented across all of the subsequent surveys undertaken until the final field survey (23 July 2020). This inventory is presented in Appendix D (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. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

2.2.3.3 Fauna nesting survey

As mentioned in Section 2.2.2.4, all of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were assessed for fauna habitat features (Figure 13). At that time, these trees were also inspected for signs of fauna nesting in hollows and/or on large stick nests (e.g. individuals in hollows, scratch/chew marks, birds flying off nests, birds 'on station'), totalling 10 hours of effective survey effort. Particular attention was given to any signs of species credit species breeding in the subject land.

Surveys were timed to coincide with the nesting period for the significant bird species with the potential to occur in the subject land

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

2.2.3.4 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[39]) and the ACT Government survey guidelines (ACT Government 2015[40]).

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, 11 grids were established. Therefore, 550 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 subject land 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 14).

Following a two week 'settling in' period, each tile was checked once per week for 10 weeks. Surveys commenced on 27 September 2019 and were completed on 29 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.

Any 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, captured Striped Legless Lizards are released beside the tile of capture, allowing them 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.

2.2.3.5 Pink-tailed Legless Lizard survey

A targeted survey was completed on Monday 28 October 2019, a sunny day with minimum temperature of 3.7 °C and maximum of 22.9 °C (Bureau of Meteorology records for Canberra Airport). As search success appears to be greatest following substantial rain, the survey was timed to

[39] 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.*
[40] ACT Government (2015). *Survey Guidelines for Striped Legless Lizard*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

occur following the 23.7 mm of rain received across the locality over the preceding three weeks. These conditions were considered optimal for Pink-tailed Legless Lizard survey.

Prior to the on-ground surveys, Capital Ecology analysed 2018 and 2019 aerial imagery in order to identify areas of potential habitat (i.e. areas containing surface rock) across the subject land. These areas are included in Figure 15.

As shown in Figure 15, each patch of potential Pink-tailed Legless Lizard habitat in the subject land was surveyed for Pink-tailed Legless Lizard individuals. Approximately 28 person-hours were spent during the survey (four ecologists for approximately seven hours) and involved the following.

- Searches for Pink-tailed Legless Lizard individuals or sloughed skins by carefully turning rocks over and then placing them back into position.
- Turning a minimum of 500 rocks per patch (considered adequate for confirming occurrence at large sites based on averages for detection presented in Jones 1999[41]), or until a Pink-tailed Legless Lizard was found and thus presence in the patch confirmed. Where it was not possible to turn 500 rocks because of a shortage of surface rock, all possible rocks were turned.

If discovered, each Pink-tailed Legless Lizard is classified as either an adult (≥12 cm total length), juvenile (<12 cm total length), or sloughed skin, and the position recorded via a handheld GPS.

The above survey methodology is consistent with the Commonwealth Survey Guidelines[42].

2.2.3.6 Golden Sun Moth survey

The NSW Government has not developed survey guidelines for the Golden Sun Moth. As such, a program of four targeted Golden Sun Moth surveys was undertaken in accordance with the Commonwealth Government survey guidelines (Commonwealth of Australia 2009a[43]) and the ACT Government survey guidelines (ACT Government 2014[44]).

Each survey involved one to two ecologists walking transects approximately 50-100 m apart across the estimated extent of potential habitat (refer to Figure 16). All observed male Golden Sun Moth flights (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 9. 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.

---

[41] Jones, S.R. (1999). *Conservation biology of the pink-tailed worm lizard (Aprasia parapulchella)*. PhD thesis Applied Ecology research group, University of Canberra.
[42] Department of Sustainability Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's threatened reptiles.* Commonwealth of Australia, Canberra.
[43] 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.
[44] ACT Government (2014). *Survey Guidelines for Golden Sun Moth*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

A GPS track was recorded for each survey; these are illustrated in Figure 16. As shown on Figure 16, 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 Golden Sun Moth 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 Yass, Murrumbateman, Sutton, and various locations across the ACT.

Table 9. Golden Sun Moth survey conditions.

Date: 30/10/2019 (Survey 1)				**Observer/s:** RES
Survey Site: The Poplars, Jerrabomberra, NSW				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1250	26.9	13 W	6/8	Very Dry Conditions, warm and sunny.
Finish: 1415	27.6	11 NNW	6/8	
General site notes:				
Good conditions. Male GSM recorded flying in low - mod numbers. Males confirmed flying near Sutton (NSW) and at multiple locations in the ACT (via ACT GSM email forum).				
Date: 13/11/2019 (Survey 2)				**Observer/s:** ST, KL
Survey Site: The Poplars, Jerrabomberra, NSW				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1030	14.1	15 N	Fine	Calm at start of survey. Wind increasing. Warm and sunny.
Finish: 1400	19.1	20 NW	Fine	
General site notes:				
Plenty of male and female GSM recorded, mostly spontaneously flying with some flushed. Some GSM looking old and damaged. Males confirmed flying near Sutton (NSW) and at multiple locations in the ACT (via ACT GSM email forum).				
Date: 22/11/2019 (Survey 3)				**Observer/s:** ST, JM
Survey Site: The Poplars, Jerrabomberra, NSW				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 1000	28.1	6 WSW	8/8	Wind increasing towards end of survey. Smoke haze.
Finish: 1215	31.5	30 N	8/8	
General site notes:				
Male GSM flushed and flying in low numbers. Few (5-10) recorded incidentally near entrance (SLL Grid 6). Males confirmed flying at multiple locations in the ACT (via ACT GSM email forum).				
Date: 29/11/2019 (Survey 4)				**Observer/s:** ST, JM
Survey Site: The Poplars, Jerrabomberra, NSW				
Time	**Air Temp.**	**Wind**	**Cloud cover**	**Other weather information**
Start: 0920	20.5	6 N	Fine	Very dry conditions. Smoke haze from North Black Range Fire.
Finish: 1100	26.9	13 NNE	Fine	
General site notes:				
Male GSM observed flying in low numbers. Males observed flying at Yarralumla Brickworks (ACT) and near Queanbeyan Nature Reserve (NSW).				

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 an open grassy woodland PCT (i.e. PCT1334), merging with grassland lower in the landscape to the west. (i.e. PCT320) (Figure 9, Table 10).

The subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 97% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The areas which retain some of the original canopy occur as isolated paddock trees or small, scattered patches of vegetation. The majority of the subject land has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris) and a variety of weeds. There is a severe infestation of Serrated Tussock in the low-lying land in the south-western corner of the subject land.

Some portions of the groundstorey across the subject land have a dominance of native grasses and forbs; these areas are largely restricted to the northern section of the subject land, the northern boundary of the southern section, and the south-western corner of the southern section. However, the prolonged period of stock grazing combined with historic pasture improvement has greatly depleted the native species diversity in the groundstorey across these areas.

The riparian vegetation in the subject land is generally dominated by exotic pasture grasses along the wet, low-lying areas bordering the drainage line in the south-east.

The majority of the vegetation in the subject land is therefore largely characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.

Table 10. PCTs recorded in the subject land.

PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
320	Kangaroo Grass - Redleg Grass forb-rich temperate tussock grassland of the northern Monaro, ACT and upper Lachlan River regions of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	This PCT is characterised by a mid-height to tall tussock grassland dominated by a variety of native grasses (including Kangaroo Grass, Redleg Grass, Wallaby Grasses, and Speargrasses) and forbs. Shrubs are very sparse. Surrounding scattered trees include Yellow Box, Blakely's Red Gum, and Apple Box. It occurs on fertile brown to black loam or clay soils derived from fine-grained sedimentary, metamorphic, or volcanic substates on gentle slopes and flats between 500	This PCT was mapped on the low-lying gently slopes and flats in the south-western corner of the subject land	Not listed (NSW). Critically Endangered (Commonwealth) when occurring in a condition consistent with the listing criteria of the TEC.	96%

PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
		and 620 m. This PCT mainly occurs in the ACT and surrounding districts of NSW.			
1334	Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion	This PCT occurs on valley flats, midslopes, and occasionally on crests. It is found in the Murrumbidgee River valley south of Royalla, the upper Shoalhaven River valley south of Bungonia, east of Queanbeyan, and south of Bungendore. It is characterised by an open woodland with a grassy groundlayer and sparse shrubstorey and midstorey. Dominant overstorey species include Yellow Box and Apple Box.	This PCT was mapped across the majority of the subject land.	Critically Endangered (NSW and Commonwealth) when occurring in a condition consistent with the listing criteria of the TEC.	92%

2.2.4.2 Vegetation zones

As detailed in Table 11 to Table 12 and shown in Figure 9, PCT320 was determined to comprise the following two discernible vegetation zones.

- PCT320 Zone 1 – native dominant understorey with moderate to high diversity (NTG-SEH); and
- PCT320 Zone 2 –exotic dominant understorey with low diversity.

As detailed in Table 13 to Table 17 and shown in Figure 9, PCT1334 was determined to comprise the following five discernible vegetation zones.

- PCT1334 Zone 1 – mature canopy, regeneration, native dominant understorey with moderate to high diversity (EPBC Act and BC Act Box-Gum Woodland);
- PCT1334 Zone 2 – mature canopy, regeneration, native dominant understorey with low diversity (BC Act Box-Gum Woodland);
- PCT1334 Zone 3 – mature canopy, regeneration, exotic dominant understorey with low diversity (BC Act Box-Gum Woodland);
- PCT1334 Zone 4 – no canopy, native dominant understorey with low diversity (BC Act Box-Gum Woodland); and
- PCT1334 Zone 5 – no canopy, exotic dominant understorey with low diversity.

PCT320 Zone 1 and PCT1334 Zone 1 to Zone 4 meet the definition of BC Act 'native vegetation'. While PCT1334 Zone 4 occurs in the development footprint, PCT320 Zone 1 and PCT1334 Zone 1 to Zone 3 do not and so will not be impacted by the proposed development.

PCT320 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. Furthermore, PCT320 Zone 2 does not occur in the development footprint and so will not be impacted by the proposed development

PCT1334 Zone 5 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. However, PCT1334 Zone 5 does occur in the development footprint and so will be impacted by the proposed development. As PCT1334 Zone 5 supports a very small native component (Appendix A and Appendix B) it must be assessed to determine the impact of the proposed development.

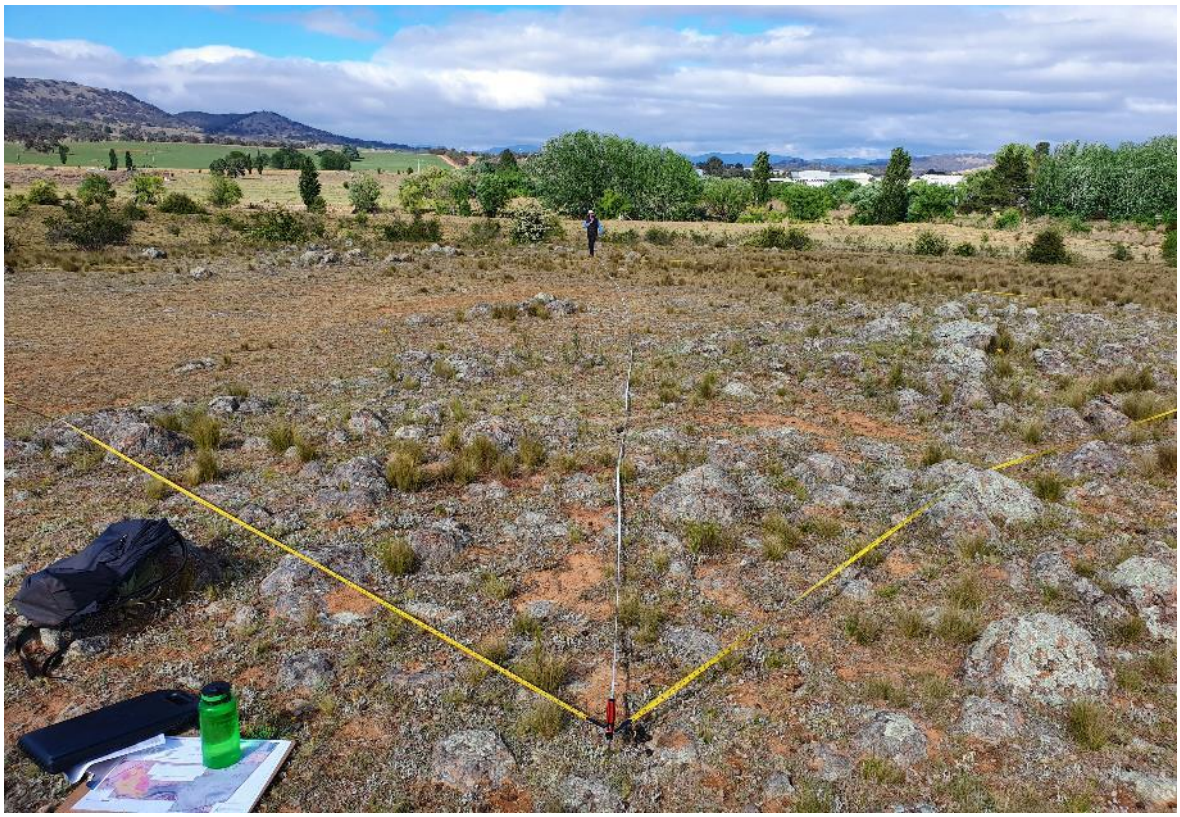
As such, only PCT1334 Zone 4 and PCT1334 Zone 5 are assessed to determine a vegetation integrity score and the impact associated with the proposed development.

2.2.4.3 Remnant Trees

The subject land supports 63 remnant trees in PCT1334, 10 of which contain at least one functional hollow (Figure 9, Appendix C). No trees in the subject land support large hollows greater than 20 cm.

The development footprint itself does not support any remnant trees. As such, no trees will be impacted by the proposed development.

Table 11. PCT320 Zone 1 results summary.

	PCT320 Zone 1
Description	Natural Temperate Grassland of the South Eastern Highlands Scattered patches of moderate to high diversity native grassland dominated by Wallaby Grasses *Rhytidosperma* spp., Red-leg Grass *Bothriochloa macra*, Kangaroo Grass *Themeda triandra*, Common Everlasting *Chrysocephalum apiculatum*, and a variety of native forbs. Moderate to high Serrated Tussock infestation and heavily grazed by Eastern Grey Kangaroo *Macropus giganteus*. This zone is restricted to the low-lying land in the south-eastern corner of the subject land.
Area – subject land	5.54 ha (3 BAM plots assessed).
Area – impact	0 ha.
Perennial Groundlayer	77% - 92% native.
Native Species Richness	9 - 23 total native species, 4 - 18 native non-grass species, 2 - 10 indicator species (as per Rehwinkel 2015[45]).
Exotic Species Richness	7 - 9 total exotic species.
Significant Weeds	Sheep's Sorrel *Acetosella vulgaris*, Saffron Thistle *Carthamus lanatus*, African Lovegrass *Eragrostis curvula*, St John's Wort *Hypericum perforatum*, African Boxthorn *Lycium ferocissimum*, Serrated Tussock, and Briar Rose *Rosa rubiginosa.*
EPBC Act and/or BC Act listed TEC	Yes (EPBC Act).
BC Act Native Vegetation	Yes.
	

[45] 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 12. PCT320 Zone 2 results summary.

	PCT320 Zone 2
Description	Exotic pasture – low diversity Highly modified exotic pasture dominated by a near monoculture of Serrated Tussock. Lightly to moderately grazed by Eastern Grey Kangaroo. This zone is restricted to the low-lying land in the south-eastern corner of the subject land.
Area – subject land	14.18 ha (3 BAM plots assessed).
Area – impact	0 ha.
Perennial Groundlayer	6% - 33% native.
Native Species Richness	8 - 11 total native species, 4 - 8 native non-grass species, 0 - 2 indicator species (as per Rehwinkel 2015).
Exotic Species Richness	7 - 9 total exotic species.
Significant Weeds	Tree of Heaven *Ailanthus altissima*, Saffron Thistle, Common Hawthorn *Crataegus monogyna*, St John's Wort, African Boxthorn, Serrated Tussock, Briar Rose, and Blackberry *Rubus fruticosus.*
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	No.

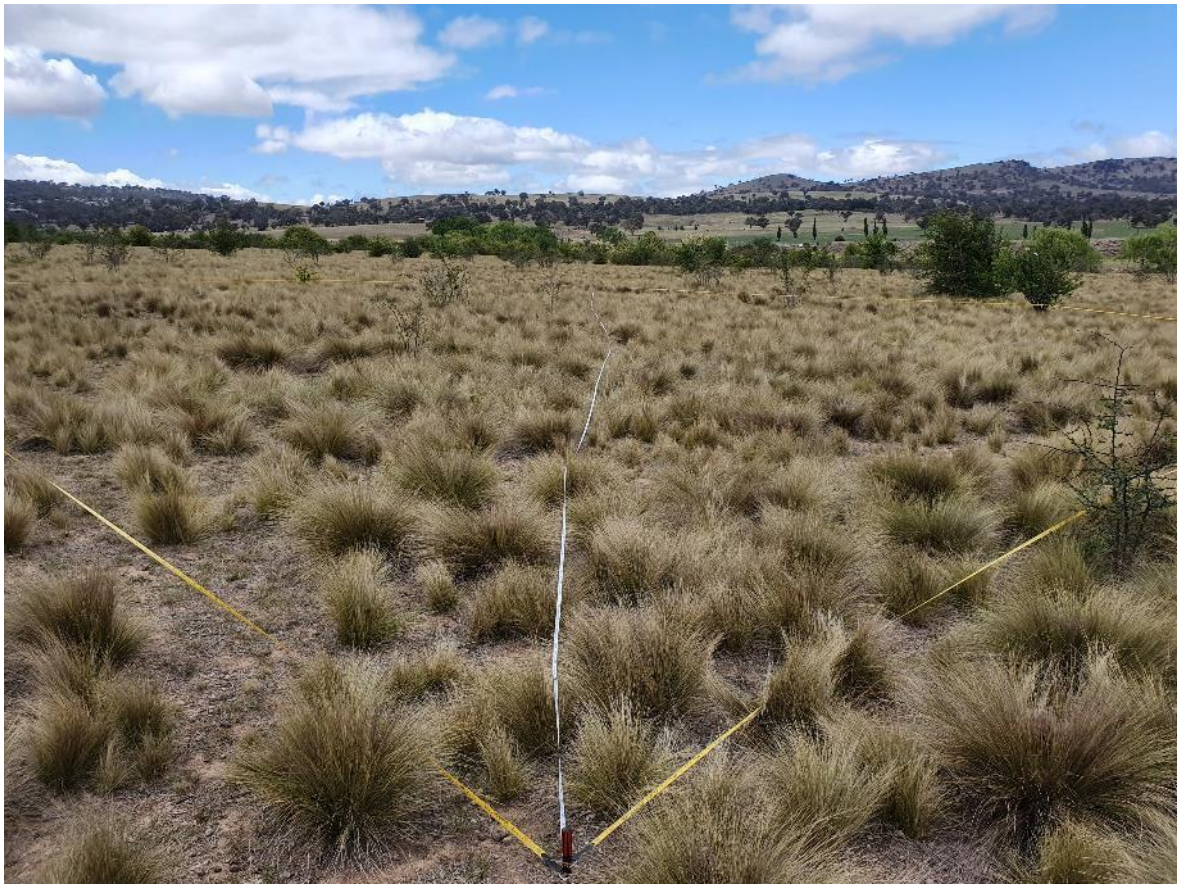


Table 13. PCT1334 Zone 1 results summary.

	PCT1334 Zone 1
Description	Southern Tableland Grassy Woodland – Moderate to High Diversity A small patch of relatively intact vegetation, with a canopy representative of the climax community. Some scattered shrubs and regeneration of the overstorey. Moderate to high diversity groundlayer dominated by perennial native grasses and a variety of forbs, including approximately 130 Hoary Sunray plants. Moderately grazed by Eastern Grey Kangaroos. This zone is restricted to the northern-most section of the subject land adjoining the more intact vegetation retained within the Poplars North BioBanking Site.
Area – subject land	0.60 ha.
Area – impact	0 ha.
BAM plots assessed	1.
Overstorey Species	Dominant = *E. blakelyi.* Associate = *E. melliodora* and *E. bridgesiana.*
Overstorey Cover	2%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	92% native, with 19 native non-grass understorey species.
Significant Weeds	African Love Grass, St John's Wort, Serrated Tussock, and Briar Rose.
EPBC Act and/or BC Act listed TEC	Yes (EPBC Act and BC Act).
BC Act Native Vegetation	Yes.

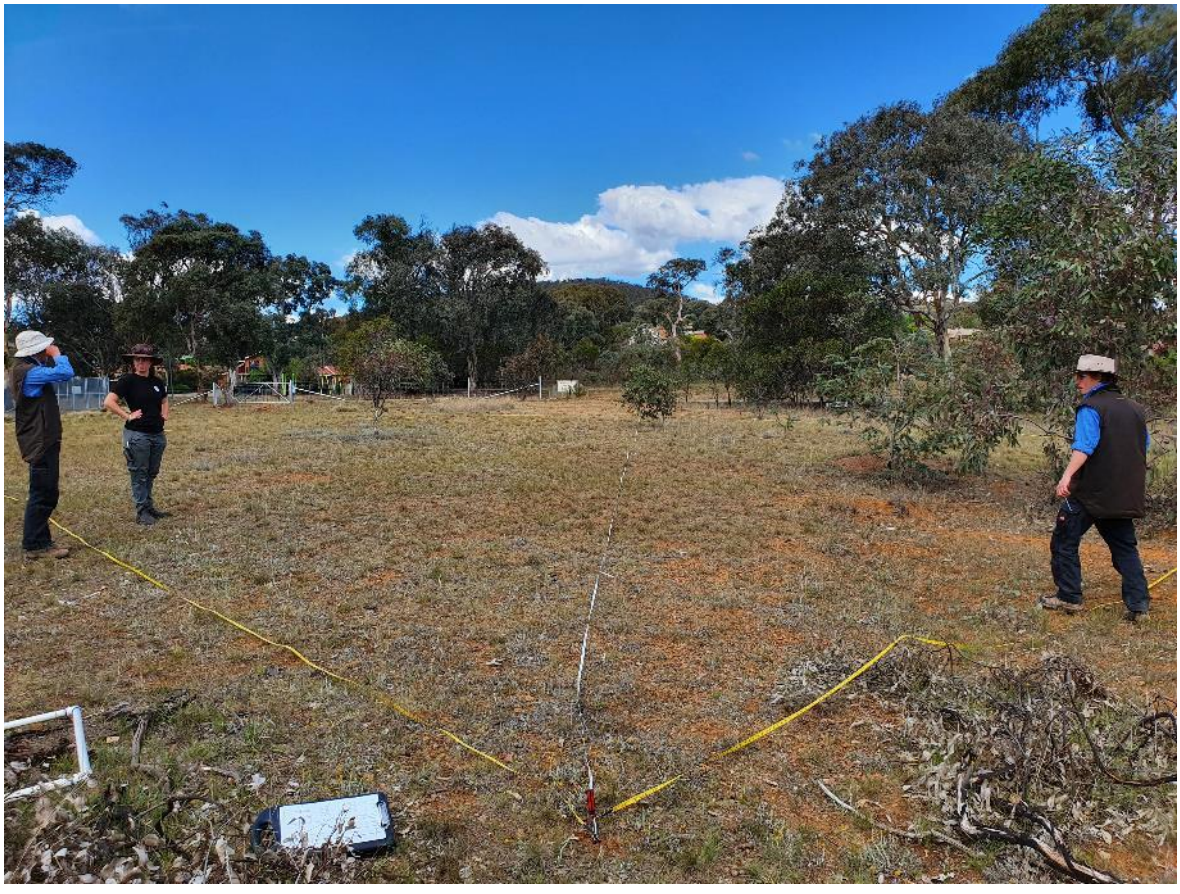


Table 14. PCT1334 Zone 2 results summary.

	PCT1334 Zone 2
Description	Southern Tableland Grassy Woodland – Low Diversity Canopy with components of the climax community, but there is evidence of historic thinning and the midstorey and shrubstorey are absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Tall Speargrass *Austrostipa bigeniculata*. Low to moderate density of significant weed species. Moderately grazed by Eastern Grey Kangaroos. This zone was restricted to a small patch of vegetation adjoining Tompsitt Drive which has subsequently been removed by the construction of Environa Drive (see Capital Ecology 2019).
Area – subject land	0.16 ha.
Area – impact	0 ha.
BAM plots assessed	1.
Overstorey Species	Co-dominant = *E. blakelyi* and *E. melliodora*.
Overstorey Cover	25%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	85% native, with 5 native non-grass understorey species.
Significant Weeds	African Boxthorn, Serrated Tussock, Paspalum *Paspalum dilatatum*, and Briar Rose.
EPBC Act and/or BC Act listed TEC	Yes (BC Act).
BC Act Native Vegetation	Yes.

Table 15. PCT1334 Zone 3 results summary.

	PCT1334 Zone 3
Description	Southern Tableland Grassy Woodland – Exotic Groundstorey Canopy with the components of the climax community, but there is evidence of historic thinning and the midstorey and shrubstorey are absent. Low diversity exotic groundlayer dominated by a variety of exotic grasses, notably Phalaris. Moderate to high density of significant weed species. Lightly grazed by Eastern Grey Kangaroos.
Area – subject land	1.45 ha.
Area – impact	0 ha.
BAM plots assessed	1.
Overstorey Species	Co-dominant = *E. blakelyi* and *E. melliodora.* Associate = *E. bridgesiana.*
Overstorey Cover	20%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	4% native, with 4 native non-grass understorey species.
Significant Weeds	Tall Flat-sedge *Cyperus eragrostis*, St John's Wort, and Serrated Tussock.
EPBC Act and/or BC Act listed TEC	Yes (BC Act).
BC Act Native Vegetation	Yes.

Table 16. PCT1334 Zone 4 results summary.

	PCT1334 Zone 4
Description	Southern Tableland Grassy Woodland – Low Diversity Derived Grassland Overstorey and midstorey are absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Tall Speargrass and Wallaby Grasses *Rhytidosperma* spp. Low to high density of significant weed species. Moderately to heavily grazed by Eastern Grey Kangaroos.
Area – subject land	16.12 ha.
Area – impact	1.46 ha.
BAM plots assessed	3.
Overstorey Species	None.
Overstorey Cover	0%.
Overstorey Regeneration	No.
Perennial Groundlayer	80% - 91% native, with 1 - 5 native non-grass understorey species.
Significant Weeds	Sheep's Sorrel, Saffron Thistle, African Lovegrass, St John's Wort, Serrated Tussock, Paspalum, and Briar Rose.
EPBC Act and/or BC Act listed TEC	Yes (BC Act).
BC Act Native Vegetation	Yes.

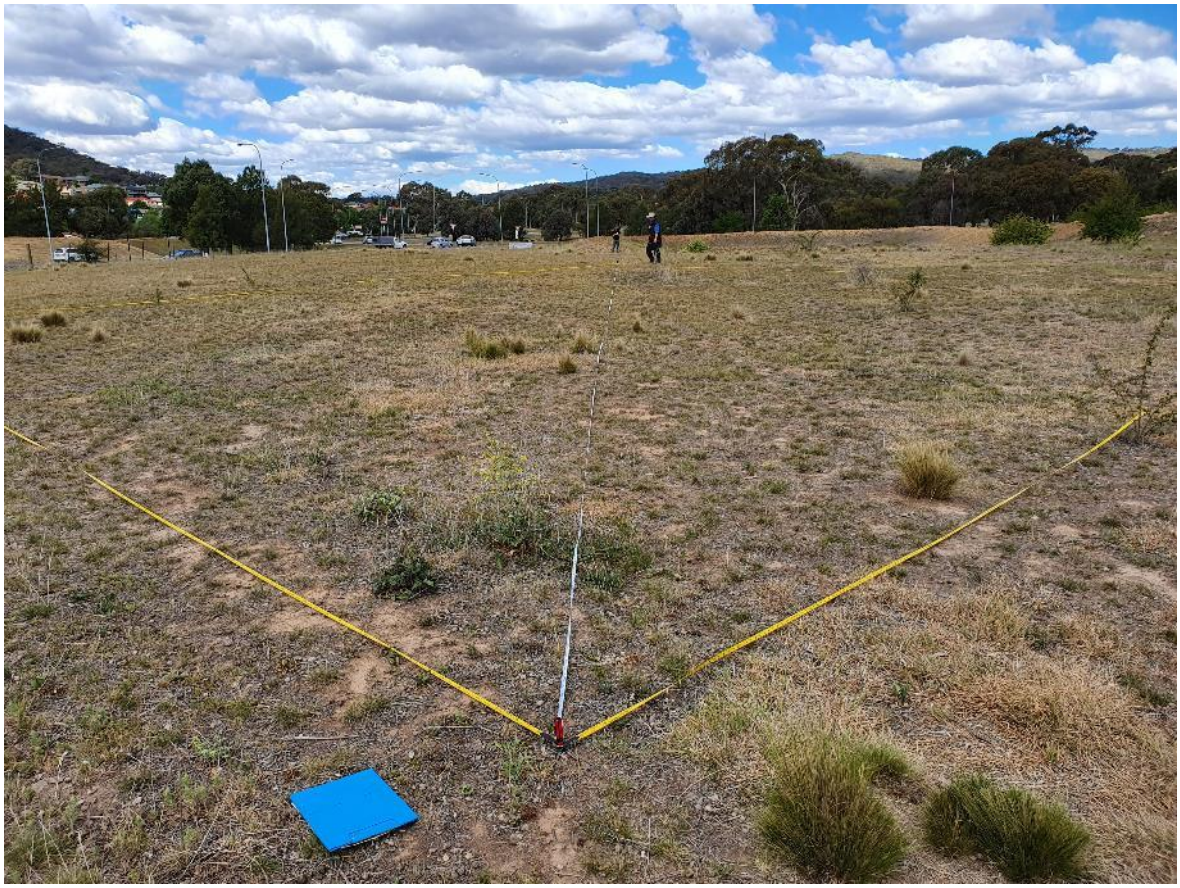
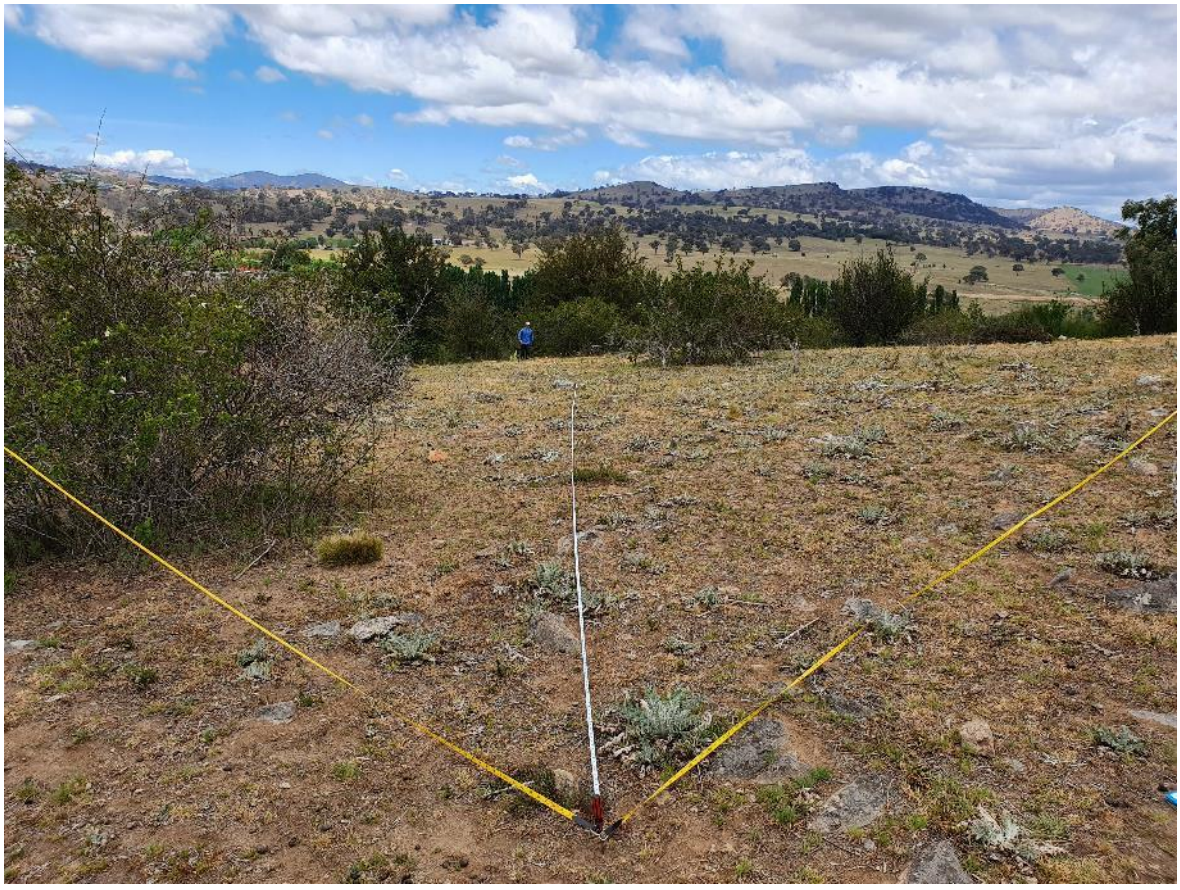


Table 17. PCT1334 Zone 5 results summary.

	PCT1334 Zone 5
Description	Southern Tableland Grassy Woodland – Low Diversity Exotic Groundstorey Overstorey and midstorey are absent. Low diversity exotic groundlayer dominated by a variety of exotic grasses, notably Phalaris. Evidence of historic cultivation and/or pasture improvement. High density of significant weed species. Lightly to highly grazed by Eastern Grey Kangaroos
Area – subject land	48.28 ha.
Area – impact	1.79 ha.
BAM plots assessed	4.
Overstorey Species	None.
Overstorey Cover	0%.
Overstorey Regeneration	No.
Perennial Groundlayer	0% - 14% native, with 1 - 5 native non-grass understorey species.
Significant Weeds	Sheep's Sorrel, Saffron Thistle, African Lovegrass, St John's Wort, Serrated Tussock, and Briar Rose.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	No.



2.2.4.4 Patch size

As defined in the BAM, patch size is -

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

With respect to the above, all of the vegetation in the subject land meets the definition of 'native vegetation' as per the BAM apart from PCT320 Zone 2 and PCT1334 Zone 5; the patch size for PCT320 Zone 2 and PCT1334 Zone 5 is therefore 0 ha.

For the remaining vegetation zones, the native vegetation outside of the study area extends to the north, east, and west for > 100 ha (Figure 8); the patch size for these vegetation zones therefore falls into the ≥ 100 ha class as defined by the BAM.

2.2.4.5 Vegetation integrity scores

As stated in Section 1.2, the 'development footprint' only relates to the portions of the 'subject land' which will be impacted by the proposed development (refer to Figure 5). Zones which support any amount of 'native vegetation', regardless of how small, and which occur in the development footprint are used to determine vegetation integrity scores and the impacts associated with the proposed development (refer to Figure 10). Zones which do not support ***any*** native vegetation do not require further assessment in the BAM except where:

(a) they are proposed for restoration as part of a biodiversity stewardship site; or

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

As detailed in Table 11 to Table 17 and shown in Figure 9, PCT320 Zone 1 to Zone 2 and PCT1334 Zone 1 to Zone 3 do not occur in the development footprint and so will not be impacted by the proposed development.

PCT1334 Zone 4 and Zone 5 do occur in the development footprint. While PCT1334 Zone 4 is classified as BC Act 'native vegetation', PCT1334 Zone 5 is not 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. However, PCT1334 Zone 5 does supports a very small native component (Appendix A and Appendix B) and so must be assessed as per the BAM.

Table 18 therefore presents the results of the BAM plot assessments and details the composition, structure, function, and resulting vegetation integrity score for PCT1334 Zone 4 and PCT1334 Zone 5.

Table 18. Vegetation integrity scores.

	PCT1334 Zone 4	PCT1334 Zone 5
PCT	1334	1334
Zone (condition class)	4	5
Native Canopy	No	No
Groundstorey	Native	Exotic
Native Diversity	Low	Low
Patch size	> 100 ha	0 ha
Area in the development footprint	1.46 ha	1.79 ha
BAM plots assessed in the subject land	3	4
Composition condition score	8.4	3.0
Structure condition score	46.8	0.2
Function condition score	1.5	4.3
Current vegetation integrity score	**8.3**	**1.3**

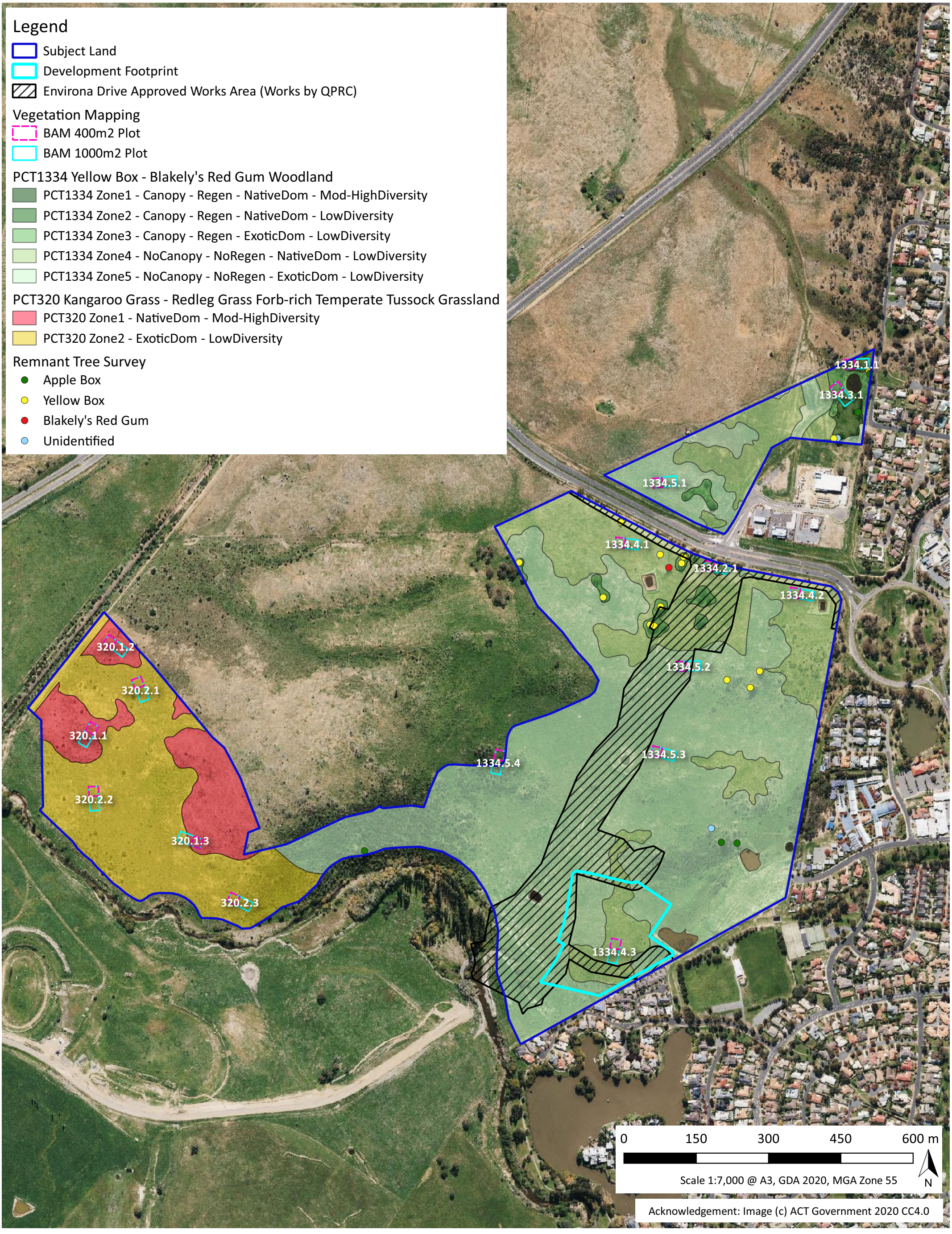


Figure 9. BAM Vegetation Mapping and Survey

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

Figure 10. BC Act Native Vegetation

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

2.2.5 Threatened Ecological Communities

2.2.5.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Two EPBC Act critically endangered listed threatened ecological communities have the potential to occur in the locality, both listed as critically endangered under the EPBC Act: Natural Temperate Grassland of the South Eastern Highlands (Natural Temperate Grassland) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland).

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

Description – As detailed in Commonwealth of Australia (2016a[46]), 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 2016a) 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.*

Presence in the subject land – Confirmed – The entire portion of the subject land mapped as PCT320 would have once supported the climax community of this TEC.

PCT320 Zone 1 meets the listing criteria for NTG-SEH as it is characterised by a native groundstorey with moderate to high native forb diversity, supporting an average of 12.3 (range of 4 – 18) native

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

non-grass species and 7 (range of 2 – 10) indicator species. PCT320 Zone 1 does not occur in the development footprint and so will not be impacted by the proposed development.

PCT320 Zone 2 does not meet the listing criteria for NTG-SEH as it is characterised by a clearly exotic groundstorey (Table 12, Appendix B). PCT320 Zone 2 does not occur in the development footprint and so will not be impacted by the proposed development

As such, while the wider subject land supports Natural Temperate Grassland of the South Eastern Highlands in the areas defined by PCT320 Zone 1, the development footprint does not.

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

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

Presence in the subject land – Confirmed – The entire portion of the subject land mapped as PCT1334 would have once supported the climax community of this TEC.

↓

Assessments of structure and floristic composition were undertaken in each of the five condition categories (Vegetation Zones) of PCT1334 present in the subject land. The purpose of these assessments was to determine whether the patches of each Vegetation Zone support characteristics sufficient to meet the listing criteria for the EPBC Act listed TEC. The assessment process follows that provided in the Commonwealth EPBC Act Policy Statement 3.5 – White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands (Commonwealth of Australia 2006). The results of this assessment are provided in Table 19. As detailed in Table 19, the area mapped as PCT1334 Zone 1 meets the criteria for the EPBC Act listed TEC. However, PCT1334 Zone 1 does not occur in the development footprint and so will not be impacted by the proposed development. PCT1334 Zone 2 to Zone 5 do not meet the listing criteria.

As such, while the wider subject land supports EPBC Act Box Gum Woodland in the areas defined by PCT1334 Zone 1, the development footprint does not.

Conclusion

The development footprint does not support either of the EPBC Act listed threatened ecological communities with the potential to occur in the locality.

Table 19. Assessment against the listing criteria for the EPBC listed TEC – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Criterion		Assessment results				
		PCT1334 Zone 1	**PCT1334 Zone 2**	**PCT1334 Zone 3**	**PCT1334 Zone 4**	**PCT1334 Zone 5**
1.	*Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?*	Yes Red Gum is dominant throughout this zone and Yellow Box occurs as an associated species.	Yes Yellow Box and Red Gum are co-dominant throughout this zone.	Yes Yellow Box and Red Gum are co-dominant throughout this zone.	Yes Yellow Box and Red Gum are expected to have been historically dominant or co-dominant throughout this zone.	Yes Yellow Box and Red Gum are expected to have been historically dominant or co-dominant throughout this zone.
2.	*Does the patch have a predominantly native understorey?*	Yes The understorey was recorded as 92% native species cover.	Yes The understorey was recorded as 85% native species cover.	No The understorey was recorded as 4% native species cover.	Yes The understorey was recorded as ranging from 80% to 91% native species cover, with an average of 86%.	No The understorey was recorded as ranging from 0% to 14% native species cover, with an average of 4%.
3.	*Is the patch 0.1 ha (1000 m^2) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.*	Yes The patch is greater than 0.1 ha in size and 19 native non-grass understorey species were recorded across the single plot.	No While the patch is greater than 0.1 ha in size, only 5 native non-grass understorey species were recorded across the single plot.	N/A Refer Criterion 2 results.	No While the patches are greater than 0.1 ha in size, only an average 2.67 (range of 1 to 5) native non-grass understorey species were recorded across three plots.	N/A Refer Criterion 2 results.
	Or					
	Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration[47] of the dominant overstorey eucalypts?	Yes When directly adjoining intact Box-Gum Woodland outside the subject land is also considered, the patch is greater than 2 ha and supports mature trees and natural regeneration of the overstorey.	No While the patch does support mature trees and natural regeneration of the overstorey, the patch is less than 2 ha in size.	N/A Refer Criterion 2 results.	No PCT1334 Zone 4 does not support mature trees or regeneration of the overstorey.	N/A Refer Criterion 2 results.
	Does the patch meet the criteria for the listed TEC?	**Yes**	**No**	**No**	**No**	**No**

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

2.2.5.2 Biodiversity Conservation Act 2016 (NSW)

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

BC Act Box-Gum Woodland

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

The below description is extracted from the NSW *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020, gazetted 17 July 2020a[48]).

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

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

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

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

Presence in the subject land – Confirmed – The entire portion of the subject land mapped as PCT1334 would have once supported the climax community of this TEC. PCT1334 Zone 1 is characterised by a native overstorey with a moderate to high diversity native understorey, PCT1334 Zone 2 by a native overstorey with a low diversity native understorey, PCT1334 Zone 3 by a native overstorey with a low diversity exotic understorey, PCT1334 Zone 4 by no overstorey with a low diversity native understorey, and PCT1334 Zone 5 by no overstorey with a low diversity exotic understorey.

PCT1334 Zones 1, Zone 2, and Zone 3, support vegetation which meets the criteria for this TEC in moderate to high condition, and PCT1334 Zone 4 supports vegetation which meets the criteria for this TEC in low condition. This condition classification is reflected in the respective vegetation integrity score for each zone (Table 18).

PCT1334 Zone 5 lacks a native overstorey and has a groundstorey that is highly modified and dominated by perennial exotic grasses and herbaceous weeds. As such, PCT1334 Zone 5 does not support vegetation which meets the criteria for this TEC under the BC Act.

PCT1334 Zone 1 to 3 do not occur in the development footprint and so will not be impacted by the proposed development. As such, the portions of the development footprint that support BC Act Box-Gum Woodland are defined by the extent of PCT1334 Zone 4.

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

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

The below description is extracted from the NSW *Final Determination for the TSC Act critically endangered listed ecological community Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion* (NSW Threatened Species Scientific Committee 2019[49]).

Monaro Tableland Cool Temperate Grassy Woodland ranges in structure from woodland to low open woodland. It is characterised by a sparse to very sparse tree stratum dominated by Eucalyptus pauciflora either in monospecific stands or with any of Acacia melanoxylon, E. rubida subsp. rubida, E. stellulata or E. viminalis as codominants. A number of other tree species have been recorded within the community, although very infrequently and always as canopy subdominants. These include E. bridgesiana, E.dives, E. blakelyi and E. melliodora. Tree height and cover vary as a function of moisture availability, drainage and past land management. The tree stratum becomes shorter and sparser with declining moisture availability or increasing levels of soil waterlogging… Trees may be absent as a consequence of tree removal under

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

pastoral management and grazing by domestic stock. A continuous herbaceous ground stratum is usually present, although this is highly variable in composition and cover as a function of grazing pressure from wild herbivores (native and exotic) and domestic stock. Ground cover species include Themeda triandra, Poa sieberiana, Elymus scaber, Hydrocotyle laxiflora, Scleranthus biflorus, Oxalis perennans, Plantago varia, Euchiton japonicus, Poa labillardieri, Hypericum gramineum, Desmodium varians, Geranium solanderi, Acaena echinata, Gonocarpus tetragynus, Microlaena stipoides, Dichondra repens, Solenogyne gunnii, Asperula conferta, Asperula scoparia, Rumex brownii, Rytidosperma laeve, Rytidosperma pilosum, Chrysocephalum apiculatum and Chrysocephalum semipapposum. The Community may develop a shrub or bracken layer as a consequence of the opening up of the ground stratum following excessive grazing by rabbits and sheep. This may include species such as Pimelea pauciflora, Acacia dealbata, Acacia melanoxylon, Acacia rubida subsp. rubida, Cassinia longifolia and Pteridium esculentum (Costin 1954).

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

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

Conclusion

The development footprint supports the BC Act listed ecological community *White Box Yellow Box Blakely's Red Gum Woodland* in the areas mapped as PCT1334 Zone 4. No part of the development footprint or wider subject land supports the BC Act listed ecological community *Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion.*

2.2.6 High threat weeds

Table 20 lists the 14 high threat weeds that occur in the subject land. Common Hawthorn, African Boxthorn, Briar Rose, and Serrated Tussock are very widespread and often occurred at high densities.

Table 20. High threat weeds.

Species Name	Common Name	Status
Trees		
Ailanthus altissima	Tree of Heaven	LM
Salix sp.	Willow	WoNS, LM/AP
Shrubs		
Crataegus monogyna	Common Hawthorn	-
Lycium ferocissimum	African Boxthorn	WoNS, AP

Species Name	Common Name	Status
Rosa rubiginosa	Briar Rose	-
Rubus fruticosus aggregate	Blackberry	WoNS, LM/AP
Forb		
Acetosella vulgaris	Sheep's Sorrey	-
Carthamus lanatus	Saffron Thistle	-
Cyperus Eragrostis	Tall Flat-sedge	-
Echium plantagineum	Paterson's Curse	-
Hypericum perforatum	St John's Wort	LM
Grass		
Eragrostis curvula	African Lovegrass	AP
Nassella trichotoma	Serrated Tussock	WoNS, C
Paspalum dilatatum	Paspalum	-

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 21. It is important to note that the information presented in Table 21 is also used to assess the presence/absence of habitat constraints and/or microhabitats for EPBC Act only listed species (Section 2.3.3), ecosystem credits species (Section 2.3.4), and species credit species (Section 2.3.5).

Table 21. Fauna habitat features.

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Remnant eucalypts	Historic clearing has removed approximately 97% of the native overstorey across the subject land, and the remaining small patches of woodland have been historically thinned or occur as isolated paddock trees. The development footprint itself does not support any remnant trees. However, the wider subject land supports 63 remnant trees, 10 of which contain at least one functional hollow (Figure 9, Appendix C). No trees in the subject land support large hollows greater than 20 cm.	All remnant trees are likely to provide foraging resources for a variety of birds and marsupials when in flower, including threatened species. The hollow bearing remnant trees are likely to provide a nesting resource for birds, bats, and marsupials.

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Other native vegetation (i.e. native shrubs, grasses, and forbs)	The midstorey and shrubstorey are almost entirely absent throughout the development footprint and wider subject land. Approximately half of the development footprint supports native dominant grassy vegetation in the form of derived grassland (i.e. PCT1334 Zone 4). The value of these areas to native fauna, particularly threatened species, depends largely on the degree of modification.	The absent midstorey and shrubstorey are likely to limit the habitat value of the development footprint and wider subject land for some of the region's threatened and rare woodland birds, which generally prefer to inhabit woodland where such features are more intact. The grasses and forbs are likely to provide a foraging resource to a variety of native birds, reptiles, and herbivorous mammals, such as the Eastern Grey Kangaroo. In addition, as detailed in Section 2.3.5.2, the areas of PCT1334 Zone 4 support habitat for the threatened Golden Sun Moth. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Exotic pasture	Approximately half of the development footprint supports a highly modified pasture dominated by exotic grasses and forbs (i.e. PCT1334 Zone 5).	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.
Surface rocks and rocky outcrops	Loose surface rock and embedded rocky outcrops are scattered across a substantial portion of the development footprint and wider subject land.	The loose surface rock is likely to provide refuge and foraging habitat for common herpetofauna and invertebrates. In addition, as detailed in Section 2.3.5.2, the areas of PCT320 Zone 1 in the wider subject land that contain loose surface rock support habitat for the threatened Pink-tailed Legless Lizard
Creeks, streams, dams	The development footprint does not contain any tributaries or well-formed drainage lines. The wider subject land supports two tributaries which joins Jerrabomberra Creek immediately to the south, and one drainage line that terminates in the south-east of the subject land. The tributaries were dry at the time of survey and is only likely to convey water following substantial rain events. The riparian vegetation in the subject land is generally dominated by exotic grasses along the wet, low-lying areas bordering the drainage line in the south-east. There are eight small to moderately sized dams in the subject land, none of which occur in the development footprint. All of the dams held a small to moderate amount water at the time of survey, and the two dams that occur along the drainage line in the south-east of the subject land are fringed by largely exotic vegetation.	The lack of reliable water flows and native riparian vegetation indicates that the tributaries and drainage line are unlikely to provide habitat of potential value to aquatic/riparian flora or fauna. The small to moderately sized farm dams are only likely to be of limited value to the common native herbivores, water birds, reptiles, and amphibians that 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 (critically endangered, endangered, or vulnerable) pursuant to the BC Act.

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

2.3.2.2 Database and literature review

Information regarding the suitability of the habitat in the subject land for threatened species was obtained from the Threatened Biodiversity Data Collection (TBDC), BioNet (e.g. the profile of a threatened species), 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 identified by the DAWE's online EPBC Act Protected Matters Search Tool (PMST) (Section 2.3.3) or flagged by the BAM as ecosystem credits species (Section 2.3.4) and species credit species (Section 2.3.5).

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 2 March 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 11).

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

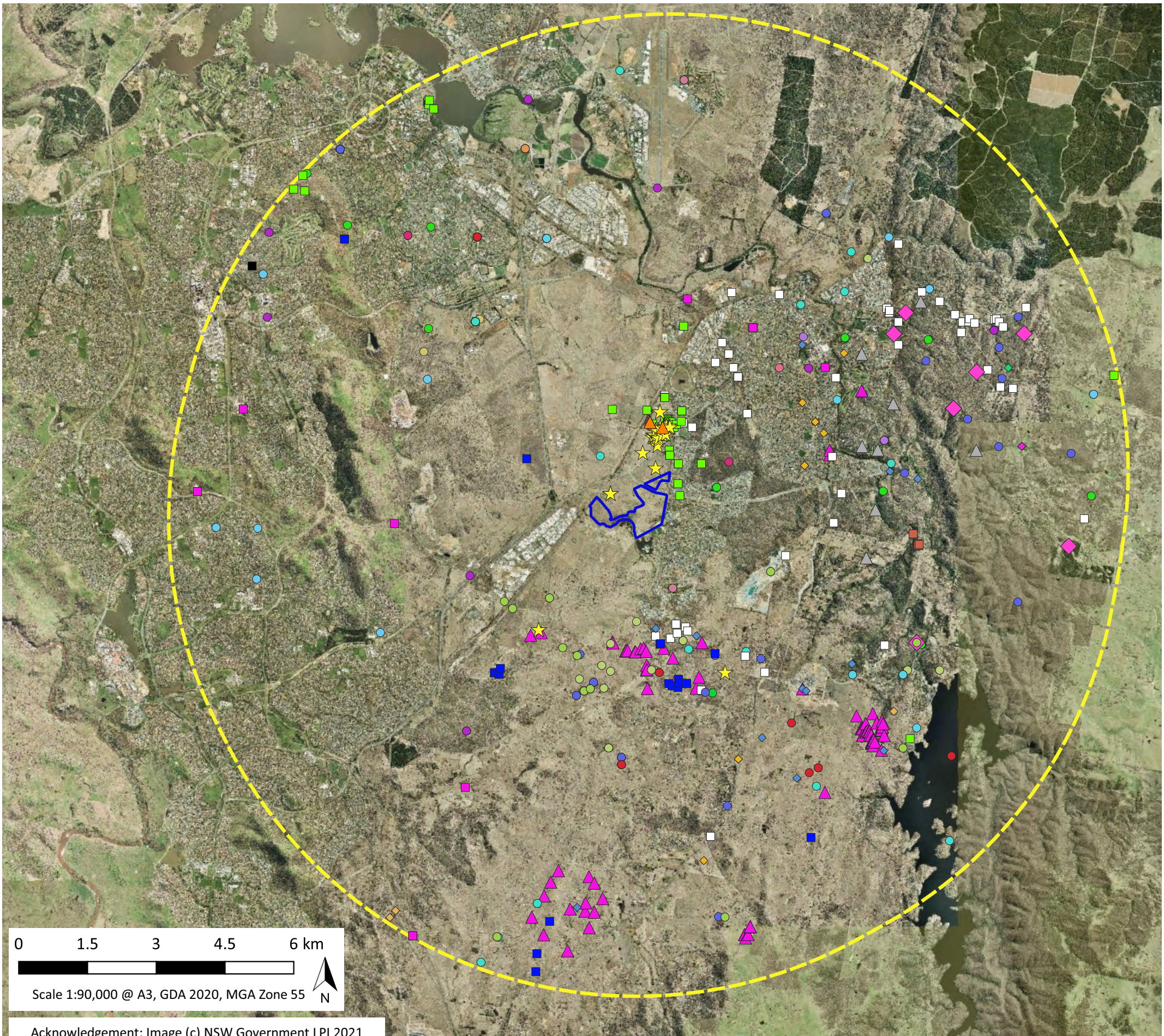


Figure 11. NSW Wildlife Atlas Threatened Species Search

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

2.3.3 Habitat suitability for species only listed under the EPBC Act

Threatened species identified by the PMST as potentially occurring in the subject land and listed under the EPBC Act only (i.e. not listed under the BC Act) are included in Table 22. Species listed under both the EPBC Act and BC Act are addressed in Table 23 and/or Table 24. 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), the BAM Calculator, listing determinations, and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. A summary of the findings from each targeted survey is given in Section 2.3.5.2.

Table 22. Candidate EPBC Act only listed species identified by the PMST as potentially occurring in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Numenius madagascariensis Eastern Curlew	-	Critically Endangered	Within Australia, the Eastern Curlew has a primarily coastal distribution and are rarely recorded inland. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. The species breeds in Russia and north-eastern China. The TBDC lists '*as per mapped areas*' as a foraging habitat constraint for this species.	No – microhabitat features	The subject land is far from coastal regions and does not support lakes, insets, bays, estuarine habitats, mudflats, or saltmarshes. While it is possible that the species may periodically visit the subject land during movements through the landscape, the species was not recorded in the subject land. Finally, the subject land does not contain nesting resources or potentially significant foraging resources for the species. Conclusion - the species is unlikely to occur in the subject land.

2.3.4 Habitat suitability for ecosystem credit species

Threatened species classified as ecosystem credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 23. The value of the habitat in the subject land for ecosystem credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based the presence/absence of specific habitat constraints, geographic limitations, and vagrancy. Information regarding habitat constraints, geographic limitations, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator.

Table 23. Predicted ecosystem credit species identified by the BAM as potentially occurring in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered	Critically Endangered	Yes – assumed	-
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	-	Yes – confirmed See Section 1.3	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Vulnerable	-	Yes – confirmed See Section 1.3	-
Chthonicola sagittata Speckled Warbler	Vulnerable	-	Yes – confirmed See Section 1.3	-
Circus assimilis Spotted Harrier	Vulnerable	-	Yes – assumed	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	Vulnerable	-	Yes – assumed	-
Daphoenositta chrysoptera Varied Sittella	Vulnerable	-	Yes – confirmed See Section 1.3	-

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	Endangered	Yes – assumed	-
Glossopsitta pusilla Little Lorikeet	Vulnerable	-	Yes – assumed	-
Grantiella picta Painted Honeyeater	Vulnerable	Vulnerable	No – habitat constraint	The BAM Calculator and TBDC lists the following habitat constraint: • Mistletoes present at a density of greater than five mistletoes per hectare. A small number of mistletoes were recorded in the wider subject land (far less than five per hectare). However, no trees or mistletoes were recorded in the development footprint. As such, the absence of this habitat constraint removes this species as an ecosystem credit species.
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable	-	Yes – confirmed See Section 1.3	-
Hirundapus caudacutus White-throated Needletail	-	Vulnerable	Yes – assumed	-
Lathamus discolor Swift Parrot (Foraging)	Endangered	Critically Endangered	Yes – assumed	-
Lophoictinia isura Square-tailed Kite (Foraging)	Vulnerable	-	Yes – assumed	-
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	Vulnerable	-	Yes – assumed	-

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	Vulnerable	-	Yes – assumed	-
Miniopterus orianae oceanensis Large Bent-winged Bat (Foraging)	Vulnerable	-	Yes – assumed	-
Neophema pulchella Turquoise Parrot	Vulnerable	-	Yes – assumed	-
Petroica boodang Scarlet Robin	Vulnerable	-	Yes – confirmed See Section 1.3	-
Petroica phoenicea Flame Robin	Vulnerable	-	Yes – confirmed See Section 1.3	-
Phascolarctos cinereus Koala (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-
Stagonopleura guttata Diamond Firetail	Vulnerable		Yes – confirmed See Section 1.3	-
Suta flagellum Little Whip Snake	Vulnerable	-	Yes – assumed	-
Varanus rosenbergi Rosenberg's Goanna	Vulnerable	-	Yes – assumed	-

2.3.5 Habitat suitability for species credit species

2.3.5.1 Candidate species credit species

Threatened species classified as species credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 24. The value of the habitat in the subject land for species credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to 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 2.3.5.2.

Table 24. Candidate species credit species identified by the BAM as potentially occurring in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Anthochaera phrygia Regent Honeyeater (Breeding)	Critically Endangered	Critically Endangered	This species inhabits dry open forest and woodland (particularly Box-Ironbark woodland and riparian forests of River Sheoak) that have significantly large numbers of mature trees, high canopy cover, and abundance of mistletoes. The species breeds in Box-Ironbark and other temperate woodlands, and in riparian gallery forest dominated by River Sheoak. The species usually nests in tall mature eucalypts, Sheoaks, or mistletoe haustoria. There are only three known key breeding regions: north-east Victoria (Chiltern-Albury) and NSW (Capertee Valley and the Bundarra-Barraba region). The TBDC lists *'as per mapped areas'* as a breeding habitat constraint for this species.	No – habitat constraint	The development footprint and wider subject land are not identified as an 'important area' for Regent Honeyeater on the 'BAM – Important Areas' map[50]. Conclusion - the subject land lacks the breeding habitat constraints required for this species.
Aprasia parapulchella Pink-tailed Legless Lizard	Vulnerable	Vulnerable	This species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. The TBDC lists *'rocky areas or within 50 m of rocky areas'* as a habitat constraint for this species and the BAM Calculator lists '*west of Dalton*' as a geographic limitation. 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 – surveyed	As detailed in Section 2.3.5.2, the species was detected in the wider subject land in PCT320 Zone 1 during targeted surveys. However, the species was not detected in the development footprint. These findings are consistent with previous ecological surveys across the subject land and adjoining land, which recorded habitat for the species in the Poplars South BioBanking Site (see Section 1.3). Conclusion - the development footprint does not support habitat for this species.
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	Vulnerable	-	In spring and summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Gang-Gang Cockatoos favour old growth forest and woodland for nesting and roosting. Nests are located in hollows of eucalypts that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. The TBDC lists '*Eucalypt tree species with hollows greater than 9 cm diameter*' as a breeding habitat constraint for this species.	No – habitat constraint, surveyed	The development footprint does not contain potential breeding habitat (i.e. trees). Furthermore, the wider subject land does not support tall mountain forests or woodlands, heavily timbered or mature wet sclerophyll forests, or old growth forest or woodland. In addition, the grassy woodland across the subject land is heavily degraded as approximately 97% of the overstorey has been cleared and the midstorey and shrubstorey are almost entirely absent. Finally, targeted bird surveys were conducted across the wider subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in hollows (Figure 13). No Gang-gang Cockatoos were recorded in the subject land and no sign of Gang-gang Cockatoos nesting in tree hollows was detected. Conclusion – the development footprint lacks the breeding habitat constraints required for this species.

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

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
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.	No – surveyed	As described in Section 2.3.5.2, targeted surveys did not detect this species in the development footprint or wider subject land. This is consistent with previous targeted surveys for the species in "The Poplars" property (see Section 1.3). Conclusion - the subject land does not support habitat for this species.
Hieraaetus morphnoides Little Eagle (Breeding)	Vulnerable	-	This species occupies open eucalypts forest, woodland, or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. The species nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. The TBDC *'Nest trees - live (occasionally dead) large old trees within vegetation'* as a breeding habitat constraint for this species.	No – habitat constraint, surveyed	The development footprint does not contain potential breeding habitat (i.e. live or dead trees). Furthermore, targeted bird surveys were conducted across the wider subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests (Figure 13). No large stick nests or Little Eagles were recorded in the subject land. Conclusion – the development footprint lacks the breeding habitat constraints required for this species.
Lathamus discolor Swift Parrot (Breeding)	Endangered	Critically Endangered	This species breeds in Tasmania from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *Eucalyptus globulus.* The species migrates between February and October to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. On the mainland, they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. In NSW, the species mostly occurs on the coast and south west slopes. The TBDC lists *'as per mapped areas'* as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified as an 'important area' for Swift Parrot on the 'BAM – Important Areas' map[51]. Conclusion - the subject land lacks the breeding habitat constraints required for this species.
Leucochrysum albicans subsp. tricolor Hoary Sunray	-	Endangered	This species occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. It can occur in modified habitats such as semi-urban areas and roadsides. It is highly dependent on the presence of bare ground for germination, and in some areas disturbance is required for successful establishment.	Yes – surveyed	As detailed in Section 2.3.5.2, approximately 130 Hoary Sunray plants were recorded in 700 m^2 of the relatively intact PCT1334 Zone 1 located immediately adjacent to the Poplars North BioBanking Site. This area will not be impacted by the proposed development. Conclusion - the subject land supports habitat for this species.
Lophoictinia isura Square-tailed Kite (Breeding)	Vulnerable	-	This species is found in a variety of timbered habitats including dry woodlands and open forests. It shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The TBDC lists *'nest trees'* as a breeding habitat constraint. The TBDC general notes state '*it will be difficult to identify a Kite nest (there are lots of comparable sized stick nests built by other species), especially given Kites have large territories and other stick nesters will undoubtedly also be nesting where Kites might be recorded. Kites will need be in attendance to confirm breeding sites*.'	No – habitat constraint, surveyed	The development footprint does not contain potential breeding habitat (i.e. trees). Furthermore, the subject land does not contain timbered watercourses and the species has not been recorded within 10 km of the subject land (Figure 11). In addition, targeted bird surveys were conducted across the wider subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests (Figure 13). No large stick nests or Square-tailed Kites were recorded in the subject land. Conclusion – the development footprint lacks the breeding habitat constraints required for this species.

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

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Vulnerable	-	Caves are the primary roosting habitat, but the species also use derelict mines, storm-water tunnels, buildings, and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. Breeding or roosting colonies can number from 100 to 150,000 individuals. The TBDC list the following breeding habitat constraint, *'Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave", observation type code "E nest-roost", with numbers of individuals >500.'*	No – habitat constraint	The subject land does not contain potential breeding habitat (caves, tunnels, mines, culverts, etc.). Conclusion – the subject land lacks the breeding habitat constraints required for this species.
Myotis macropus Southern Myotis	Vulnerable	-	The Southern Myotis 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[52]), 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	The development footprint does not contain potential breeding habitat (i.e. trees). Conclusion – the development footprint lacks the breeding habitat constraints required for this species.
Phascolarctos cinereus Koala (Breeding)	Vulnerable	Vulnerable	This species inhabits eucalypt woodlands and forests, feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species. Home range size varies with quality of habitat, ranging from less than 2 hectares to several hundred hectares in size. The TBDC lists *'areas identified via survey as important habitat'* as a habitat constraint for breeding for this species. 'Important habitat' is defined in TBDC by the density of Koalas and quality of habitat as determined by on-site survey.	No – habitat constraint, habitat degraded	The subject land is isolated from the nearest areas of intact vegetation that contain Koala records by a number of major roads and expanses or urban development (see Figure 11). Approximately 97% of the subject land has been historically cleared and the remaining vegetation is thinned, isolated, and fragmented (Figure 9). Finally, the development footprint itself does not support any potential habitat (i.e. it lacks trees). In addition, despite being conspicuous when present, no Koalas or signs of Koala presence were detected during the surveys conducted for this BDAR, or by previous ecological surveys of "The Poplars" property (see Section 1.3). The degraded vegetation and lack of Koala observations indicates that the subject land could not be classified as 'important habitat' for breeding. Conclusion - the species is considered unlikely to breed in the subject land.

[52] 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
Rutidosis leptorrhynchoides Button Wrinklewort	Endangered	Endangered	This species occurs in Box-Gum Woodland, secondary grassland derived from Box-Gum Woodland, or in Natural Temperate Grassland. It often occurs in the ecotone between Box-Gum Woodland and Natural Temperate Grassland. The species grows on soils that are usually shallow, stony red-brown clay loams and tends to occupy areas where there is relatively less competition from herbaceous species (either due to the shallow nature of the soils, or at some sites due to the competitive effect of woodland trees). It exhibits an ability to colonise disturbed areas (e.g. vehicle tracks, bulldozer scrapings and areas of soil erosion). The species is apparently susceptible to grazing, being retained in only a small number of populations on roadsides, rail reserves, and other un-grazed or very lightly grazed sites. Some of the main threats to this species listed in the TBDC are: 1) loss and degradation of habitat and/or populations by intensification of grazing regimes; 2) loss and degradation of habitat and/or populations by invasion of weeds; and 3) increased competition from other native grassland species within the habitat because of adverse increases of biomass due to absence of fire or grazing and the resultant closing up of the inter-tussock spaces that this species requires.	No – surveyed, habitat degraded	Approximately 72% of the climax vegetation across the subject land has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos. Finally, targeted threatened flora surveys through potential habitat did not detect the species (Figure 12), and, while the species is known to occur in the Poplars North BioBanking Site, the species has not been recorded in the subject land by previous ecological surveys of "The Poplars" property (see Section 1.3). Conclusion - the species is considered unlikely to occur in the subject land.
Swainsona recta Small Purple-pea	Endangered	Endangered	Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum *E. blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida*, and Long-leaf Box *E. goniocalyx*. It grows in association with understorey dominants that include Kangaroo Grass *Themeda australis*, Poa tussocks *Poa* spp. and Speargrasses *Austrostipa* spp.. Some of the main threats to this species listed in the TBDC are: 1) grazing and trampling by cattle, sheep and goats; and 2) loss, degradation and fragmentation of habitat and/or populations for residential developments, agricultural developments, and by weed invasion (including exotic grasses mostly, as well as bridal creeper and St John's wort).	No – surveyed, habitat degraded	Approximately 72% of the climax vegetation across the subject land has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos. Finally, targeted threatened flora surveys through potential habitat did not detect the species (Figure 12), and the species has not been recorded by previous ecological surveys of "The Poplars" property (see Section 1.3). Conclusion - the subject land has been degraded to the extent that the species is considered unlikely to occur.
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 – surveyed, habitat degraded	Approximately 72% of the climax vegetation across the subject land has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos. Finally, targeted threatened flora surveys through potential habitat did not detect the species (Figure 12), and the species has not been recorded by previous ecological surveys of "The Poplars" property (see Section 1.3). Conclusion - the subject land has been degraded to the extent that the species is considered unlikely to occur.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Synemon plana Golden Sun Moth	Endangered	Vulnerable	The species occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which the groundlayer is dominated by Wallaby grasses *Rhytidosperma* spp.. Grasslands dominated by Wallaby grasses are typically low and open and the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several Wallaby grass species, which are typically associated with other grasses particularly Speargrasses *Austrostipa* spp. or Kangaroo Grass *Themeda australis*. The TBDC lists '*Wallaby grass Rytidosperma sp., Chilean needlegrass Nassella nessiana or Serrated Tussock N. trichotoma*' as a habitat constraint, and the BAM Calculator lists '*Not east of Lake George Escarpment or Great Dividing Range*' as a geographic limitation. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat by urban, residential, infrastructure, and agricultural development, modifications to agricultural practices (e.g. fertiliser application, ploughing, and inappropriate grazing), overgrazing by domestic stock, and invasive grasses.	Yes – surveyed	As detailed in Section 2.3.5.2, the species was detected in PCT1334 Zone 4 of the development footprint during targeted surveys. Conclusion - the development footprint supports habitat for this species.

2.3.5.2 BAM targeted survey results

As described in Table 24, targeted surveys were completed to confirm the occurrence and/or habitat potential for the species credit species identified as having the potential to occur in the subject land.

Threatened flora

As detailed in Table 24, all of the threatened flora species credit species flagged by the BAM are considered unlikely to occur in the subject land given that approximately 72% of the climax vegetation across the subject land has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos.

Notwithstanding this, targeted threatened flora surveys were conducted across rocky areas and the less disturbed vegetation zones (Figure 12). A total of 105 flora species were recorded during field surveys, comprising 49 native species and 56 exotic species (Appendix B).

One EPBC Act listed threatened species, Hoary Sunray, was recorded in the northern-most corner of the subject land (Figure 12). Approximately 130 plants were recorded in 700 m^2 of the relatively intact PCT1334 Zone 1 located immediately adjacent to the Poplars North BioBanking Site. The proposed development will not impact PCT1334 Zone 1 and so will not impact the Hoary Sunray.

None of remaining threatened flora species credit species identified in Table 24 were recorded in the subject land and none are considered likely to occur.

Threatened fauna

A total of 42 native fauna species were recorded during field surveys, comprising 31 bird species, 4 reptile species, 3 amphibian species, 3 mammal species, and 1 invertebrate species (Appendix D). Golden Sun Moth was the only threatened fauna species detected in the subject land for this BDAR during field surveys (see below for further information).

Threatened birds

A total of 35 bird species were recorded across all surveys, comprising 31 native species and 4 exotic species (Appendix D). No threatened bird species were recorded.

As detailed in Section 1.3, while not detected during the current surveys, a number of threatened bird species have previously been recorded foraging in or immediately adjacent to “The Poplars” property, including Dusky Woodswallow, Gang-gang Cockatoo, Varied Sitella, Little Eagle, Scarlet Robin, Flame Robin, Speckled Warbler, Diamond Firetail, and the migratory White-throated Needletail and Rainbow Bee-eater. Apart from the migratory species (which are only likely to visit the subject land and surrounds on a transitory basis) all of the above species are assumed to be present as ecosystem credit species (Table 23).

None of the threatened candidate species credit species identified in Table 24 were, or have previously been, recorded nesting/breeding in the subject land.

In light of the above, all of the threatened bird species credit species flagged by the BAM are considered unlikely to breed in the subject land.

Striped Legless Lizard *Delma impar*

No Striped Legless Lizard individuals were recorded during the survey program between 27 September 2019 and 29 November 2019. All grids were placed in areas with suitable habitat characteristics, notably areas with a well-defined grass tussock structure (refer to Figure 14).

A number of non-target herpetofauna were observed during the survey program, including Rainbow Skink *Carlia tetradactyla*, Delicate Skink *Lampropholis delicata*, Common Dwarf Skink *Menetia greyii*, and Boulenger's Skink *Morethia boulengeri*. The full survey results are attached as Appendix E.

In light of the above, it is concluded that the subject land does not support the Striped Legless Lizard.

Pink-tailed Legless Lizard *Aprasia parapulchella*

Across the 28 hours of survey effort, one Pink-tailed Legless Lizard sloughed skin was recorded in the south-western corner of the subject land in a patch of PCT320 Zone 1 that supports a high cover of loose surface rock. No individuals or sloughed skins were recorded in the development footprint or remainder of the subject land.

Pink-tailed Legless Lizard habitat in the subject land has therefore been estimated based on the portions of PCT320 Zone 1 that support loose surface rock. As shown in Figure 15, the subject land is therefore estimated to support 3.30 ha of Pink-tailed Legless Lizard habitat, all of which occurs in the south-western corner of the subject land. These findings are consistent with previous ecological surveys across the subject land and adjoining land, which recorded habitat for the species in the south-western corner of the Poplars South BioBanking Site (see Section 1.3).

In light of the above, while the wider subject land supports habitat for the Pink-tailed Legless Lizard, the development footprint does not.

Golden Sun Moth *Synemon plana*

Surveys were conducted through all patches of suitable habitat during suitable survey conditions when Golden Sun Moth activity was confirmed at other ACT/NSW sites (Figure 16, Table 9).

A total of 188 Golden Sun Moths (23 females and 165 males) were recorded in the subject land across the four surveys (Figure 16, Plate 1). Twenty (20) were recorded on 30 October 2019, 121 were recorded on 13 November 2019, 29 were recorded on 22 November 2019, and 18 were recorded on 29 November 2019.

As shown in Figure 16, Golden Sun Moths were recorded at low to moderate density across those zones with a native dominant groundstorey (i.e. PCT320 Zone 1 and PCT1334 Zones 1, 2, and 4). The exception to this is the patch of Golden Sun Moth habitat immediately to the north-east of Environa Drive, which supported a greater density of moths. With respect to the Golden Sun Moth habitat that occurs in the development footprint, only 2 (1%) of the 188 Golden Sun Moth sightings were recorded in or adjacent to this area.

It is important to note that a small number of Golden Sun Moths were recorded in exotic dominant vegetation zones (i.e. PCT320 Zone 2 and PCT1334 Zone 5). However, as detailed in Section 2.2.4, Appendix A, and Appendix B, PCT320 Zone 2 and PCT1334 Zone 5 are not considered Golden Sun Moth habitat as they have a low cover of appropriate Golden Sun Moth feed species, a low cover of associated native species (i.e. Tall Speargrass), a high cover of exotic species, a high overall ground cover (indicating a low cover of bare ground), and have been subject to many of the key identified threats to Golden Sun Moth habitat over an extended period. This classification as non-habitat is

supported by the fact that, despite surveys occurring in areas far from native dominant vegetation zones, all Golden Sun Moth records in PCT320 Zone 2 and PCT1334 Zone 5 were within 60 m of a native dominant vegetation zone, with the vast majority occurring within 25 m of a native dominant vegetation zone. As stated in the NSW Government Office of Environment & Heritage Golden Sun Moth profile[53], ACT native grassland conservation strategy and action plans (ACT Government 2017[54]), and the TBDC[55], Golden Sun Moth males are known to fly up to 50 – 100 m from suitable habitat before turning back. As such, the Golden Sun Moth recorded in PCT320 Zone 2 and PCT1334 Zone 5 all occur well within the expected distance from suitable habitat.

The extent of habitat in the subject land is therefore based on the extent of the zones that possess a native dominant groundstorey (i.e. PCT320 Zone 1 and PCT1334 Zones 1, 2, and 4). Following this method, the subject land was assessed as supporting 22.40 ha of Golden Sun Moth habitat, 3.33 ha of which has been subsequently removed by the construction of Environa Drive. Of the remaining 19.07 ha of Golden Sun Moth habitat in the subject land, 1.46 ha occurs in the development footprint and will be impacted by the proposed development (Figure 16). This equates to an impact of 8% of the remaining habitat in the subject land, and an impact of 1.4% when the 83.48 ha of habitat in the adjoining BioBanking Sites is also considered.

Plate 1. Female Golden Sun Moth recorded in the subject land.

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

[54] ACT Government (2017). *ACT native grassland conservation strategy and action plans*. Environment, Planning and Sustainable Development, Canberra. Available at https://www.environment.act.gov.au/__data/assets /pdf_file/0004/1136056/Grassland-Strategy-Final-WebAccess-Part-B-5-Golden-Sun-Moth.pdf

[55] http://www.bionet.nsw.gov.au/

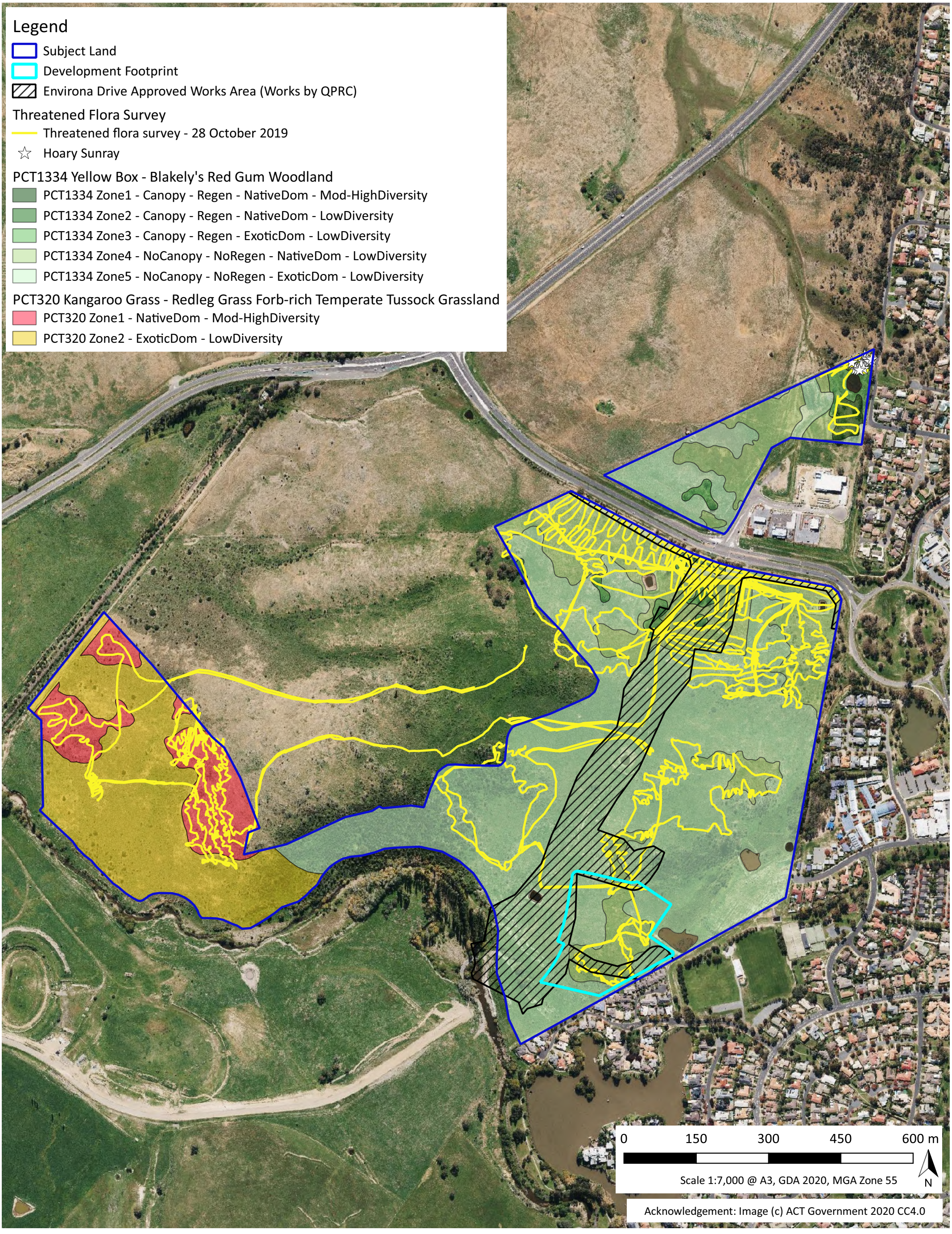


Figure 12. Threatened Flora Survey Results

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

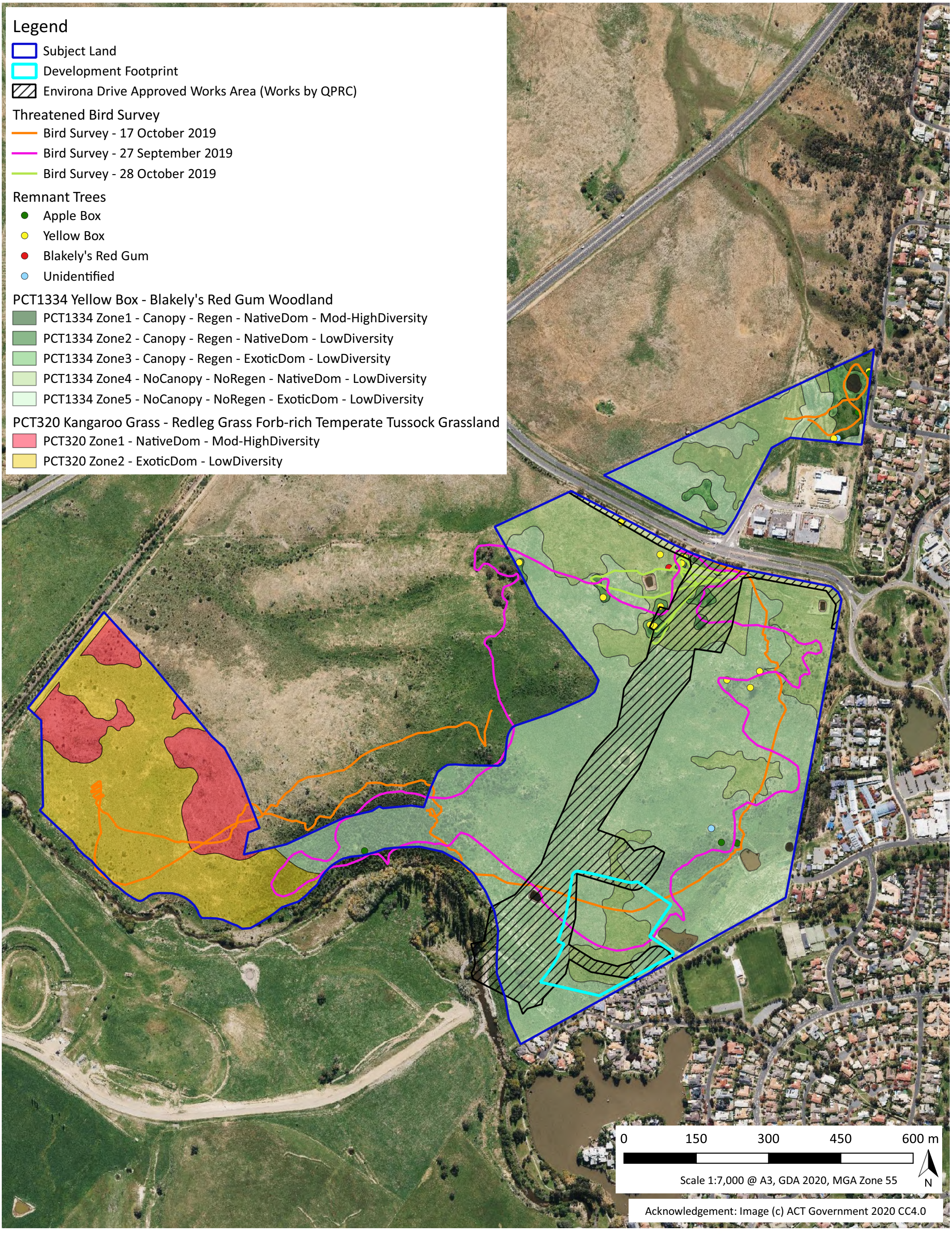


Figure 13. Threatened Bird Survey Results

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

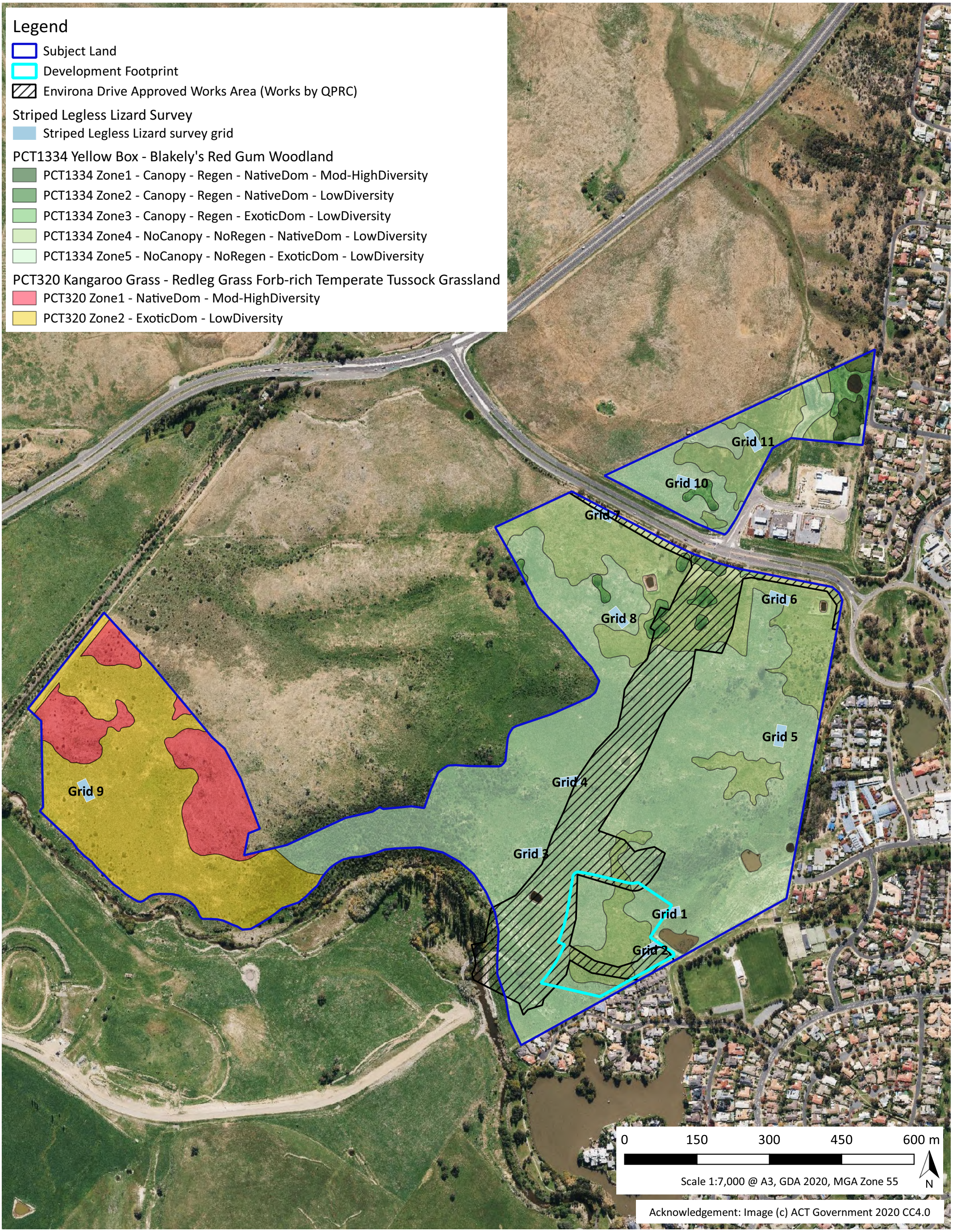


Figure 14. Striped Legless Lizard Survey Results

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

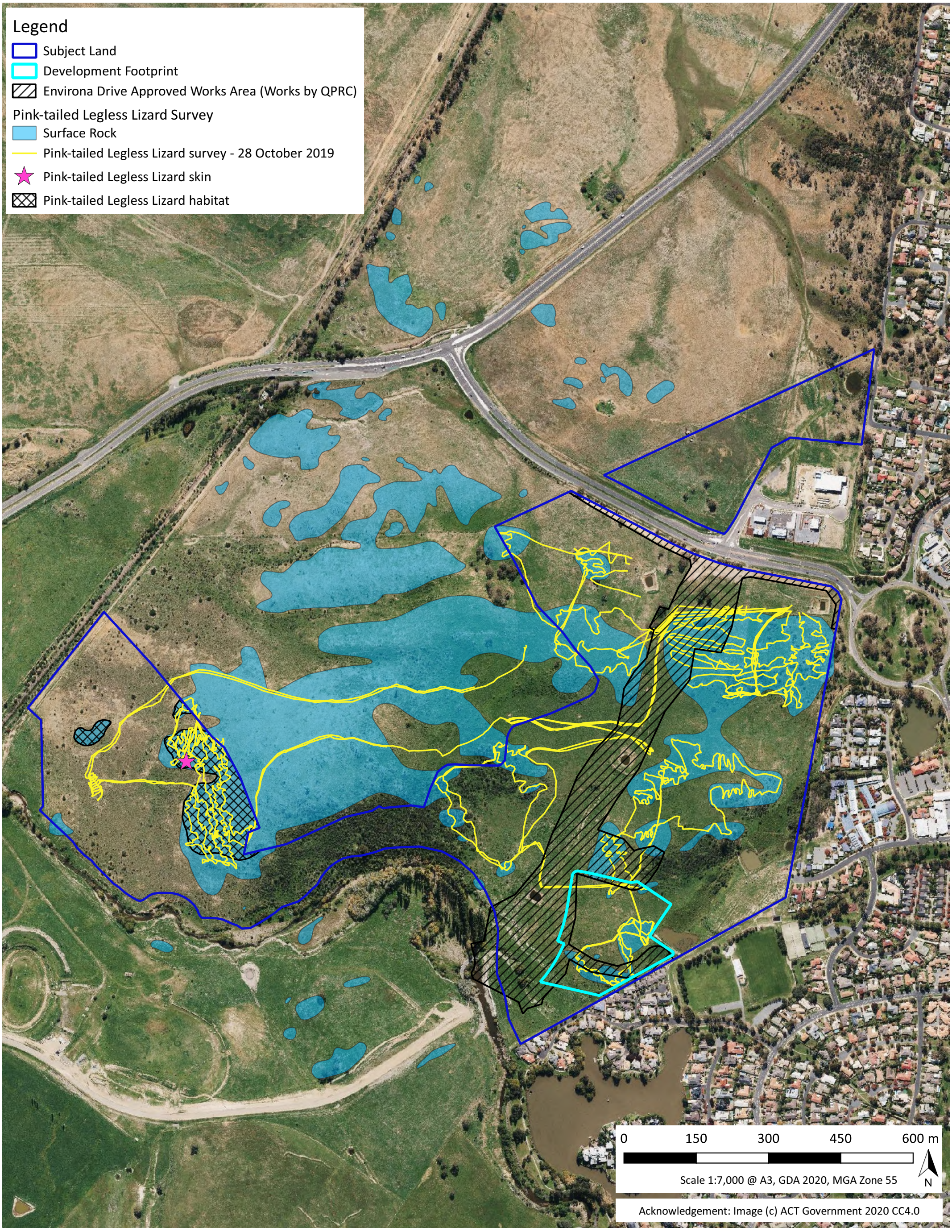


Figure 15. Pink-tailed Legless Lizard Survey

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

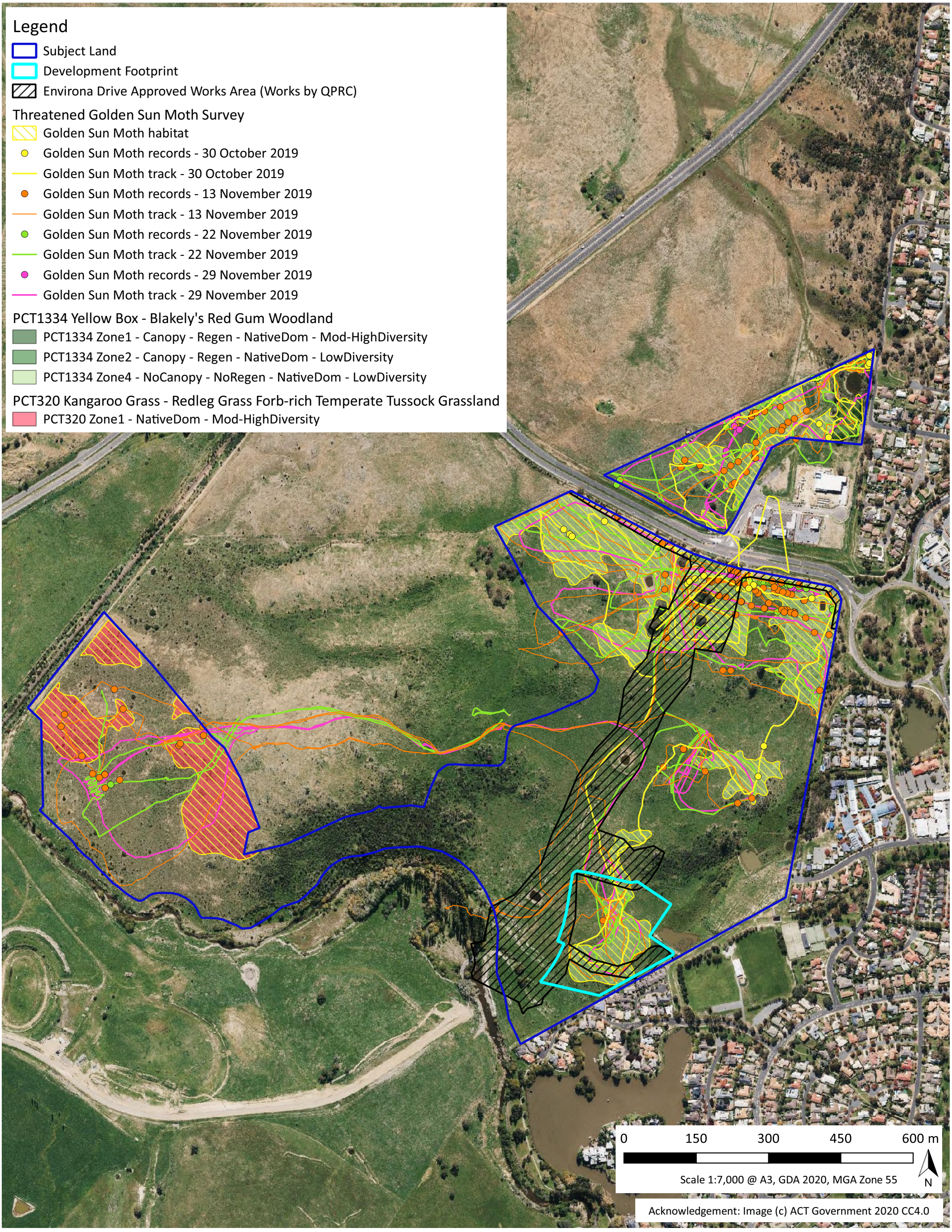


Figure 16. Golden Sun Moth Survey Results

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

3 Part 2 – Impact Assessment (BAM Stage 2)

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

3.1 Avoidance and Minimisation of Impacts on Biodiversity Values

In accordance with the BAM, 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.

As mentioned in Section 1.2, the proposed development will clear the entire development footprint, thus no substantial avoidance is specifically proposed for the current action. However, it is important to consider that planning for "The Poplars", both for development and conservation, has been a process that has progressed over more than three decades, and which has been informed by a substantial number of ecological studies (refer to Section 1.3). The end result of this process was the formal establishment and in-perpetuity management of large grassland reserves containing the vast majority of the land of high biodiversity value in "The Poplars" (i.e. the Poplars North and South BioBanking Sites). These large and highly significant conservation measures have been implemented on the understanding that they constitute the primary avoidance measures for the overall development at "The Poplars". This approach was specifically discussed with DPIE Biodiversity Conservation Division (BCD) during a meeting on 6 May 2020 and in-principle support was provided. This approach was also presented in the EPBC Act referral (EPBC Ref: 220-8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation, and approved by DAWE on 13 September 2021) following its agreement as the most appropriate approach during the 18 June 2020 pre-referral meeting and other communication with DAWE.

3.1.1 Location

3.1.1.1 Locating the project where there are low or no biodiversity values

As mentioned in Section 1.3, the ecological values of "The Poplars" property have been investigated since the early 1990s. One of the key outcomes of this work was the decision that any future development in "The Poplars" property would be designed around the existing ecological values of the land. As a result, the West Jerrabomberra LEP allocated land to either conservation or development in a manner that protected the vast majority of the land supporting significant biodiversity conservation values. As shown in Figure 17, this land has since been formally conserved under two BioBanking Agreements.

The establishment of the 'The Poplars North' and 'The Poplars South' BioBanking Sites protects approximately 50% (98.46 ha) of "The Poplars" property, including the vast majority of the identified significant biodiversity values. Protected values include:

- 87.42 ha of grassland vegetation (i.e. MR631/PCT1202 and PC686/PCT1289), 57.35 ha of which meets the listing criteria for EPBC Act listed NTG-SEH;
- 10.65 ha of woodland vegetation (i.e. MR648/PCT1330), 8.48 ha of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 83.48 ha of Golden Sun Moth habitat;

- 61.86 ha of Grassland Earless Dragon habitat; and
- 18.63 ha of Pink-tailed Legless Lizard habitat.

In addition, the BioBanking Sites protect habitat for threatened flora (i.e. Button Wrinklewort and Hoary Sunray), threatened birds (i.e. Dusky Woodswallow, Gang-gang Cockatoo, Varied Sitella, Little Eagle, Scarlet Robin, Flame Robin, Speckled Warbler, Diamond Firetail, and the migratory White-throated Needletail and Rainbow Bee-eater), and ACT listed and 'rare and uncommon species' (i.e. Perunga Grasshopper, Canberra Raspy Cricket, and Key's Matchstick Grasshopper).

In contrast, approximately 72% of the climax vegetation across the subject land has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5, Figure 17). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos.

When considered together, the vast majority of the land allocated for development across "The Poplars" property has been located in areas that support very low or 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

As mentioned previously, the two BioBanking Sites protect the vast majority of higher quality vegetation (including EPBC Act listed NTG-SEH and Box-Gum Woodland) and threatened species habitat (including the majority of the Golden Sun Moth habitat, Pink-tailed Legless Lizard habitat, threatened flora habitat, and threatened woodland bird habitat, and all of the Grassland Earless Dragon habitat) that occurs across "The Poplars" property.

In contrast, approximately 72% of the climax vegetation across the subject land has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5, Figure 17). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos.

In addition, while the proposed development of the subject land does impact 1.46 ha of Golden Sun Moth habitat, targeted surveys only recorded two Golden Sun Moth individuals in or immediately adjacent to this area (Figure 16). This equates to 0.7 individuals recorded per hectare. In contrast, 186 Golden Sun Moth individuals were recorded across the remaining 20.95 ha of Golden Sun Moth habitat in the wider subject land. This equates to 8.9 individuals recorded per hectare. As described in Section 3.4, such a measure of relative abundance is one of the more appropriate descriptors of a Golden Sun Moth population. As such, the proposed development will impact a portion of the subject land that supports lower quality Golden Sun Moth habitat.

When considered together, the proposed development has therefore been located in areas where the native vegetation and threatened species habitat is in the poorest condition.

3.1.2 Design

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

As mentioned in Section 1.3.1, the 'The Poplars North' and 'The Poplars South' are established as BioBanking Sites under BioBanking Agreements (Figure 17). These agreements provide a formal, legally binding, and audited conservation focussed management regime for the portions of "The Poplars" property recognised as supporting significant biodiversity values. These agreements also stipulate a wide variety of management activities that are designed to protect and enhance the significant biodiversity values that these areas support. These management activities include the following.

- Retention of remnant native vegetation, regrowth, dead timber, and rocks.
- Replanting or supplementary planting where natural regeneration will not be sufficient (Poplars South BioBanking Site only).
- An integrated weed management plan, including weed control, monitoring, and inspection of existing and new weeds.
- Control of feral and overabundant native herbivores using a variety of methods (e.g. biocontrol, baiting, warren destruction, fumigation, shooting, trapping, and harbour destruction), including monitoring and inspection requirements.
- Vertebrate pest management (foxes and other miscellaneous feral species) using a variety of methods (baiting, den destruction, shooting, and trapping), including monitoring and inspections of existing and new vertebrate pests.
- A fire management plan, including prescribed ecological burns if required.
- Stock are not permitted to graze in any area of the Biobank Sites.
- Erosion control.
- Management of site drainage from urban stormwater catchments.
- Management of human disturbance, including fencing (to deter human and vehicular access) and signage, and restrictions on permitted activities.
- Monitoring, reporting, and record keeping requirements, including:
    - site inspection and monitoring, recording ground cover, stock numbers, condition of fencing and gates, human disturbance, erosion, and waste;
    - annual reporting, detailing the completed management actions and the results of any monitoring, inspections, or survey; and
    - Record keeping, including photographs, management actions, inspections, monitoring, and surveys.
- Adaptive management, including a review of management plans every 4 to 6 years. This process considers the effectiveness of the matters contained in the current plan.

When considered together, the proposed development therefore includes provision for the demarcation, ecological restoration, rehabilitation, and ongoing maintenance of the retained native vegetation and habitat across "The Poplars" property.

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 “The Poplars” is located immediately adjacent to existing urban and industrial development, 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.

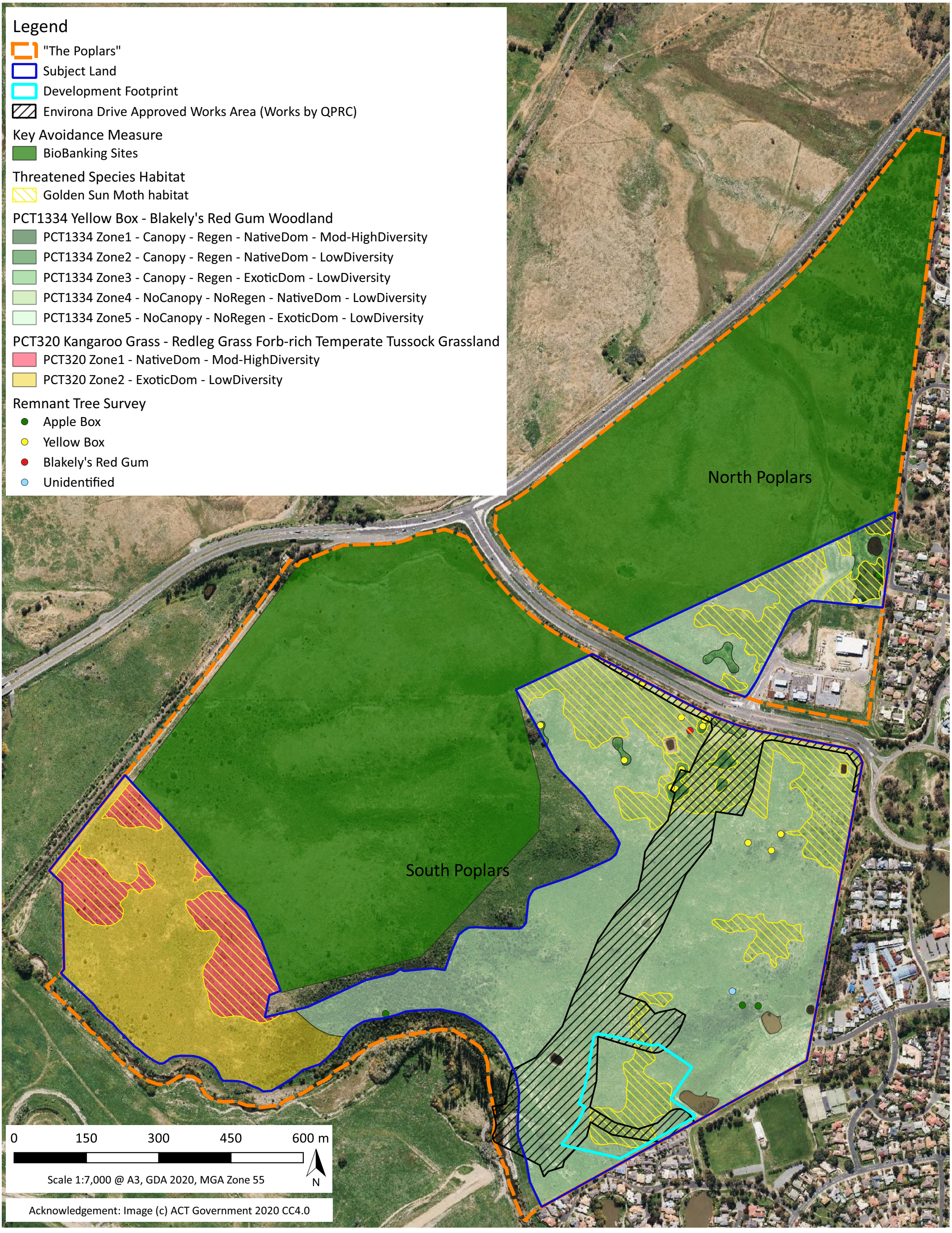


Figure 17. Avoidance, minimisation, and mitigation measures

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 17 May 2021

3.2 Residual Biodiversity Impacts of the Proposed Development

3.2.1 Direct impacts on native vegetation and habitat

As shown in Figure 18, the proposed development will result in the clearance of:

- 1.46 ha of PCT1334 Zone 4 – low diversity native pasture (BC Act native vegetation, BC Act Box-Gum Woodland);
- 1.79 ha of PCT1334 Zone 5 – low diversity exotic pasture that supports a small native component; and
- 1.46 ha of Golden Sun Moth habitat (BC Act endangered, EPBC Act vulnerable), located in PCT1334 Zone 4.

In total, the proposed development will result in the clearance of 1.46 ha of BC Act native vegetation, all of which meets the criteria of BC Act Box-Gum Woodland and supports Golden Sun Moth habitat, and 1.79 ha of exotic pasture that supports a small native component.

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. Jerrabomberra Creek) 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.

- Golden Sun Moth.
- The threatened species listed in Table 23.
- The retained vegetation and threatened species protected in the two BioBanking Sites (refer to Section 1.3.1).

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 low or no biodiversity values.

- Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition.
- Making provision for the demarcation, ecological restoration, rehabilitation, and/or ongoing maintenance of retained native vegetation and habitat.
- 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.

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 and operation;
- 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 8.3 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.

A potential 'prescribed biodiversity impact' due to the proposed development was identified during the development of this BDAR. As described in the following section, this potential impact was not determined to be a 'prescribed biodiversity impact' due to the fact that it did not impact threatened species habitat or threatened ecological communities in addition to that described in Section 3.2.1 and Section 3.2.2.

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

3.2.3.1 Rocks

As detailed in Section 2.3 and shown on Figure 15, the development footprint contains patches of loose surface rock, the removal of which is identified as a potential prescribed biodiversity impact. As detailed in Section 2.2.3.5 and 2.3.5.2, a rock turning survey was performed across the development footprint and wider subject land in order to determine the value of the loose surface rock to threatened fauna (particularly with respect to Pink-tailed Legless Lizard, the species credit species associated with loose surface rock).

One Pink-tailed Legless Lizard sloughed skin was recorded in the south-western corner of the subject land in a patch of PCT320 Zone 1 that supports a high cover of loose surface rock. No individuals or sloughed skins were recorded in the development footprint or remainder of the subject land. Pink-tailed Legless Lizard habitat in the subject land was therefore estimated based on the portions of PCT320 Zone 1 that support loose surface rock. As shown in Figure 15, the subject land is therefore estimated to support 3.30 ha of Pink-tailed Legless Lizard habitat, all of which occurs in the south-western corner of the subject land. These findings are consistent with previous ecological surveys across the subject land and adjoining land, which recorded habitat for the species in the south-western corner of the Poplars South BioBanking Site (see Section 1.3).

In light of the above, while the wider subject land supports habitat for the Pink-tailed Legless Lizard, the development footprint does not. It is therefore unlikely that the removal of rocks in the development footprint will have a prescribed biodiversity impact on any threatened species or ecological community.

Figure 18. Residual Biodiversity Impacts of the Proposed Development

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. 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 proposed biodiversity certification area and adjoining areas during construction 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 during construction.

- Appropriate vehicle hygiene will be maintained. Vehicles and machinery entering the proposed biodiversity certification area 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 adjacent Poplars North and Poplars South BioBanking Sites will be protected and managed in accordance with the BioBanking Agreements. These agreements provide a formal, legally binding, and audited conservation focussed management regime for the portions of "The Poplars" property recognised as supporting significant biodiversity values. These agreements also stipulate a wide variety of management activities that are designed to protect and maintain the significant biodiversity values that these areas support. These management activities include the following.

- Retention of remnant native vegetation, regrowth, dead timber, and rocks.
- Replanting or supplementary planting where natural regeneration will not be sufficient (Poplars South BioBanking Site only).
- An integrated weed management plan, including weed control, monitoring, and inspection of existing and new weeds.
- Control of feral and overabundant native herbivores using a variety of methods (e.g. biocontrol, baiting, warren destruction, fumigation, shooting, trapping, harbour destruction), including monitoring and inspection requirements.
- Vertebrate pest management (foxes and other miscellaneous feral species) using a variety of methods (baiting, den destruction, shooting, trapping), including monitoring and inspections of existing and new vertebrate pests.
- A fire management plan, including prescribed ecological burns if required.
- Stock are not permitted to graze in any area of the Biobank Sites.
- Erosion control.
- Management of site drainage from urban stormwater catchments.
- Management of human disturbance, including fencing (to deter human and vehicular access) and signage, and restrictions on permitted activities.
- Monitoring, reporting, and record keeping requirements, including:
    - site inspection and monitoring, recording ground cover, stock numbers, condition of fencing and gates, human disturbance, erosion, and waste;
    - annual reporting, detailing the completed management actions and the results of any monitoring, inspections, or survey; and
    - Record keeping, including photographs, management actions, inspections, monitoring, and surveys.
- Adaptive management, including a review of management plans every 4 to 6 years. This process considers the effectiveness of the matters contained in the current plan.

3.3.3 Adaptive management for uncertain impacts

As per Chapter 8.5 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 biodiversity impacts. If uncertain biodiversity impacts are identified, the proponent must develop an adaptive management strategy.

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

- the 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;
- the proposed development is unlikely to substantively increase the incidence of vehicle strikes; and
- the minimisation and mitigation detailed in Section 3.1 and 3.3 are considered sufficient to reduce the risk of indirect impacts to an acceptably low level.

As such, an adaptive management strategy is not required for the proposed development. Notwithstanding this, as detailed in Section 3.1.2, the two BioBanking Agreements include adaptive management strategies. As such, the adaptive management approach outlined in those two documents will act to address any potential unforeseen biodiversity impacts on the significant vegetation and habitat retained within the two BioBanking Sites.

3.4 Serious and irreversible impacts

The guidance to assist a decisionmaker to determine a serious and irreversible impact (NSW Government 2019[56]) 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 listed as an SAII entity. However, the subject land does support the following biodiversity values, both of which are listed as SAII entities.

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

The proposed development will result in the removal of a total of 1.46 ha of Golden Sun Moth habitat (located entirely within PCT1334 Zone 4) and a total of 1.46 ha of BC Act Box-Gum Woodland (comprised entirely of PCT1334 Zone 4).

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. Accordingly, the below additional information is provided to support the decision maker to determine if the proposed removal of 1.46 ha of Golden Sun Moth habitat or 1.46 ha of BC Act Box-Gum Woodland constitute an SAII.

However, as detailed in the following sections, the substantial avoidance, minimisation, and mitigation measures incorporated into the Poplars 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 9.1 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*[57] Golden Sun Moth habitat spatial data, accessed on 3 March 2021.
- NSW Government Saving Our Species (SOS) Golden Sun Moth species profile[58] and project report[59].
- NSW Government Office of Environment & Heritage Golden Sun Moth profile[60].
- *ACT native grassland conservation strategy and action plans* (ACT Government 2017[61]).

[56] NSW Government (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. State of New South Wales and Office of Environment and Heritage

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

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

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

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

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

- *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana)* (Commonwealth of Australia 2009b[62]).
- *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[63]).

3.4.1.1 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 19).

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 19). The EOO was calculated according to International Union for Conservation of Nature (IUCN) Standards and Petitions Subcommittee (2017)[64] 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 19, Table 25). The EOO in Figure 19 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.

[62] 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.
[63] Commonwealth of Australia (2013b). *Approved Conservation Advice for Synemon plana (golden sun moth).* Approved by the delegate of the Minister on 17 December 2013.
[64] 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 25, 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 19). 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 25 are referred to throughout the following SAII assessment.

Table 25. 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	68.41% (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.

3.4.1.2 Golden Sun Moth – SAII additional information

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

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

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

In total, "The Poplars" property was estimated to support 105.88 ha of Golden Sun Moth habitat (22.40 ha across the subject land plus 83.48 ha retained within the two BioBanking

Sites). Of that, 3.33 ha has subsequently been removed by the construction of Environa Drive. "The Poplars" therefore supports 102.55 ha of Golden Sun Moth habitat (19.07 ha in the subject land and 83.48 ha in the BioBanking Sites). The proposed development will impact 1.46 ha (1%) of the 102.55 ha of the Golden Sun Moth habitat that occurs in "The Poplars"; all impacts occur in highly degraded habitat that has a vegetation integrity of only 8.3 (i.e. PCT1334 Zone 4).

Of the remaining areas of Golden Sun Moth habitat in "The Poplars", 83.48 ha (81%) will be protected in the two BioBanking Sites; this includes the vast majority of the higher quality Golden Sun Moth habitat. These large expanses of well-connected, high-quality Golden Sun Moth habitat will be protected and managed in accordance with the BioBanking Agreements, which includes the management actions detailed in Section 3.3.2.

2. ***The current status of the species' population, including:***

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

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

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

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

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

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

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

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

      i. ***extent of occurrence***

      ii. ***area of occupancy***

      iii. ***number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and***

      iv. ***whether the species' population is likely to undergo extreme fluctuations.***

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

i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site

ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or

iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).

Golden Sun Moth is listed under the NSW BC Act as an Endangered species. It is considered to be an SAII entity based on Principle 3[65]. As stated in the NSW Threatened Species Scientific Committee Final Determination[66]:

'Museum records show that the species was more common prior to 1950 and the original range may have been from near Bathurst, south to central Victoria and west to South Australia.

The number of authentic, location specific, records from NSW is very small.

There has been a severe decline in the area of the habitat occupied by Synemon plana. The habitat is threatened by agricultural practices, invasion by exotic weeds and from housing development.

Given that:

- *the known populations of the species are fragmented in distribution and that there is only one authenticated extant site in NSW;*
- *there is evidence of a decline from a previous wider distribution;*
- *there is evidence of a decline in available habitat; and,*
- *threats to the habitat continue, the Scientific Committee is of the opinion that criteria for listing as an endangered species specified in Section 10 of the Threatened Species Conservation Act are met…'*

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

The species is not data deficient.

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

[66] https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/1996-1999/golden-sun-moth-synemon-plana-endangered-species-listing

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

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

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

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

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

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 subject land'.* The subject land and adjoining BioBanking Sites therefore support a local population with the following characteristics.

- 102.55 ha of remaining habitat (19.07 ha in the subject land and 83.48 ha in the BioBanking Sites).
- Low abundance in the habitat that occurs in the development footprint and in the north-western and south-western corners of the subject land. The remaining patches of habitat support moderate to high abundance.
- With the exception of the three patches of habitat to the east of Environa Drive (which includes the habitat in the development footprint), all of the remaining patches of habitat are functionally connected to the 83.48 ha of known habitat in the BioBanking Sites.

The proposed development will directly impact 1.46 ha (1%) of the 102.55 ha of local Golden Sun Moth habitat.

Of the remaining habitat, 83.48 ha (81%) will be avoided, protected, and managed in the two BioBanking Sites. Potential indirect impacts to retained habitat will be mitigated by the measures detailed in Section 3.1 and Section 3.3.

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

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

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

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

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

The proposed development will directly impact 1% (1.46 ha) of the 102.55 ha of local Golden Sun Moth habitat. 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 19). 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 3.4.1.1, Table 25). The impact to 1.46 ha of Golden Sun Moth habitat in the subject land will therefore reduce the available habitat in NSW by 0.01% and in the Murrumbateman IBRA subregion by 0.015%.

The 1.46 ha patch of habitat impacted by the proposed development supports a low abundance of moths and only represents 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.

Furthermore, the area impacted is not directly connected to any other patches of Golden Sun Moth habitat. As such, the proposed development is unlikely to increase habitat fragmentation in the development footprint or immediate locality.

The documents referenced at the start of Section 3.4 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 development footprint and wider subject land have been impacted by a number of these threats in the past as approximately 72% of the climax vegetation has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 14.18 ha of PCT320 Zone 2 and 48.28 ha of PCT1334 Zone 5). The remaining 28% of the vegetation is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by Eastern Grey Kangaroos. As a result, the majority of the development footprint and wider subject land have a disturbed soil profile, a groundstorey dominated by exotic perennial and annual pasture species, and are heavily grazed by stock and native herbivores.

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 impacts from agricultural activities. These activities, over time, are likely to further degrade or entirely destroy the remaining patches of Golden Sun Moth habitat.

While the proposed development will directly impact 1.46 ha (1%) of the 102.55 ha of local Golden Sun Moth habitat, 83.48 ha will be protected and managed in the two BioBanking Sites. The establishment of the two BioBanking Sites therefore avoids, protects, and manages 81% of the Golden Sun Moth habitat that remains across "The Poplars" property (Figure 17). These large expanses of high-quality and well-connected Golden Sun Moth habitat will be protected and managed in accordance with the BioBanking Agreements, which includes the management actions detailed in Section 3.3.2.

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.

Legend

- Australian_Capital_Territory_Border
- Murrumbateman IBRA Subregion
- Subject Land - SAII
- Golden Sun Moth - Extent of Occurence
- Golden Sun Moth records - subject land
- NSW Wildlife Atlas Threatened Species - Golden Sun Moth
- Golden Sun Moth habitat - ACTmapi

0 5 10 15 20 km

Scale 1:320,000 @ A3, GDA 2020, MGA Zone 55

N

Figure 19. Golden Sun Moth Extent of Occurrence and Estimated Occupied Habitat

capital ecology

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 16 March 2021

3.4.2 Box-Gum Woodland

The following information is presented according to the requirements outlined in Section 9.1 of the BAM and has been informed by the following databases and documents.

- ACT Government's ACTmapi *Significant Species, Vegetation Communities & Registered Trees*[67] threatened woodland spatial data, accessed on 3 March 2021.
- NSW Government Saving Our Species (SOS) profile[68], project report[69], and Googong-Burra Region priority management information[70].
- *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Gazetted 17 July 2020 (NSW Threatened Species Scientific Committee 2020a).
- *Notice of and reason for the Final Determination (*NSW Threatened Species Scientific Committee 2020b[71]).
- *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020c[72]).
- NSW Government Office of Environment & Heritage White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland profile[73].
- *ACT native woodland conservation strategy and action plans* (ACT Government 2019[74]).
- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice* (Department of the Environment and Heritage 2006[75]).
- *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands* (Commonwealth of Australia 2006[76]).
- *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (DECCW 2010[77]).

[67] http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt
[68] https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10837
[69] https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=988&ReportProfileID=10837
[70] https://www.environment.nsw.gov.au/savingourspeciesapp/ManagementSite.aspx?SiteID=3052
[71] NSW Threatened Species Scientific Committee (2020b), *Notice of and reason for the Final Determination.*
[72] NSW Threatened Species Scientific Committee (2020c). *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*
[73] https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837
[74] ACT Government (2019). *ACT native woodland conservation strategy and action plans*. Environment, Planning and Sustainable Development.
[75] Department of the Environment and Heritage (2006). *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice*. Nationally threatened species and ecological communities guidelines. EPBC Act policy statement.
[76] Commonwealth of Australia (2006). *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands.* EPBC Act Policy Statements, Nationally threatened species and ecological communities.
[77] DECCW (2010). *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* Department of Environment, Climate Change and Water NSW, Sydney

3.4.2.1 Box-Gum Woodland – SAII additional information

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

The proposed development enacts the principles detailed in Section 3.1 to avoid and minimise impacts to Box-Gum Woodland.

Potential indirect impacts, including indirect impacts to Box-Gum Woodland, will be minimised and mitigated by the measures outlined in Section 3.3.

In total, "The Poplars" property is estimated to support 28.98 ha of Box-Gum Woodland (18.33 ha across the subject land in PCT1334 Zones 1 to 4, plus 10.65 ha retained within the two BioBanking Sites). The proposed development will therefore impact 1.46 ha of PCT1334 Zone 4, all of which meets the criteria for this TEC in low condition (i.e. vegetation integrity of 8.3), which is approximately 5% of that which occurs across "The Poplars" property. The remaining 1.79 ha of PCT1334 (i.e. PCT1334 Zone 5) impacted by the proposed development has been disturbed to the extent that it no longer meets the listing criteria for BC Act Box-Gum Woodland.

Of the remaining areas of Box-Gum Woodland in "The Poplars", 10.65 ha will be protected in the two BioBanking Sites; this includes the vast majority of the higher quality Box-Gum Woodland, 8.48 ha of which meets the EPBC Act listing criteria. These areas of high-quality Box-Gum Woodland will be protected and managed in accordance with the BioBanking Agreements, which includes the management actions detailed in Section 3.3.2.

6. The current status of the TEC including:

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

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

i. change in community structure

ii. change in species composition

iii. disruption of ecological processes

iv. invasion and establishment of exotic species

v. degradation of habitat, and

vi. fragmentation of habitat

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

i. Extent of occurrence

ii. Area of occupancy, and

iii. Number of threat-defined locations

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

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed under the NSW BC Act as a Critically Endangered Ecological Community. It is considered to be an SAII entity based on Principles 1 and 2[78]. As stated in the Final Determination (NSW Threatened Species Scientific Committee 2020b):

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

…White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is subject to a number of threatening processes that have caused severe declines in biotic processes and interactions throughout its range and are likely to cause continuing decline in the future.'

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

The TEC is not data deficient.

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

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

i. in hectares, and

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

Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal.

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

- Former (pre-1750) extent in NSW = 3,717,366 ha.
- Current extent in NSW = 250,729 ha (93% cleared).
- Former extent (pre-1750) in South-Eastern NSW = 1,012,052 ha.
- Current extent in South-Eastern NSW = 59,468 ha (94% cleared).

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

In total, "The Poplars" property is estimated to support 28.98 ha of Box-Gum Woodland (18.33 ha across the subject land in PCT1334 Zones 1 to 4, plus 10.65 ha retained within the two BioBanking Sites).

The proposed development will impact 1.46 ha of PCT1334 Zone 4, all of which meets the criteria for this TEC in low condition (i.e. vegetation integrity of 8.3). The remaining 1.79 ha of PCT1334 (i.e. PCT1334 Zone 5) impacted by the proposed development has been disturbed to the extent that it no longer meets the listing criteria for BC Act Box-Gum Woodland.

The proposed development of the subject land will therefore have a direct impact on 5% (1.46 ha) of the low-quality BC Act Box-Gum Woodland. This impact represents 0.002% of the TEC in South-Eastern NSW, or 0.0006% of the total extent in NSW.

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

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

In total, "The Poplars" property is estimated to support 28.98 ha of Box-Gum Woodland. The proposed development will impact 1.46 ha of PCT1334 Zone 4, all of which meets the criteria for this TEC in low condition (i.e. vegetation integrity of 8.3). The proposed development is surrounded by mostly cleared agricultural and residential land and will not involve the removal of any mature remnant trees.

As shown in Figure 20, a 500 m buffer around the development footprint contains approximately 3.14 ha of BC Act Box-Gum Woodland, the majority of which is in similar condition to that within the development footprint. The areas to be cleared are small, already isolated patches of low-quality vegetation that lack a native overstorey, midstorey, and shrubstorey.

The proposed development is therefore unlikely to significantly reduce the size or result in an increase in isolation of the remaining patches.

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

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

The average minimum distance between all patches of BC Act Box-Gum Woodland within 500 m of the development footprint (including vegetation within the development footprint, refer to Figure 20) is:

- if the remnant is retained = 68 m; and
- if the remnant is removed as proposed = 85 m.

The proposed development would therefore result in an average increase of 17 m (25%) for the minimum distance between all patches of BC Act Box-Gum Woodland within 500 m of the development footprint. However, it is important to note that the proposed development will only impact 1.46 ha of PCT1334 Zone 4, which is a low-diversity vegetation zone that does not

support an overstorey, midstorey, or shrubstorey. The removal of such degraded BC Act Box-Gum Woodland is therefore considered unlikely to further isolate retained and adjacent areas of the TEC.

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

The vegetation across the subject land is highly disturbed as approximately 97% of the overstorey has been cleared and the midstorey and shrubstorey are almost entirely absent. Indeed, the development footprint does not support any remnant trees or native midstorey or shrubstorey. The impact of the proposed development is therefore restricted to 1.46 ha of low diversity derived grassland and 1.79 ha of exotic pasture.

The proposed development is therefore entirely located in an area that supports low-quality vegetation and flora habitat. In addition, the proposed development will not significantly reduce the size or result in an increase in isolation of the remaining patches of the TEC. As a result, the proposed development is considered unlikely to impact the dispersal of any flora species characteristic of the TEC.

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

The average area to perimeter ratio for all patches of BC Act Box-Gum Woodland within 500 m of the development footprint (including vegetation within the development footprint, refer to Figure 20) is:

- if the remnant is retained = 7.70; and
- if the remnant is removed as proposed = 6.37.

The proposed development would therefore result in an average decrease of 1.33 (17%) for the average area to perimeter ratio for all patches of BC Act Box-Gum Woodland within 500 m of the development footprint.

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

The proposed development will directly impact (i.e. remove) of a total of 1.46 ha of BC Act listed Box-Gum Woodland, comprised of the following vegetation condition zone.

- PCT1334 Zone 4. Vegetation Integrity Score of 8.3 (composition 8.4, structure 46.8, and function 1.5). As described in Table 16, this zone is characterised as '*Overstorey and midstorey are absent. Low diversity native groundlayer dominated by disturbance tolerant native grasses, notably Tall Speargrass and Wallaby Grasses Rhytidosperma spp. Low to high density of significant weed species. Moderately to heavily grazed by Eastern Grey Kangaroos.'*

As described above, this zone of BC Act Box-Gum Woodland has been substantially degraded by historic and current agricultural activities and only meets the definition of the TEC in a highly modified form.

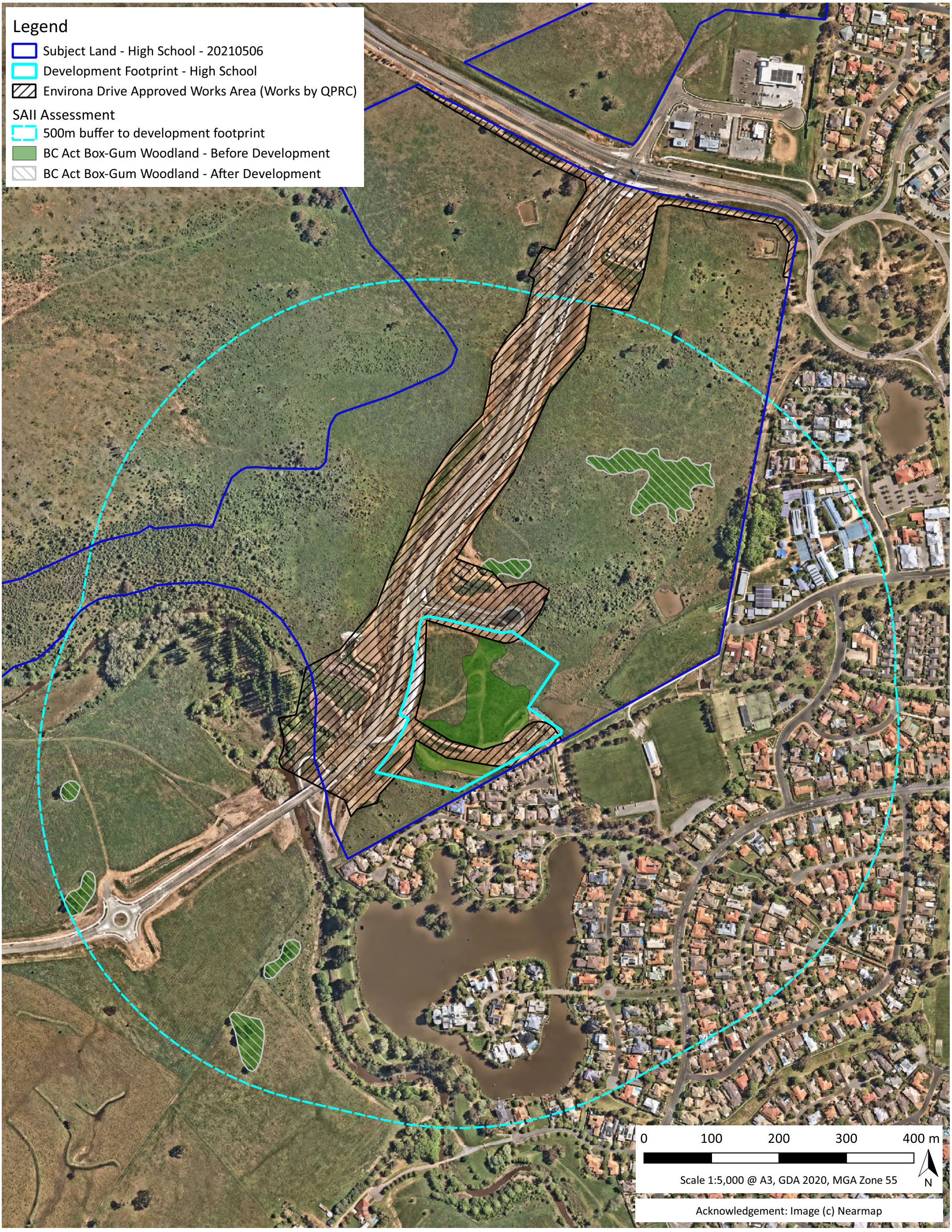


Figure 20. Box-Gum Woodland within 500 m of the Development Footprint

Capital Ecology Project No: 3036
Drawn by: S. Reid
Date: 6 December 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 development footprint does not:

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

However, as detailed in Section 3.2, the proposed development will impact 1.46 ha of Golden Sun Moth habitat, a threatened species listed under the EPBC Act. As mentioned in Section 1, the impact of all stages of the Poplars Development on MNES was referred to DAWE on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved by DAWE on 13 September 2021, subject to certain conditions.

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 F.

3.5.2.1 Biodiversity risk weighting

The biodiversity risk weighting (Section 5.4 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 development footprint contains vegetation with a vegetation integrity score that requires offsetting for impacts on ecosystem credits. The development footprint 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.

- PCT1334 – Biodiversity risk rating of 2.5.
- *Synemon plana* Golden Sun Moth – Biodiversity risk rating of 3.

3.5.2.2 Ecosystem credit requirements

The results of the BAM ecosystem credit calculations completed for the proposed development are provided in Table 26. As shown in Table 26, the assessed vegetation zones in the development footprint do not have a vegetation integrity score sufficient for their clearance to result in generation of ecosystem credits, as outlined in Section 9.2.1 of the BAM, these being vegetation zones that have a vegetation integrity score of:

> *a. ≥15, where the PCT is representative of an EEC or a CEEC*
>
> *b. ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community*
>
> *c. ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.*

Accordingly, the proposed development does not generate an ecosystem credit obligation.

Table 26. Ecosystem credit requirements.

PCT & Vegetation Zone	Vegetation Integrity Score	Proposed Clearance Area (ha)	Credits Required
PCT1334 Zone 4	8.3	1.46	0
PCT1334 Zone 5	1.3	1.79	0

3.5.2.3 Species credit requirements

The development footprint supports habitat of potential significance to the Golden Sun Moth, which is species credit species. Accordingly, as detailed in Table 27, the proposed development does generate a species credit obligation.

Table 27. Species credit requirements.

Species	PCT & Vegetation Zone	Habitat Condition (Vegetation Integrity) Loss	Proposed Clearance Area (ha)	Credits Required
Synemon plana Golden Sun Moth	PCT1334 Zone 4	8.3	1.46	9

3.5.2.4 Credit obligation options

As detailed by the NSW Department of Planning, Industry and Environment[79], the proponent can address the estimated offset obligation outlined in the following two ways (options).

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.*

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

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.

3.5.2.5 The manner in which the offset requirements have been met for the proposed development

As mentioned in Section 1.1, the school site is part of an existing lot (Lot 1 DP1263364). However, it is to become a newly created lot (Lot 2 DP1263364), the creation of which was approved by Council under DA332-2015 on 10 March 2021 but is not yet registered. As part of this process, Condition 4 of the conditions of consent[80] required:

Evidence of the retirement of credits or payment to the Biodiversity Conservation Fund in satisfaction of Table 1 requirements must be provided to the consent authority prior to issue of Subdivision Certificate.

Table 1 Species credits required to be retired - like for like

Impacted species credit species	*Number of species credits*	*PCT & Vegetation Zone*
Synemon plana/ Golden Sun Moth	*9*	*PCT1334 Zone 4*

To address Condition 4, the required offset obligation was addressed by The Village Building Co. Ltd who purchased and retired the required 9 Golden Sun Moth credits. **The entire offset obligation for the proposed development has therefore been met.**

[80] DA 322-2015 - Draft Conditions of Consent - Two Lot Subdivision - 300 Lanyon Drive, Jerrabomberra.

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.

1. The subject land is located within the Queanbeyan-Palerang 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 support a number of the tree species listed in Schedule 2 of the Koala Habitat Protection SEPP. Accordingly, the subject land supports 'potential koala habitat'.

4. "The Poplars" property is separated by over 6 km from the nearest Koala records, all of which occur in intact vegetation to the west; the intervening areas are characterised by urban development and include a substantial number of significant impediments to Koala movement (e.g. large roads, urban expanses, human disturbance).

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land is therefore considered unlikely to support Koala habitat and as such is unlikely to constitute important or occupied Koala habitat now or in the future.

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

References

ACTmapi viewer, available at http://www.actmapi.act.gov.au/.

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

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

ACT Government (2015). *Survey Guidelines for Striped Legless Lizard*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

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

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

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

Biodiversity Credit Ownership Report – Biodiversity credits owned under the Biodiversity Banking and Offsets Scheme and reasonable equivalence to credits under the Biodiversity Offsets Scheme (ref: DOC19/495776-4). Dated 12 September 2019.

Biodiversity Credit Ownership Report – Biodiversity credits owned under the Biodiversity Banking and Offsets Scheme and reasonable equivalence to credits under the Biodiversity Offsets Scheme (ref: DOC19/495776-3). Dated 12 September 2019.

Biosis Research (2003). Final *Draft: Flora & Fauna Assessment at 300 Lanyon Drive, Queanbeyan*. Report for Queanbeyan City Council, June 2003. Project No. S3777/M3225.

Capital Ecology (2019). *Proposed modification of the approved layout for Stage 3 of the Poplars Northern Entry Road – Preliminary Ecological Impact Assessment*. Project No. 2921, 30 September 2019.

Capital Ecology (2020a). *Poplars Innovation Precinct (Stage 1), Jerrabomberra, NSW – Biodiversity Development Assessment Report.* Final 01 – August 2020. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2971.

Capital Ecology (2020b). *Jerrabomberra High School, Jerrabomberra, NSW – Biodiversity Development Assessment Report.* Final 01 – October 2020. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2990.

Capital Ecology (2020c). "*The Poplars", Jerrabomberra, NSW – Matters of National Environmental Significance Assessment Report*. Final 01 – September 2020. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2971.

Capital Ecology (2020d). *"The Poplars" – Review of previous ecological studies and rationale behind the allocation of land for development or conservation.* Project No. 2945, 18 June 2020.

Capital Ecology (2021a). *The Poplars Development, Jerrabomberra, NSW – Biodiversity Certification Assessment Report*. Draft 02 – May 2021. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 3027.

Capital Ecology (2021b). *The Poplars Development – EPBC Act Preliminary Documentation*. Final 01 – July 2021. Prepared for Poplars Developments Pty Ltd. Authors: S. Reid and R. Speirs. Project no. 3027.

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.

Commonwealth of Australia (2009a). *Background Paper to EPBC Act Policy Statement 3.12 – Nationally Threatened Species and Ecological Communities Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana).* Department of the Environment, Water, Heritage and the Arts.

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.

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.*

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.

Commonwealth of Australia (2013b). *Approved Conservation Advice for Synemon plana (golden sun moth).* Approved by the delegate of the Minister on 17 December 2013.

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

Davis, M.S. (1991). *The Poplars, Queanbeyan. Preliminary Vegetation Survey and Delineation of Fauna Habitat.* Prepared for Scott & Furphy Pty Ltd, Belconnen, August.

DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.

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

Department of the Environment and Heritage (2006). *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice*. Nationally threatened species and ecological communities guidelines. EPBC Act policy statement.

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

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

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

Kevin Mills & Associates (1994). *Fauna Survey and Assessment "The Poplars" Queanbeyan, NSW*. Prepared for Mr D.H.T. Larcombe.

Kevin Mills & Associates (2009). *Proposed New Road. The Poplars – North Tralee. City of Queanbeyan*. Prepared for The Village Building Company, August 2009.

Kevin Mills & Associates (2015). *Ecological Assessment. Northern Road Access Route. Stage 3, South Tralee, Queanbeyan. The Village Building Company, Canberra*. Prepared for The Village Building Company, December 2015.

Loyn, R.H. (1986). '*Birds in fragmented forests in Gippsland, Victoria'.* In Keast, A., Recher, H.F., Ford, H. and Saunders, D. (eds.). In Birds of Eucalypt Forests and Woodlands; Ecology, Conservation Management, RAOU; and Surrey Beatty and Sons.

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

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

NSW Government (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. State of New South Wales and Department of Planning, Industry & Environment.

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

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

NSW Office of Environment & Heritage (2018a). *BioBanking Agreement ID: BA310 – Poplars North.*

NSW Office of Environment & Heritage (2018b). *BioBanking Agreement ID: BA309 – Poplars South.*

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

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

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

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

Rehwinkel (1999). *Natural Temperate Grassland of the Southern Tablelands: modelled distribution prior to European settlement.* Data as presented in Figure 1. of Environment ACT (2005). *National*

Recovery Plan for Natural Temperate Grassland of the Southern Tablelands (NSW and ACT): an endangered ecological community. Environment ACT, Canberra.

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

Queanbeyan Local Environmental Plan 2012.

- *Terrestrial Biodiversity Map – Sheet BIO_001*.

Queanbeyan Local Environmental Plan (West Jerrabomberra) 2013.

- *Land Zoning Map - Sheet LZN_001.*
- *Lot Size Map - Sheet LSZ_001.*

Umwelt (2015). *BioBanking Agreement for 'The Poplars', Jerrabomberra, NSW*. Prepared on behalf of Robin Pty Limited, March 2015.

Umwelt (2019). *Briefing Note – Poplars Environmental Assessment.* 01 March 2019.

Appendices

Appendix A. BAM Plot/Transect Scores

PCT code	Veg. Zone	Plot No.	Composition (species richness)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
320	1	1	0	1	8	10	1	1
		2	0	0	6	3	0	0
		3	0	1	9	11	1	1
	2	1	0	0	7	1	0	0
		2	0	0	7	3	0	0
		3	0	0	6	4	0	1
1334	1	1	1	1	6	13	1	2
	2	1	1	0	5	1	0	1
	3	1	1	0	7	1	0	0
	4	1	0	0	4	0	0	0
		2	0	0	2	0	0	0
		3	0	0	5	3	0	0
	5	1	0	0	2	0	0	0
		2	0	0	4	2	0	0
		3	0	0	3	1	0	0
		4	0	0	0	1	0	0

PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
320	1	1	0	0.1	33.5	11.6	0.2	0.1
		2	0	0	35.3	0.3	0	0
		3	0	0.1	34.5	3.7	0.1	0.1
	2	1	0	0	4.3	0.1	0	0
		2	0	0	16.4	0.3	0	0
		3	0	0	20.3	0.4	0	0.1
1334	1	1	2	0.1	27.2	4.1	0.1	0.2
	2	1	25	0	26.4	0.2	0	0.1
	3	1	20	0	2.8	0.1	0	0
	4	1	0	0	33.5	0	0	0
		2	0	0	30.1	0	0	0
		3	0	0	29.6	0.3	0	0
	5	1	0	0	2.2	0	0	0
		2	0	0	6.3	0.6	0	0
		3	0	0	0.3	0.1	0	0
		4	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					
320	1	1	-	-	-	-	-	0	0	1.4	0	3.3
		2	-	-	-	-	-	0	0	4.4	0	15.3
		3	-	-	-	-	-	0	0	7	0	3.7
	2	1	-	-	-	-	-	0	0	46	0	65.7
		2	-	-	-	-	-	0	0	31	0	61.5
		3	-	-	-	-	-	0	0	27	0	49.5
1334	1	1	Y	Y	Y	-	-	1	0	6.8	1	1.4
	2	1	-	Y	-	-	-	2	1	37	8	1.2
	3	1	Y	Y	Y	Y	Y	1	0	8.2	5	2.2
	4	1	-	-	-	-	-	0	0	13	0	1.8
		2	-	-	-	-	-	0	0	2.6	0	0.5
		3	-	-	-	-	-	0	0	13	0	1.3
	5	1	-	-	-	-	-	0	0	2	0	0.4
		2	-	-	-	-	-	0	0	19	0	1.8
		3	-	-	-	-	-	0	0	22	0	1
		4	-	-	-	-	-	0	0	18	2	10.7

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

Species List	Common Name	320.1.1	320.1.2	320.1.3	320.2.1	320.2.2	320.2.3	1334.1.1	1334.2.1	1334.3.1	1334.4.1	1334.4.2	1334.4.3	1334.5.1	1334.5.2	1334.5.3	1334.5.4	Recorded elsewhere in the subject land
Exotic																		
Acetosella vulgaris	Sheep's Sorrel	0.1											1.0		0.1			
Aira sp.	Hair-grass	0.1			0.1			0.1										
Ailanthus altissima	Tree of Heaven						0.2											
Avena sp.	Wild Oats										0.1	0.5			0.1	0.2	5.0	
Briza maxima	Greater Quaking-grass				0.1			1.0										
Briza minor	Lesser Quaking-grass									0.1								
Bromus sp.	Brome Grass		0.1		0.1	0.1	0.1		0.2	2.0		0.1	0.1	0.2	0.1	0.2	5.0	
Capsella bursa-pastoris	Shepherd's Purse																	X
Carthamus lanatus	Saffron Thistle			0.1	0.1	0.1	0.1				0.1	0.2	0.2		0.5	0.2	0.2	
Centaurium sp.	Common Centaury			0.1														
Chondrilla juncea	Rush Skeleton-weed																	X
Conyza sp.	Fleabane																	X
Crataegus monogyna	Common Hawthorn					0.1	3.0											X
Cyperus eragrostis	Tall Flat-sedge									0.1								
Dactylis glomerata	Cock's Foot															0.1		
Echium plantagineum	Paterson's Curse					0.1	0.1		0.1	0.2	0.1		0.1	0.1		0.1	1.0	
Eleusine tristachya	Goose Grass									0.1								
Eragrostis curvula	African Lovegrass		0.1					1.0			0.1			0.2				
Erodium botrys	Long Stocksbill								0.1			0.5						
Erodium cicutarium	Common Stork's-bill													0.1				
Erodium sp.	Stork's-bill										0.2							
Festuca arundinacea	Tall Fescue									5.0								
Gnaphalium americanum	Purple Cudweed									0.1								
Hirschfeldia incana	Buchan Weed					0.1	0.1		0.5			0.5	0.1	0.1	1.0	1.0	0.2	
Holcus lanatus	Yorkshire Fog							0.1		2.0								
Hordeum sp.	Barley Grass													0.2				
Hypericum perforatum	St John's Wort	0.2	0.2	0.5	0.2	0.2	0.2	0.1		0.1	0.1			0.1	0.1	0.2	0.5	
Hypochaeris glabra	Smooth Cats-ear																	X
Hypochaeris radicata	Flatweed	0.1		0.1	0.2	0.1	0.1	0.1	1.0		0.1							
Lactuca serriola	Prickly Lettuce					0.1								0.1				
Lepidium africanum	Exotic Peppercress								0.1			0.1	0.1		0.1	0.1	2.0	
Lolium perenne	Perennial Ryegrass								0.1									
Lycium ferocissimum	African Boxthorn		5.0			0.1	3.0		0.1									
Malva sp.	Mallow / Marshmallow Weed														0.1	0.1	0.2	
Marrubium vulgare	White Horehound									0.1		0.1		0.2	0.1	0.1		
Nassella trichotoma	Serrated Tussock	3.0	10.0	3.0	65.0	60.0	40.0	0.2	0.5	2.0	0.5	0.2	0.1	0.1	0.1	0.1		
Oenothera stricta	Common Evening Primrose					0.1												
Onopordum acanthium	Scotch Thistle												0.1	0.1	15.0	5.0	5.0	
Paronychia brasiliana	Brazilian Whitlow								0.1				0.1			0.2		
Paspalum dilatatum	Paspalum Grass								0.1									
Petrorhagia nanteuilii	Proliferous Pink	0.1			0.1	0.1						0.1	0.1				0.2	
Phalaris aquatica	Phalaris				1.0					55.0	1.0	2.0	3.0	70.0	25.0	35.0	20.0	

Species List	Common Name	320.1.1	320.1.2	320.1.3	320.2.1	320.2.2	320.2.3	1334.1.1	1334.2.1	1334.3.1	1334.4.1	1334.4.2	1334.4.3	1334.5.1	1334.5.2	1334.5.3	1334.5.4	Recorded elsewhere in the subject land
Plantago lanceolata	Plantain / Lamb's Tongue		0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.5	0.2	0.2	0.2		0.5	0.1		
Portulaca oleracea	Pigweed									0.1								
Prunus sp.	Plum															0.1	1.0	
Rosa rubiginosa	Briar Rose			0.1	0.4	1.0	2.0	0.1	0.5		1.0	0.1			1.0	0.5	10.0	
Rubus fruticosus	Blackberry						1.0											X
Salix sp.	Willow																	X
Salvia verbenaca	Wild Sage											0.2	0.1					
Sonchus sp.	Milk/Sow Thistle									0.1								
Taraxacum officinale	Common Dandelion								0.1					0.1				
Tolpis umbellata	Yellow Hawkweed	0.1		0.1														
Tragopogon dubius	Yellow Salsify				0.1													
Trifolium sp.	Clover	0.1	0.1	0.1	0.1	0.1	2.0		0.5		0.2	0.5	2.0	1.0	0.5	0.2	5.0	
Verbascum thapsus	Common Mullein				0.1								0.1					
Vulpia sp.	Rat's Tail Fescue				0.1		0.1		1.0	0.2	0.5		0.1					
Native																		
Acacia baileyana	Cootamundra Wattle							0.1										
Acaena ovina	Sheep's Burr																	X
Amyema sp.	Box Mistletoe																	X
Aristida ramosa	Purple Wiregrass	1.0	0.2	0.1		0.1		2.0										
Austrostipa bigeniculata	Tall Speargrass		5.0	2.0	1.0	5.0	5.0	10.0	25.0		30.0	30.0	25.0	0.2	5.0	0.1		
Austrostipa scabra	Rough Spear-grass	1.0	5.0	2.0	1.0	1.0		0.1		1.0			2.0					
Bothriochloa macra	Red-leg Grass	10.0	15.0	10.0	1.0	5.0	5.0	5.0	1.0	0.2	1.0							
Calocephalus citreus	Lemon Beauty-heads							1.0										
Carex inversa	Knob Sedge			0.1			0.1		0.2			0.1			1.0	0.1		
Cheilanthes sieberi	Rock Fern	0.2		0.1				0.1										
Chloris truncata	Windmill Grass																	X
Chrysocephalum apiculatum	Common Everlasting	10.0	0.1	2.0			0.1	2.0		0.1								
Convolvulus erubescens	Australian Bindweed			0.1			0.1	0.1										
Crassula sieberiana	Austral Stonecrop	0.2		0.1			0.1						0.1		0.5			
Desmodium varians	Slender Tick-trefoil	0.1						0.1	0.1									
Einadia nutans	Climbing Saltbush								0.2				0.1				0.1	
Eleocharis acuta	Common Spikerush									0.1								
Elymus scaber	Common Wheat Grass	0.2	0.1			0.1			0.1									
Eryngium ovinum	Blue Devil							0.1										
Eucalyptus blakelyi	Blakely's Red Gum							2.0		20.0								
Eucalyptus bridgesiana	Apple Box																	X
Eucalyptus melliodora	Yellow Box								25.0									
Euchiton sp.	Cudweed				0.1													
Gonocarpus tetragynus	Common Raspwort			0.1														
Goodenia hederacea	Ivy Goodenia			0.1				0.1										
Goodenia pinnatifida	Cut-Leaved Goodenia	0.2	0.1					0.1										
Hypericum gramineum	Native St John's Wort			0.1														
Juncus australis	Austral Rush				0.1				0.1									
Juncus filicaulis	Pinrush				0.1					0.1								

Species List	Common Name	320.1.1	320.1.2	320.1.3	320.2.1	320.2.2	320.2.3	1334.1.1	1334.2.1	1334.3.1	1334.4.1	1334.4.2	1334.4.3	1334.5.1	1334.5.2	1334.5.3	1334.5.4	Recorded elsewhere in the subject land
Leptorhynchos squamatus	Scaly Buttons			0.3														
Leucochrysum albicans	**Hoary Sunray**							**0.1**										
Lomandra coriacea	Wattle Mat-rush	0.2		0.2			0.1	0.1					0.1		0.1			
Lomandra multiflora	Many-flowered Mat-rush			0.1														
Melichrus urceolatus	Urn Heath	0.1		0.1														
Microtis unifolia	Common Onion Orchid							0.1										
Oxalis perennans	Woody-Root Oxalis	0.1				0.1												
Panicum effusum	Hairy Panic	1.0			0.1	0.2	0.1			0.2	0.5		0.5					
Plantago varia	Variable Plantain	0.5						0.1										
Rumex brownii	Swamp Dock	0.1		0.1			0.1						0.1		0.1	0.1		
Rytidosperma carphoides	Short Wallaby Grass									1.0								
Rytidosperma laeve	Smooth Wallaby-Grass									0.2								
Rytidosperma sp.	Wallaby Grass	20.0	10.0	10.0	1.0	5.0	10.0	10.0			2.0		2.0	2.0	0.2	0.1		
Solenogyne dominii	Smooth Solengyne							0.1										
Stackhousia monogyna	Creamy Candles			0.2														
Themeda triandra	Kangaroo Grass	0.1		10.0														
Tricoryne elatior	Yellow Rush-lily	0.2						0.1										
Vittadinia muelleri	Narrow-leaved New Holland Daisy	0.1		0.5				0.1										
Wahlenbergia communis	Native Bluebell	0.1	0.1	0.1		0.1	0.1	0.1										
Wahlenbergia luteola	Yellowish Bluebell	0.1		0.1		0.1		0.1										
Number of Species		29	16	32	23	25	26	33	24	25	17	16	24	16	21	22	15	
Number of Native Species		21	9	23	8	10	11	24	8	9	4	2	8	2	6	4	1	
No. Native Non-grass Species		15	4	18	4	4	8	19	5	4	1	2	5	1	5	3	2	
No. of Native Indicator Species (Rehwinkel 2015)		9	2	10	0	0	2	-	-	-	-	-	-	-	-	-	-	
Number of Exotic Species		8	7	9	15	15	15	9	16	16	13	14	16	14	15	18	14	
% Native Ground Cover		92.3	76.9	90.4	6.1	21.4	32.6	92.1	85.3	4.1	91.3	85.3	79.9	2.9	13.7	0.9	0.2	

Appendix C. Tree Survey Results

Tree number	Species Name	Common Name	DBH (cm)	Height (m)	Hollows			Alive/ Dead	Notes
					S	M	L		
2	*E. bridgesiana*	Apple Box	152	10	2			A	Mistletoe x 1.
3	*E. sp.*	Unidentified	60	5	2	1		D	
4	*E. bridgesiana*	Apple Box	124	11	2			A	Bee hive in hollow.
5	*E. bridgesiana*	Apple Box	37	10				A	
6	*E. blakelyi*	Blakely's Red Gum	55	7				A	
7	*E. melliodora*	Yellow Box	98	13				A	
8	*E. melliodora*	Yellow Box	113	9				A	
9	*E. melliodora*	Yellow Box	105	10				A	Bee hive in base of tree.
10	*E. blakelyi*	Blakely's Red Gum	46	5				A	
11	*E. melliodora*	Yellow Box	78	10				A	
12	*E. blakelyi*	Blakely's Red Gum	75	7				A	
13	*E. sp.*	Unidentified	66	9				A	
14	*E. melliodora*	Yellow Box	45	6				A	
15	*E. blakelyi*	Blakely's Red Gum	54	7				A	
16	*E. blakelyi*	Blakely's Red Gum	104	10				A	
17	*E. blakelyi*	Blakely's Red Gum	64	9				A	
18	*E. blakelyi*	Blakely's Red Gum	74	10				A	
19	*E. blakelyi*	Blakely's Red Gum	33	8				A	
20	*E. blakelyi*	Blakely's Red Gum	42	8				A	Mistletoe x 2.
21	*E. blakelyi*	Blakely's Red Gum	42	8				A	
22	*E. bridgesiana*	Apple Box	50	8				A	
23	*E. blakelyi*	Blakely's Red Gum	29	9				A	
24	*E. blakelyi*	Blakely's Red Gum	34	9				A	

Tree number	Species Name	Common Name	DBH (cm)	Height (m)	Hollows			Alive/ Dead	Notes
					S	M	L		
25	*E. blakelyi*	Blakely's Red Gum	40	9				A	
26	*E. blakelyi*	Blakely's Red Gum	56	7				A	2 large hollows very low to ground, likely not functional.
27	*E. blakelyi*	Blakely's Red Gum	36	8				A	
28	*E. blakelyi*	Blakely's Red Gum	41	7				A	
29	*E. blakelyi*	Blakely's Red Gum	42	9				A	
30	*E. blakelyi*	Blakely's Red Gum	160	9				A	Tree comprised of 3 large trunks.
31	*E. blakelyi*	Blakely's Red Gum	59	9				A	
32	*E. blakelyi*	Blakely's Red Gum	50	9				A	
33	*E. blakelyi*	Blakely's Red Gum	70	10.5				A	
34	*E. blakelyi*	Blakely's Red Gum	45	7				A	
35	*E. melliodora*	Yellow Box	93	10				A	Mistletoe x 5.
36	*E. blakelyi*	Blakely's Red Gum	29	6				A	
37	*E. blakelyi*	Blakely's Red Gum	28	7				A	
38	*E. bridgesiana*	Apple Box	65	12				A	
39	*E. blakelyi*	Blakely's Red Gum	40	6				A	
40	*E. blakelyi*	Blakely's Red Gum	65	10				A	
41	*E. blakelyi*	Blakely's Red Gum	32	8				A	
42	*E. blakelyi*	Blakely's Red Gum	75	10				A	Mud nest.
43	*E. blakelyi*	Blakely's Red Gum	40	9				A	
44	*E. blakelyi*	Blakely's Red Gum	35	7				A	
45	*E. blakelyi*	Blakely's Red Gum	50	8	1			A	
46	*E. blakelyi*	Blakely's Red Gum	80	7	1			A	Bee hive in hollow.
47	*E. blakelyi*	Blakely's Red Gum	84	9		2		A	Eastern Rosella nest in hollow.
48	*E. blakelyi*	Blakely's Red Gum	86	9				A	
49	*E. blakelyi*	Blakely's Red Gum	50	7		1		A	Starling nest in hollow.

Tree number	Species Name	Common Name	DBH (cm)	Height (m)	Hollows			Alive/ Dead	Notes
					S	M	L		
50	*E. blakelyi*	Blakely's Red Gum	72	7				A	
53	*E. melliodora*	Yellow Box	55	8				A	
54	*E. blakelyi*	Blakely's Red Gum	40	3				A	
55	*E. blakelyi*	Blakely's Red Gum	75	12				A	1 x small stick nest.
56	*E. melliodora*	Yellow Box	55	15	1			A	1 x old small stick nest.
57	*E. blakelyi*	Blakely's Red Gum	35	6				A	
58	*E. melliodora*	Yellow Box	65	9				A	
59	*E. melliodora*	Yellow Box	110	13				A	
63	*E. melliodora*	Yellow Box	144	-	2	2		A	Assessed by Kevin Mills and Associates EIA (2015).
65	*E. melliodora*	Yellow Box	91	-				A	Assessed by Kevin Mills and Associates EIA (2015).
66	*E. melliodora*	Yellow Box	94	-				A	Assessed by Kevin Mills and Associates EIA (2015).
72	*E. blakelyi*	Blakely's Red Gum	76	9				A	
73	*E. melliodora*	Yellow Box	98	14		2		A	
74	*E. melliodora*	Yellow Box	109	16				A	
75	*E. melliodora*	Yellow Box	45	9				A	

Appendix D. Fauna Species Recorded

Classification	Scientific Name	Common Name	BC Status	EPBC Status
Amphibia	*Crinia parinsignifera*	Eastern Sign-bearing Froglet	Protected	-
Amphibia	*Crinia signifera*	Common Eastern Froglet	Protected	-
Amphibia	*Limnodynastes tasmaniensis*	Spotted Grass Frog	Protected	-
Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	Protected	-
Aves	*Acridotheres tristis*	Indian Myna	-	-
Aves	*Anas gracilis*	Grey Teal	Protected	-
Aves	*Anas superciliosa*	Pacific Black Duck	Protected	-
Aves	*Anthochaera carunculata*	Red Wattlebird	Protected	-
Aves	*Aquila audax*	Wedge-tail Eagle	Protected	-
Aves	*Cacatua galerita*	Sulphur-crested Cockatoo	Protected	-
Aves	*Calyptorhynchus funereus*	Yellow-tailed Black-cockatoo	Protected	-
Aves	*Carduelis carduelis*	European Goldfinch	Protected	-
Aves	*Chenonetta jubata*	Australian Wood Duck	Protected	-
Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	Protected	-
Aves	*Corvus coronoides*	Australian Raven	Protected	-
Aves	*Dacelo novaeguineae*	Laughing Kookaburra	Protected	-
Aves	*Eolophus roseicapilla*	Galah	Protected	-
Aves	*Falco berigora*	Brown Falcon	Protected	-
Aves	*Grallina cyanoleuca*	Magpie-lark	Protected	-
Aves	*Gymnorhina tibicen*	Australian Magpie	Protected	-
Aves	*Hirundo neoxena*	Welcome Swallow	Protected	-
Aves	*Lalage sueurii*	White-winged Triller	Protected	-
Aves	*Malurus cyaneus*	Superb Fairy-wren	Protected	-
Aves	*Nesoptilotis leucotis*	White-eared Honeyeater	Protected	-
Aves	*Ocyphaps lophotes*	Crested Pigeon	Protected	-
Aves	*Pachycephala rufiventris*	Rufous Whistler	Protected	-
Aves	*Phalacrocorax varius*	Pied Cormorant	Protected	-
Aves	*Phaps chalcoptera*	Common Bronzewing	Protected	-
Aves	*Platycercus elegans*	Crimson Rosella	Protected	-
Aves	*Platycercus eximius*	Eastern Rosella	Protected	-
Aves	*Porphyrio porphyrio*	Purple Swamphen	Protected	-
Aves	*Psephotus haematonotus*	Red-rumped Parrot	Protected	-
Aves	*Rhipidura albiscapa*	Grey Fantail	Protected	-
Aves	*Rhipidura leucophrys*	Willy Wagtail	Protected	-
Aves	*Smicrornis brevirostris*	Weebill	Protected	-
Aves	*Sturnus vulgaris*	Common Starling	-	-
Aves	*Turdus merula*	European Blackbird	-	-
Aves	*Vanellus miles*	Masked Lapwing	Protected	-
Insecta	***Synemon plana***	**Golden Sun Moth**	**E1**	**CE**
Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo	Protected	-

Classification	Scientific Name	Common Name	BC Status	EPBC Status
Mammalia	*Vombatus ursinus*	Common Wombat	Protected	-
Mammalia	*Vulpes vulpes*	Red Fox	-	-
Reptilia	***Aprasia parapulchella***	**Pink-tailed Legless Lizard**	**V1**	**V**
Reptilia	*Carlia tetradactyla*	Southern Rainbow Skink	Protected	-
Reptilia	*Lampropholis delicata*	Delicate Skink	Protected	-
Reptilia	*Menetia greyii*	Common Dwarf Skink	Protected	-
Reptilia	*Morethia boulengeri*	Boulenger's Skink	Protected	-

Appendix E. 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
1	27/09/2019	8:15:00 AM	10:30:00 AM	8	15	Fine	slight breeze	10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	2	
								11	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	3	
								7	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	2	
2	3/10/2019	7:45:00 AM	9:50:00 AM	11	18	Fine	none	10	-	-	-	-	-	Unidentified Skink	Individual	2	
								11	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
3	10/10/2019	8:55:00 AM	11:15:00 AM	8	14	Fine	slight breeze	10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	2	
								11	-	-	-	-	-	Unidentified Skink	Individual	2	
								4	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
								9	-	-	-	-	-	Unidentified Skink	Individual	3	
4	17/11/2019	9:10:00 AM	10:10:00 AM	14	14	5/8	slight breeze	10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	5	
								3	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
								2	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
								2	-	-	-	-	-	Unidentified Skink	Individual	1	
								1	-	-	-	-	-	Unidentified Skink	Individual	2	
5	22/10/2019	7:55:00 AM	9:05:00 AM	11	15	Fine	none	10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	2	
								11	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	2	
								7	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
6	28/10/2019	8:05:00 AM	9:40:00 AM	8	12	Fine	none	10	-	-	-	-	*Menetia greyii*	Common Dwarf Skink	Individual	1	
								10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	4	
								11	-	-	-	-	*Morethia boulengeri*	Boulenger's Skink	Individual	1	
								11	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	3	
								5	-	-	-	-	-	Unidentified Skink	Individual	2	
7	5/11/2019	8:30:00 AM	9:30:00 AM	10	11	3/8	light wind	10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	6	
								11	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
								11	-	-	-	-	-	Unidentified Skink	Individual	1	
8	13/11/2019	7:45:00 AM	10:15:00 AM	9.7	14.1	Fine	slight breeze	10	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
								10	-	-	-	-	*Carlia tetradactyla*	Rainbow Skink	Individual	1	
9	22/11/2019	8:30:00 AM	10:00:00 AM	26.1	28.1	Fine	none	5	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
								9	-	-	-	-	*Lampropholis delicata*	Delicate Skink	Individual	1	
10	29/11/2019	8:00:00 AM	9:20:00 AM	16.3	20.5	Fine	none	9	-	-	-	-	-	Unidentified Skink	Individual	1	

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

Appendix F. BAM Credit Summary Report

BAM Credit Summary Report

Proposal Details

Assessment Id
00025701/BAAS20006/21/00025704

Proposal Name
3036 TSA - Poplars Jerrabomberra High School - BDAR

BAM data last updated *
24/11/2021

Assessor Name
Samuel F Reid

Report Created
18/02/2022

BAM Data version *
50

Assessor Number
BAAS20006

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Yellow Box grassy woodland of the northern Monaro and Upper Shoalhaven area, South Eastern Highlands Bioregion												
1	1334_Zone_4	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	8.3	8.3	1.5	PCT Cleared - 92%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	0

2	1334_Zone_5	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	1.3	1.3	1.8	PCT Cleared - 92%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	0
											Subtotal	**0**
											Total	**0**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Synemon plana / Golden Sun Moth (Fauna)									
1334_Zone_4	8.3	8.3	1.5			Endangered	Critically Endangered	True	9
								Subtotal	**9**