



Denman Prospect 'Deferred Area'

Ecological Impact Assessment

Final 04 – November 2022

Prepared for Capital Estate Developments

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

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1 Introduction

Capital Ecology has been commissioned by Capital Estate Developments to prepare an Ecological Impact Assessment (EIA) for the development proposed within the 'deferred area' of Denman Prospect 2 Estate (Block 12, Section 1, Denman Prospect) as identified in the Application for EIS Exemption Consideration Report¹ and covered by Notifiable instrument NI2017–183².

1.1 Background

As part of the Molonglo Valley Stage 2 area, Denman Prospect 2 Estate obtained an exemption in 2013 from the requirement to prepare an Environmental Impact Statement (EIS) under Section 211 (s.211) of the ACT *Planning and Development Act 2007* (P&D Act) (see Environmental Approvals Plan, page 2). The 'deferred area' was excluded from the area covered by the 2013 exemption due to information gaps. The deferred area was considered again under the 2017 s.211 EIS exemption with that exemption providing approval for some of the area to be managed as a bushfire asset protection zone (APZ), however no urban development was proposed in the deferred area at that time.

A supplementary s.211 exemption application was lodged in January 2022 seeking an exemption to allow urban development of a portion of the deferred area. A previous version of this EIA was submitted to inform that application (Capital Ecology 2021³). On 9 February 2022, the ACT Conservator of Flora and Fauna determined that the application for a s.211 exemption was not supported and an EIS would be required. The Conservator stipulated that –

as part of the EIS process the proponent is also required to provide:

- *Clarification on the proposed works within the deferred area, including indicative asset protection zones;*
- *Revised mapping of Pink-tailed Worm-lizard habitat;*
- *Mitigation measures in relation to impacts on protected orchids; and*
- *Assessment and consideration of impacts beyond the holding lease.*

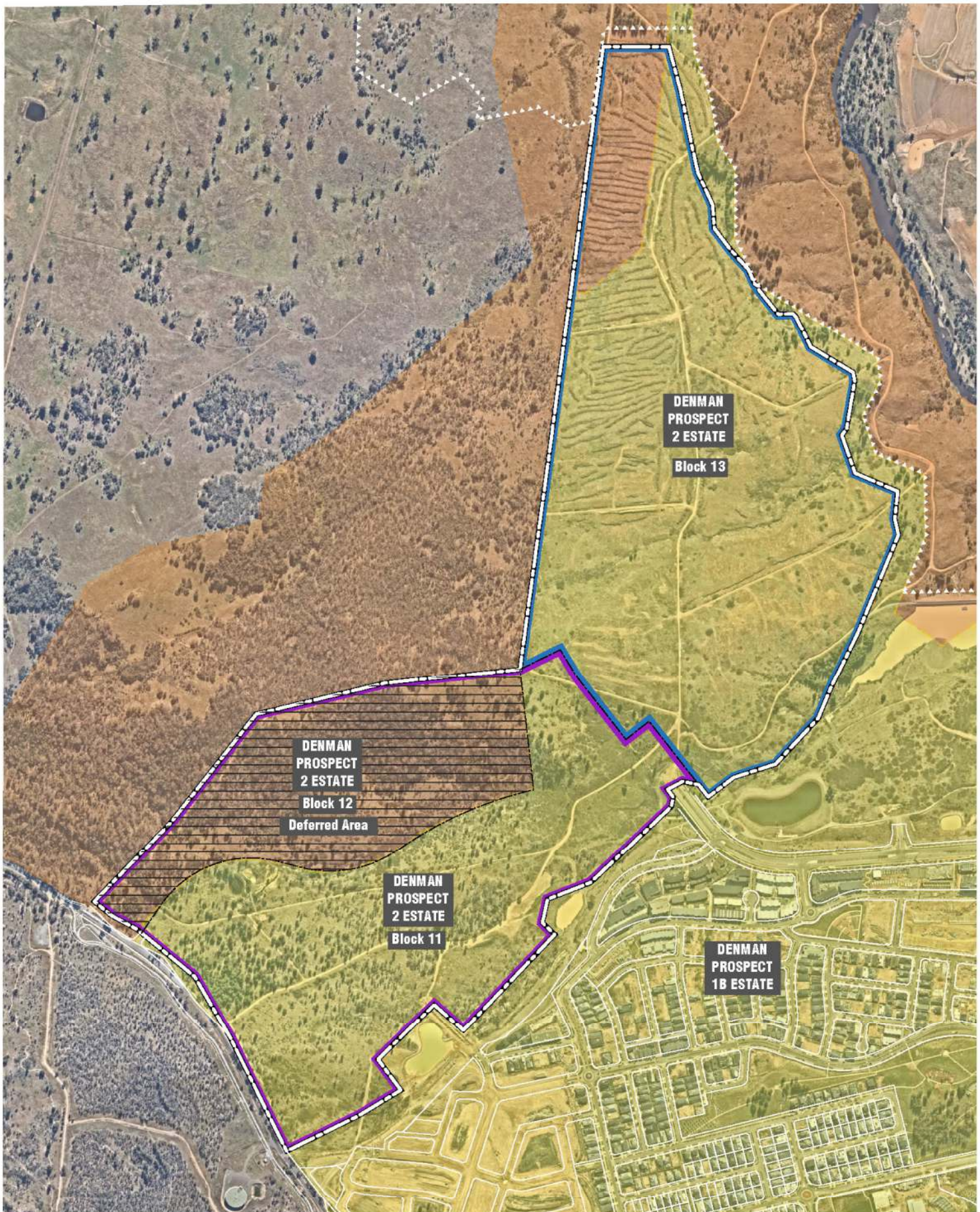
However, following further discussion with ACTPLA it was determined that a full EIS was not required, and an updated s.211 exemption application should be prepared to address the Conservator's comments and submissions received from other agencies and through the community consultation process.

The primary aim of this EIA is to determine and assess the likely impacts of the proposed development within the deferred area upon habitat for terrestrial flora and fauna species and ecological communities listed as threatened pursuant to the *ACT Nature Conservation Act 2014* (NC Act).

¹ ACT Government (2017). *Application for EIS Exemption Consideration Report – Denman Prospect Deferred Area and Bushfire Protection Zone*. FINAL – 16 March 2017.

² ACT Parliamentary Counsel (2017). *Planning and Development (Environmental Impact Statement – Denman Prospect Deferred Area and Bushfire Protection Zones) Exemption 2017*. Signed by Mick Gentleman MLA on 6 April 2017.

³ Capital Ecology (2021). *Denman Prospect 'Deferred Area' – Ecological Impact Assessment*. December 2021. Prepared for Capital Estate Developments. Authors: S. Reid and R. Speirs. Project no. 3072.



LEGEND

Denman Prospect 2 Estate Holding Lease

EDP1 Area: Stromlo Reach

EDP2 Area: Denman North

Block Boundary

2013 S211 Area

2017 S211 Area

2022 S211 Area

DENMAN PROSPECT NORTH
ENVIRONMENTAL APPROVALS PLAN

CLIENT



0 100 200 300 400

SCALE: 1:7500@A3
DATE: 26.10.22
REVISION: C
SHEET NO: 1 of 1



The impacts of the development of Molonglo Valley upon *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Matters of National Environmental Significance (MNES) were assessed via the Molonglo Valley Strategic Assessment. The subsequently prepared *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance*⁴ (the 'NES Plan') details the 'conservation outcomes' to which the ACT Government has committed as conditions of the EPBC Act approval. The deferred area is entirely within the 'development area' identified in the Molonglo Valley Strategic Assessment. Accordingly, provided that the development is consistent with the NES Plan, only ACT legislative requirements need to be considered for component developments within the Molonglo Valley Strategic Assessment Area.

Notwithstanding the above, this EIA has been prepared in a manner that identifies the values of the study area (defined under Section 1.2) as listed under both the EPBC Act and the NC Act. This is necessary as the NES Plan stipulates impact budgets for the clearance of EPBC Act listed Box-Gum Woodland and Pink-tailed Worm-lizard *Aprasia parapulchella* habitat, thus such impacts must be quantified and reported to the Environment, Planning and Sustainable Development Directorate (EPSDD) for inclusion in its NES Plan implementation reports.

This EIA has been prepared with regard to:

- information and associated spatial data provided by Place Logic and Capital Estate Developments regarding the study area and the proposed urban area;
- the results of database searches for the study area;
- a review of relevant studies and other background information;
- a preliminary site visit on 4 June 2019;
- field surveys on 16 and 27 March 2020, 4 May 2020, 27 September 2021, 25 and 27 October 2021, 21 February 2022, 11 May 2022, and 8 July 2022, completed to record and assess the ecological values of the study area;
- threatened species spatial data provided by ACT Government ecologist Greg Baines (on behalf of Canberra Nature Map) on 4 July 2022;
- the knowledge of the authors regarding the biota of the locality, specifically the threatened ecological communities, flora, and fauna (and associated habitat) with the potential to occur in the lowland woodland ecosystems of the region; and
- submissions made in response to the EIS exemption application.

1.2 Study Area

The 'study area' for this EIA comprises the entire deferred area (Block 12, Section 1, Denman Prospect) as well as a buffer ranging between 40 m and 90 m in width around the southern and eastern sides of the deferred area (total area approx. 36.72 ha). Figure 1 shows the location of the study area in the Molonglo Valley locality, Figures 2 and 3 show the study area on historical aerial imagery (1988 and 2004 respectively), and Figure 4 shows the study area and proposed development on current aerial imagery.

⁴ ACT Government (2011). *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance*.

As shown in Figure 1 and Figure 4, the study area is bordered by:

- Block 403, a large area of intact native vegetation to the north;
- future development areas for the suburb of Denman Prospect (Blocks 11 and 13) to the south and east; and
- native vegetation to the west, much of which has been revegetated following the 2003 bushfires.

The topography of the study area is moderately sloping, with elevation ranging from 650 m Australian Height Datum (AHD) along the fire trail at the northern boundary, dropping to 582 m along the drainage line.

As shown in the 1988 aerial photograph in Figure 2, most of the study area has undergone past vegetation clearance and modification associated with its former use as part of the ACT Commercial Pine Plantation Estates. The entire study area was burnt during the 2003 Canberra bushfire. Following the bushfire, the remaining pine stems were pushed into windrows and burnt, and these cleared areas were then ripped along contours, presumably to minimise soil erosion. The 2004 aerial image (Figure 3) clearly shows this modification along with the remaining remnant Blakely's Red Gum *Eucalyptus blakelyi* trees present in the study area.

The vegetation in the study area is now characterised by a relatively intact dry sclerophyll forest of moderate to high diversity on the upper slopes of the ridge, and a highly disturbed open woodland with scattered remnant and regenerating eucalypts in the low-lying areas.

Many exotic plant species are present in the study area. The open low-lying portions of the study area contain a very dense cover of the noxious weed Blackberry *Rubus fruticosus*. Levels of Blackberry infestation are heaviest along the drainage line, decreasing upslope. Most of the former pine plantation areas now contain scattered self-sown pines. All vegetation zones contain a moderate to high diversity of common grass and herbaceous weeds.

1.3 Proposed Development

The proposed development of the deferred area is an extension of the development of Denman Prospect (Block 11), which has been previously approved under the existing 2013 s.211 exemption for Denman Prospect 2 Estate. As shown in Figure 4, the proposed development will impact the areas along the southern and eastern boundary of the deferred area, and consists of residential blocks and associated roads and services, with a 60 m bushfire Inner Asset Protection Zone (IAPZ) extending from the edge of the blocks (i.e. including the edge road).

The layout of the proposed development (see Denman Prospect Design Option, page 5) has been significantly modified in response to additional field surveys and feedback on the application for an s.211 exemption (submitted January 2022), and as a result the proposed impact area has been reduced from 16.1 ha (proposed in January 2022) to 7.14 ha (currently proposed). Note that this revised impact area (7.14 ha) includes a 0.3 ha allowance for a network of tracks in the retained areas of Block 12 (see Denman Prospect Design Option, page 5).



LEGEND:

BOUNDARIES



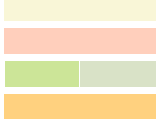
HOLDING LEASE BOUNDARY
BLOCK BOUNDARY

ECOLOGICAL CONSTRAINTS



NATIVE DOMINANT - MOD HIGH DIVERSITY
AREA OF IMPACT OF 60m APZ OF NATIVE DOMINANT - MOD HIGH DIVERSITY
PINK TAIL WORM LIZARD - MODERATE QUALITY POTENTIAL HABITAT - PINK TAIL WORM LIZARD
PINK TAIL WORM LIZARD - POTENTIAL HABITAT UNDER TREE CANOPY

PROPOSED DEVELOPMENT ZONES



SINGLE DWELLINGS (RZ1)
MULTI UNIT SITE (RZ4 and RZ5)
OPEN SPACE (PRZ1 and NUZ3)
SCHOOL SITE (CFZ)

TREES



TREES TO BE RETAINED
TREES TO BE REMOVED

PATHWAYS



EQUESTRIAN BRIDLE TRAIL ON EXISTING FIRE TRAIL ALIGNMENT
PROPOSED WALKING TRAIL

FLORA LEGEND (2022)



Montane Leafy Greenhood
Rufous Midge Orchid
Pink Caps
Pigweed

Consultant:



PURDON
PLANNING CONSULTANT

Consultant:



CALIBRE
ENGINEERING CONSULTANT

Consultant:



SPIIRE
LANDSCAPE CONSULTANT

Client:



CAPITAL ESTATE DEVELOPMENTS

Project:



DENMAN PROSPECT 2 ESTATE
STROMLO REACH

Prepared by:



IMOGEN MILLER URBAN DESIGN 0419 462 943

Scale:
1:5000 @ A3

Drawn: Aarqm
Checked: IM
Approved: IM



Drawing Title:

EDP LAYOUT

Status:

FOR INFORMATION

Plot Date:

8/11/2022

Revision:

J

Drawing Number:

UD.02

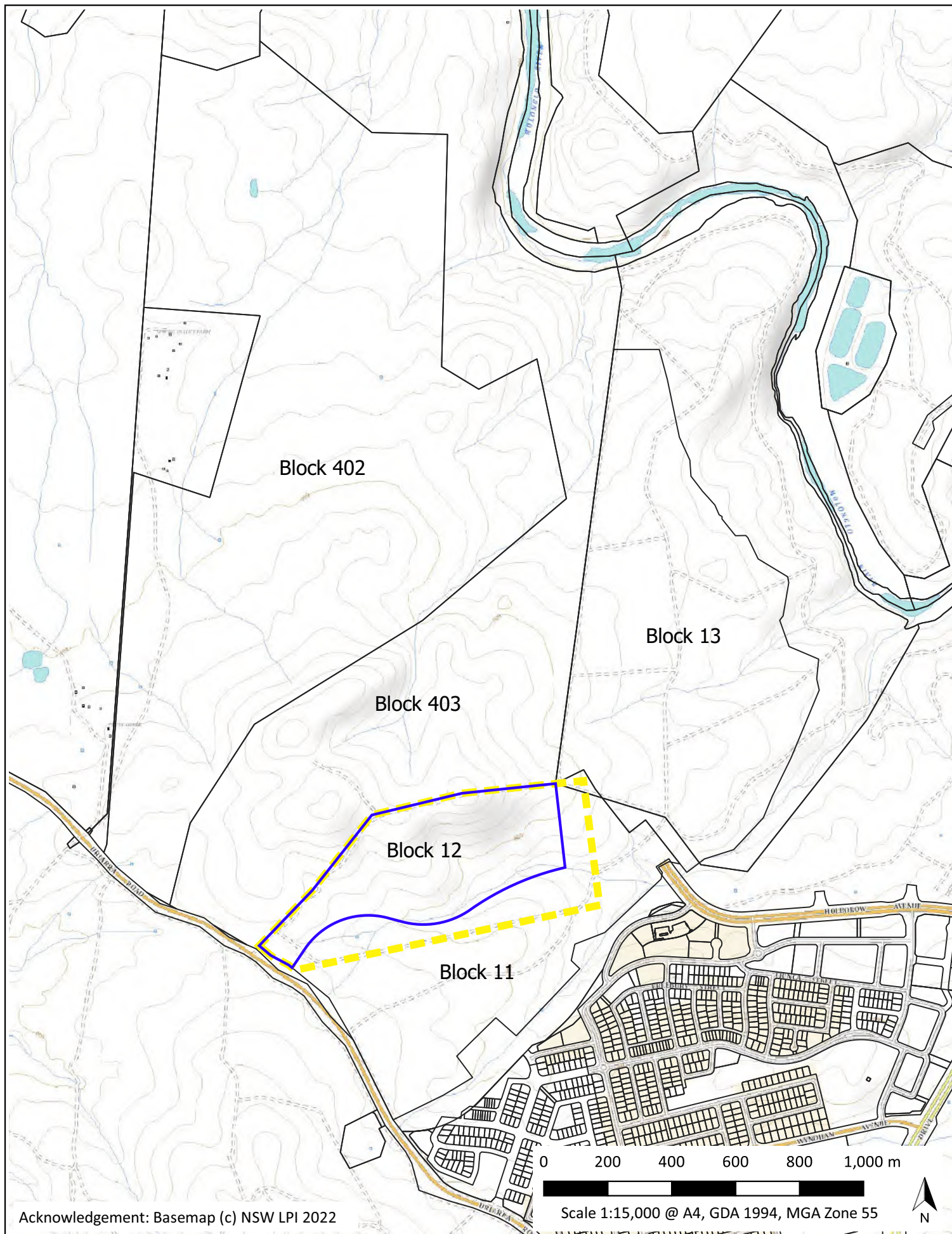


Figure 1. Locality Plan

Capital Ecology Project No: 3072
 Drawn by: C. Ross
 Date: 12 July 2022

Legend

-  Study Area
-  Denman Prospect Deferred Area



Legend

3072 - 2021-22 Revision

 Denman Prospect Deferred Area

 Study Area

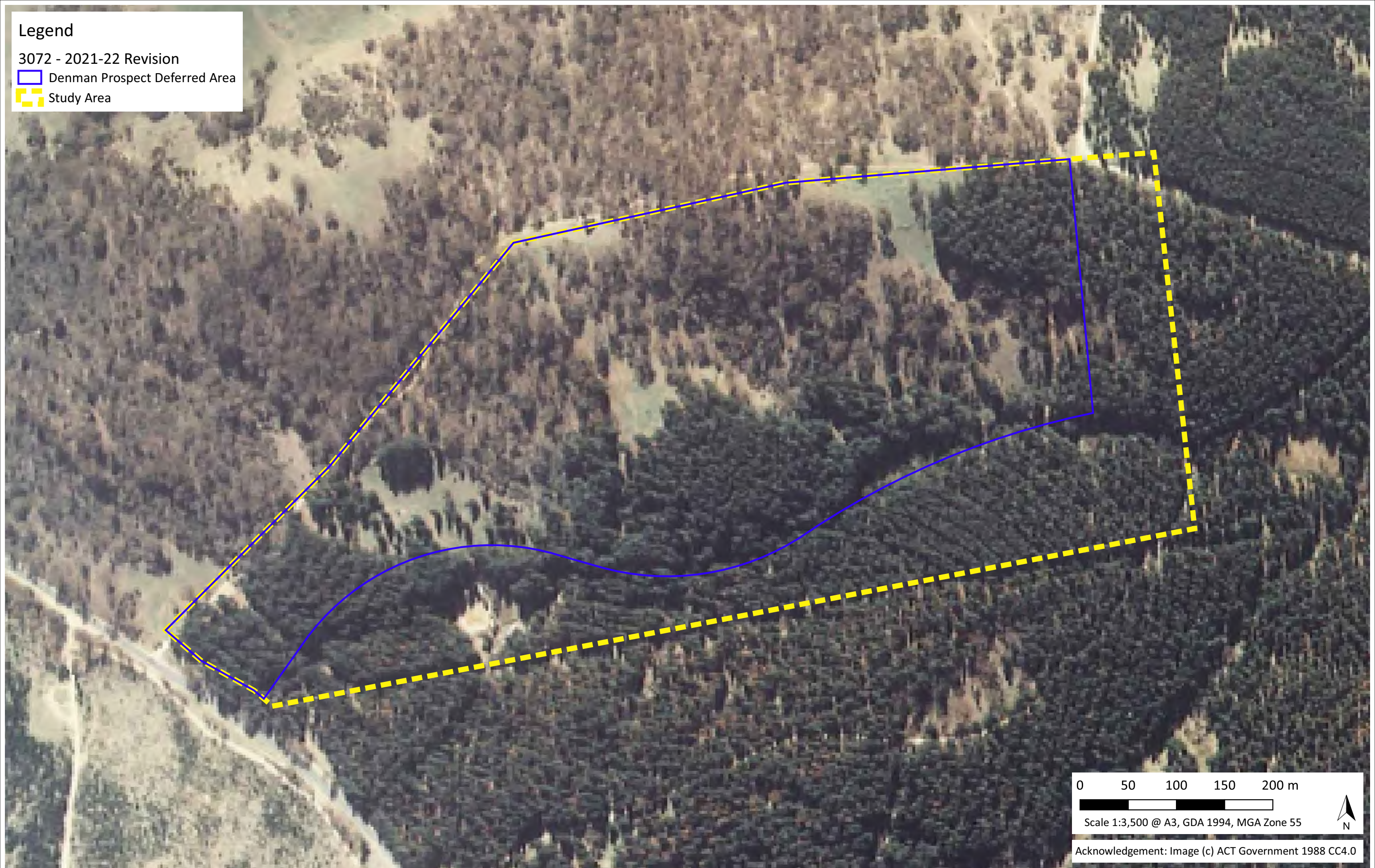


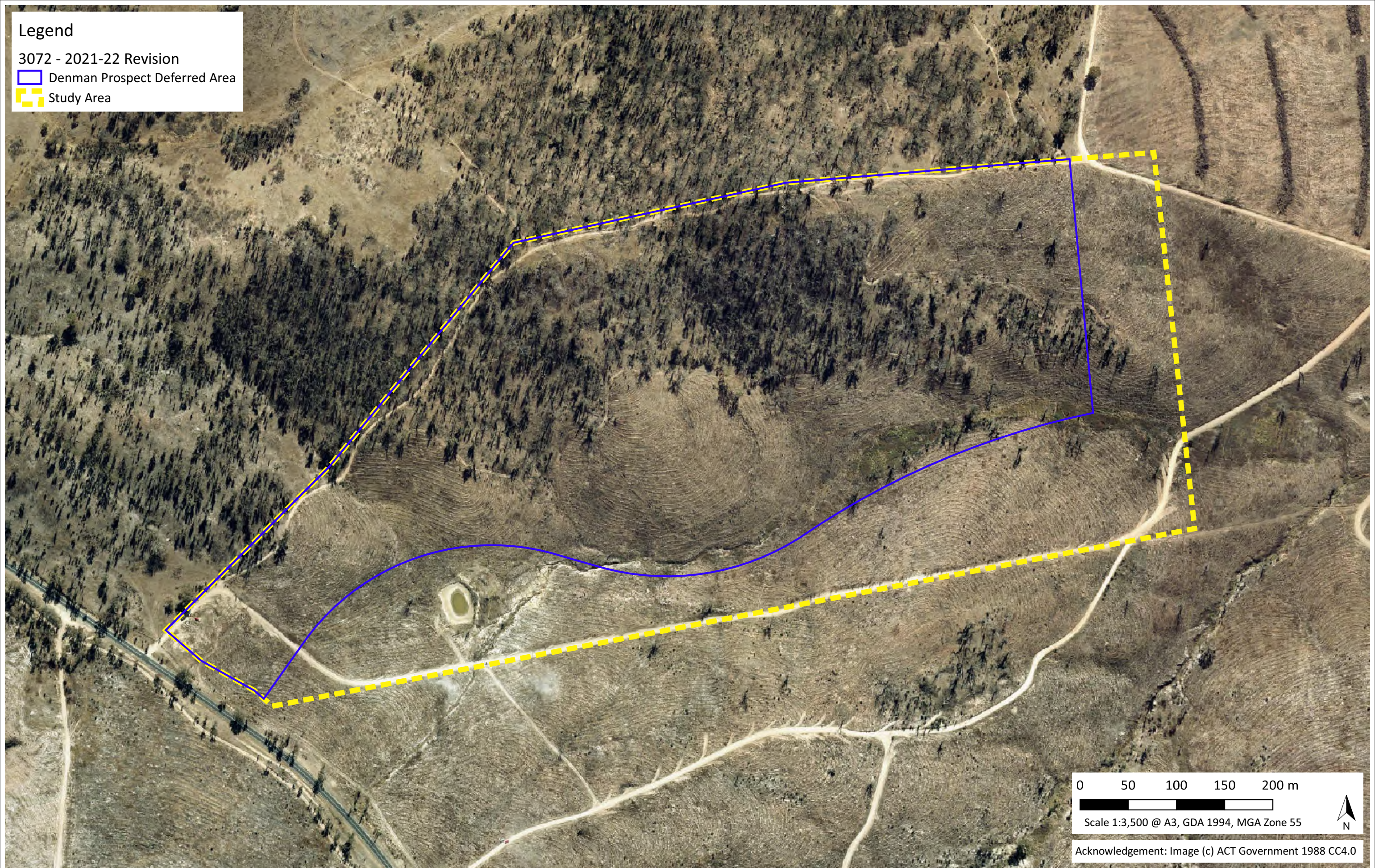
Figure 2. Study Area on 1988 Aerial Image

Legend

3072 - 2021-22 Revision

 Denman Prospect Deferred Area

 Study Area



0 50 100 150 200 m

Scale 1:3,500 @ A3, GDA 1994, MGA Zone 55

Acknowledgement: Image (c) ACT Government 1988 CC4.0



Figure 3. Study Area on 2004 Aerial Image

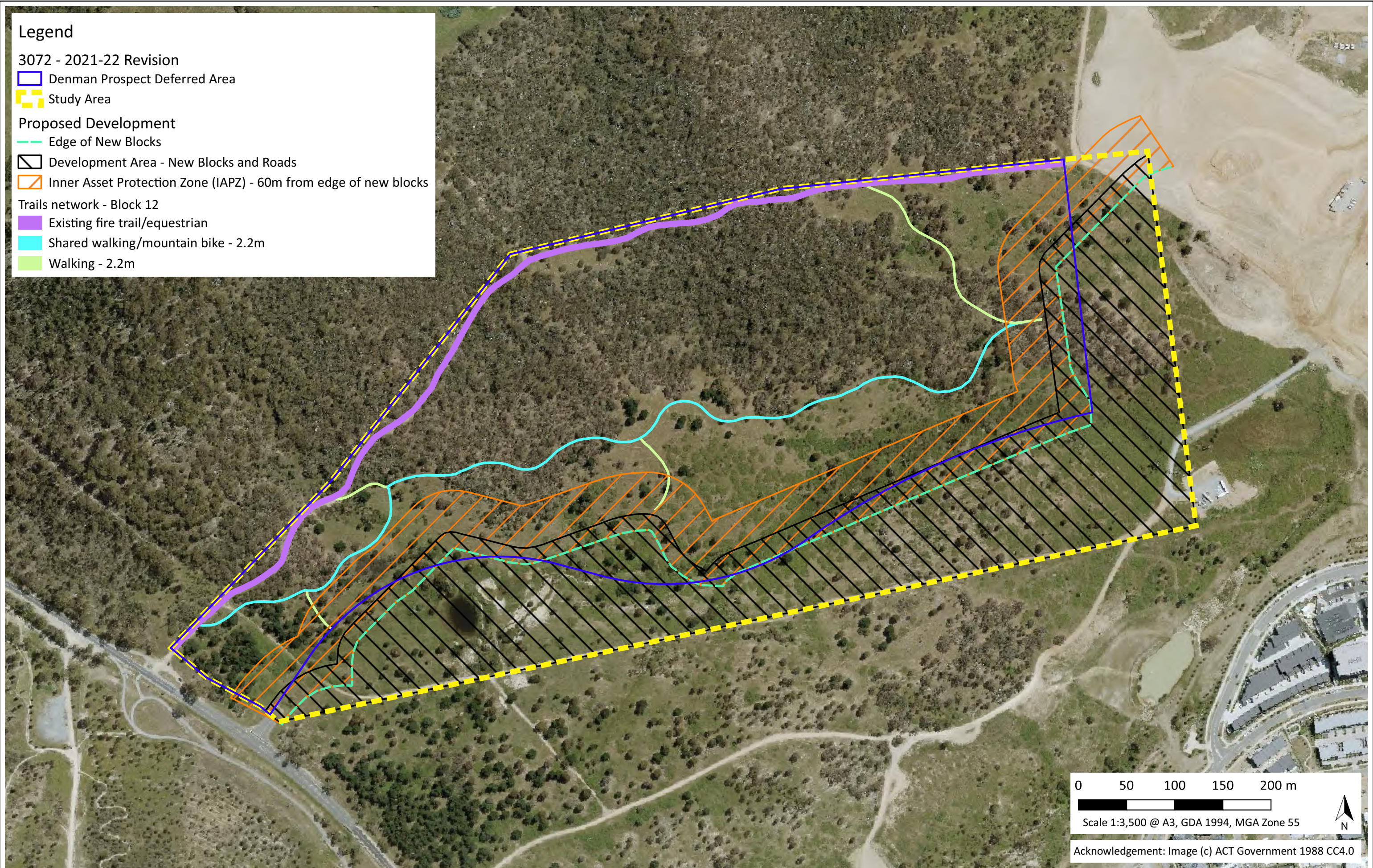


Figure 4. Proposed development on 2022 Aerial Image

2 Methods

2.1 Database and Literature Review

To inform the surveys, Capital Ecology completed a desktop review involving the following.

- A review of the above noted Application for EIS Exemption Consideration Report and Notifiable instrument NI2017–183.
- 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 study area was obtained using the Department of Climate Change, Energy, the Environment and Water's (DCCEEW) online EPBC Act Protected Matters Search Tool (PMST) on 9 September 2021 and updated on 21 July 2022.
- A review of the ACT Government ACTmapi mapping tool, Canberra Nature Map, eBird, and the Atlas of Living Australia to obtain the most current layers and point data for the significant ecological values of the locality. These values include species listed as threatened pursuant to the EPBC Act and/or the NC Act, together with flora species considered 'rare or uncommon in the ACT' and fauna which are otherwise of a conservation focus.
- A review of previous and current studies undertaken by Capital Ecology and others in the locality, a list of which is provided under 'references'.

2.2 Survey Dates and Survey Effort

Vegetation and potential flora/fauna habitat were surveyed and mapped. This involved the following ecological surveys performed by Capital Ecology between 16 March 2020 and 8 July 2022. All survey dates and effort are summarised in Table 1.

Table 1. Flora and fauna survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
PCT and Zone mapping	Random meander	16/03/2020	1 person	3 hours
Vegetation assessment	BAM plot	27/03/2020	2 people	6 hours
Remnant Tree survey	Random meander	5/05/2020	1 person	3 hours
Targeted threatened flora searches	Walked transects ~10m apart through likely habitat	27/09/2021	2 people	2 hours
		25/10/2021	2 people	4 hours
		27/10/2021	6 people	4 hours
		21/02/2022	2 people	4 hours
Threatened bird survey	Point counts	11/05/2022	2 people	2 hours
		8/07/2022	1 person	4 hours
Pink-tailed Legless Lizard habitat assessment	On-ground habitat mapping	25/05/2022	1 person	4 hours
Threatened bat survey	Anabat®	11/03/2022 – 15/03/2022 17/03/2022 – 21/03/2022	Four Anabat® locations (a total of 16 trap nights).	128 hours of recordings

2.3 Vegetation Mapping and Assessment

The vegetation across the study area was mapped using a method based upon the relevant contemporary Commonwealth Government (Commonwealth of Australia 2006a⁵, Commonwealth of Australia 2006b⁶), and ACT Government (ACT Government 2015a⁷, ACT Government 2015b⁸, ACT Government 2015c⁹) vegetation mapping guidelines, together with other technical guidelines. Observations were made regarding the type and condition of the vegetation present in the study area, the study area was divided into polygons of homogenous vegetation, and floristic survey plots were completed in each vegetation zone. The location of the step-point-transects and floristic survey plots are shown on Figure 5. The vegetation survey and mapping involved the three-staged process outlined in the sections below.

The results of the vegetation survey were accurately mapped using GIS, allowing the total area of each vegetation zone to be calculated.

2.3.1 Step 1. Plant Community Type (PCT) Mapping

The on-ground boundaries of each of the PCTs (as provided in ACT Government 2015d¹⁰) present in the study area were accurately mapped. Mapping of the PCTs (i.e. the climax communities) was undertaken by walking the boundaries and recording them using a combination of hand-held GPS and marking directly on to high resolution orthorectified aerial photograph field maps.

Given that ecotones are usually gradual transitions between vegetation communities (i.e. often in excess of 50 m in width) and that the vegetation across portions of the study area has been subject to some level of modification, on occasion it was difficult to now define the precise pre-1750 boundaries of the PCTs. Notwithstanding this, the PCT boundaries were defined based on:

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

The above was informed by the both the current vegetation (2018, 2019, 2021 and 2022 aerial imagery and site surveys) and that shown in the 2004 aerial imagery following the 2003 Canberra bushfires.

⁵ Commonwealth of Australia (2006a). *Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*.

⁶ Commonwealth of Australia (2006b). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.

⁷ ACT Government (2015a). *ACT Environmental Offsets Calculator Assessment Methodology*. Environment and Planning. May 2015.

⁸ ACT Government (2015b). *Monitoring Guidelines for Natural Temperate Grasslands*. Conservation Research, October 2015.

⁹ ACT Government (2015c). *Monitoring Guidelines for Box-Gum Woodlands*. Conservation Research, October 2015.

¹⁰ ACT Government (2015d). *ACT Vegetation Types Database – Attachment to the ACT Environmental Offsets Calculator Assessment Methodology*. 18 May 2015.

2.3.2 Step 2. Vegetation Zone Definition and Mapping

Each of the mapped PCTs was divided into vegetation zones based on the structure, floristic composition, and overall condition ('intactness') of the vegetation. Mapping of the vegetation zones was undertaken by walking the boundaries and marking them using a combination of hand-held GPS and marking directly on to high resolution orthorectified aerial photograph field maps.

2.3.3 Step 3. Data Collection (plot-transects)

The data collection methodology was developed based on that provided in Chapter 3 of the *ACT Environmental Offsets Calculator Assessment Methodology* (ACT Government 2015a). The number of survey plot/transects completed within each vegetation zone was determined in accordance with Table 2 of the Survey Methodology (copy provided below) and totalled nine across the three vegetation zones (i.e. three in each vegetation zone). It is noted that a woodland or dry sclerophyll forest vegetation zone is generally only considered to be in 'low condition' if it lacks the characteristic canopy, lacks regeneration of the canopy, and has an exotic dominant groundstorey (i.e. it is exotic pasture).

Extract from *ACT Environmental Offsets Calculator Assessment Methodology* (ACT Government 2015a).

Table 2 sets out the minimum number of plots/transects that are required in each vegetation zone. If the condition of the vegetation is more variable across the zone, more transects and plots may be needed than the number in **Table 2**, particularly where the area of the vegetation zone is large.

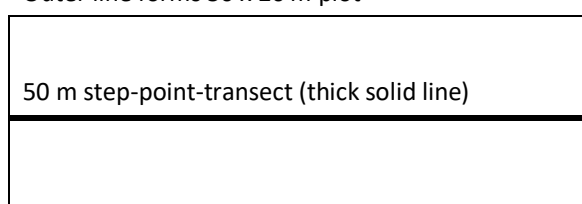
Table 2: Minimum number of transects/plots required per zone area

Vegetation zone area (ha)	Minimum number of transects/plots
0 – 4	1 transect/plot per 2 ha (or part thereof) or 1 transect/plot if vegetation is in low condition.
> 4 – 20	3 transects/plots or 2 transects/plots if vegetation is in low condition.
> 20 – 50	4 transects/plots or 3 transects/plots if vegetation is in low condition.
> 50 – 100	5 transects/plots or 3 transects/plots if vegetation is in low condition.
> 100 – 250	6 transects/plots or 4 transects/plots if vegetation is in low condition.
> 250 – 1000	7 transects/plots or 5 transects/plots if vegetation is in low condition. More transects/plots may be needed if the condition of the vegetation is variable across the zone.
> 1000	8 transects/plots or 5 transects/plots if vegetation is in low condition. More transects/plots may be needed if the condition of the vegetation is variable across the zone.

For each plot/transect the ten site attributes listed in Table 3 of the Survey Methodology were collected. The locations of the plots/transects are shown in Figure 5. As illustrated in Diagram 1, in order to better align the method with the *EPBC Act Policy Statement 3.5 – White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* (Commonwealth of Australia 2006b), the dimensions of each plot-transect were 50 x 20 m (1,000 m², 0.1 ha), the centreline of which is a 50 m step-point transect. Plot-transects were completed in locations deemed via observation during Steps 1 and 2 to be representative of the vegetation zone.

Diagram 1. Vegetation survey plot-transect

Outer line forms 50 x 20 m plot



The following floristic survey data were collected from each 50 x 20 m plot-transect.

1. At each 1 m point along the 50 m step-point transect the ground layer was allocated to one of the following options:
 - Cryptogams (Moss/Lichen)
 - Bare Earth
 - Rocks
 - Litter/Dead Vegetation
 - Annual Exotic Grass
 - Perennial Exotic Grass
 - Exotic Broadleaf
 - Perennial Native Grass
 - Other native.
2. Dominant overstorey species were recorded.
3. Every vascular plant species observed in the 1,000 m² plot was recorded.
4. The presence and abundance of natural regeneration of the dominant overstorey eucalypts of at least 15 cm circumference at 130 cm above the ground was recorded.
5. An estimate was made of the numbers of trees in the 1,000 m² plot that have a circumference of at least 125 cm at 130 cm above the ground.

2.4 Remnant Woodland Tree Habitat Assessment

A survey was completed to record the following for each remnant woodland tree in the study area:

- Tree Number – a unique identifying number allocated to the tree;
- Location – recorded via handheld GPS;
- Species Name and Common Name;
- Diameter at Breast Height (DBH) – measured with a DBH tape;
- Height – the approximate height of the tree measured with a clinometer;
- Alive or Dead;
- Hollows – the number and characteristics of any hollows present; and
- Other Notes – regarding any other notable fauna habitat features observed (e.g. stick nests etc.).

2.5 Flora and Fauna Targeted Surveys

Based on the database and literature review, a number of threatened flora and fauna species were identified as potentially occurring in the study area. The following surveys were undertaken to address comments and submissions in response to the s.211 exemption application, and in discussion with ACT Government ecologists.

2.5.1 Threatened and Rare Flora Surveys

Four surveys were completed in the study area, on 27 September, 25 and 27 October 2021, and 21 February 2022. These surveys involved walked transects through the areas mapped as PCT-ACT25 Zone 1 (Figure 7). All observations of threatened or protected species were recorded via a GPS waypoint and, if a population, the population boundary was recorded (Figure 8).

2.5.2 Bird Surveys

Two bird surveys were completed in the study area, on 11 May and 8 July 2022. Surveys were carried out using a point count method, consistent with ACT Government surveys being undertaken concurrently on the adjoining Block 403 and elsewhere in the ACT. Nine sites were selected across the study area and surrounding land, shown in Figure 9. At each site, all birds were recorded during a 10-minute period. Within a 50 m radius of the observer, the species and number of individuals were recorded. Species recorded within 50-200 m of the observer were also noted.

2.5.3 Bat Surveys

Surveys for microbats were undertaken in March 2022 using Anabat® acoustic recording devices. Two Anabat recorders were deployed in the study area on 11 March 2022 and left in place for four nights (Figure 9). They were then moved on 17 March and deployed for another four nights, resulting in a total of 16 trap nights and 128 hours of acoustic recordings.

The filtered data were then sent to Biodiversity Monitoring Services Pty Ltd for expert analysis and identification. Recordings are analysed using identification software and then verified for quality control.

2.5.4 Pink-tailed Worm Lizard Habitat Mapping

Several small patches were identified by Osbourne and Wong (2010¹¹) (as shown on ACTmap*i*) as having moderate potential habitat value for the EPBC Act and NC Act listed Pink-tailed Worm-lizard (refer Figure 10). The previous version of this EIA (Capital Ecology 2022) assessed these areas and determined that the surface rock in these identified patches and elsewhere in the study area is not characteristic of the occupied Pink-tailed Worm-lizard habitat in the Molonglo Valley. However, two Pink-tailed Worm-lizards were found in the study area in November 2019, indicating that there are some patches in the study area which remain able to support the species. In response to feedback from the ACT Conservator, the habitat throughout the study area was re-assessed in May 2022, using the following methodology. No rock-turning surveys were undertaken as part of this assessment.

¹¹ Osbourne, W., and Wong, D. (2010). *Extent of potential pink-tailed worm-lizard (Aprasia parapulchella) habitat in the Stage 2 Investigation Area – East Molonglo downstream of Coppins Crossing*. Report commissioned by ACTPLA.

Step 1. Mapping of Potential Habitat

Step 1 involves fine-scale mapping of the extent of the potential Pink-tailed Worm-lizard habitat throughout the study area. This is achieved using a combination of field survey and GIS with high resolution aerial imagery to map the extent of surface rock.

Step 2. Habitat Assessment and Categorisation

Step 2 involves a process of on-ground assessment to categorise the mapped potential habitat based on the current rock characteristics (i.e. loose surface rock vs. embedded boulders), current vegetation characteristics (i.e. native perennial grass dominance vs. exotic pasture), and other relevant geological and landscape characteristics. The habitat categories were defined in accordance with those developed by Osbourne and Wong (2010) and displayed on ACTmapi:

- Moderate quality potential habitat;
- Low quality potential habitat; and
- Potential habitat under tree canopy.

3 Findings

3.1 Vegetation

3.1.1 Descriptive Overview

As shown in the 1988 aerial photograph in Figure 2, most of the study area has undergone past vegetation clearance and modification associated with its former use as part of the ACT Commercial Pine Plantation Estates. The entire study area was burnt during the 2003 Canberra bushfire. Following the bushfire, the remaining pine stems were pushed into windrows and burnt, and these cleared areas were then ripped along contours, presumably to minimise soil erosion. The 2004 aerial image (Figure 3) clearly shows this modification along with the remaining remnant Blakely's Red Gum trees present in the study area.

The vegetation in the study area is now characterised by a relatively intact dry sclerophyll forest of moderate to high diversity on the upper slopes of the ridge, and a highly disturbed open woodland with scattered remnant and regenerating eucalypts in the low-lying areas.

Many exotic plant species are present in the study area. The open low-lying portions of the study area contain a very dense cover of the noxious weed Blackberry. Levels of Blackberry infestation are heaviest along the drainage line, decreasing upslope. Most of the former pine plantation areas now contain scattered self-sown pines. All vegetation zones contain a moderate to high diversity of common grass and herbaceous weeds.

3.1.1.1 Plant Community Types and Vegetation Zones

3.1.1.1.1 Plant Community Types

As illustrated in Figure 5 and Table 2, the study area supports two PCTs, 'PCT-ACT16 – *Eucalyptus melliodora* - *E. blakelyi* Tableland Grassy Woodland' and 'PCT-ACT25 – *Eucalyptus macrorhyncha* Tableland Grass/Shrub Forest'. PCT-ACT16 occurs in the low-lying portion of the study area, along the central drainage line and extending part way up the ridge, on soils of moderate fertility and depth. PCT-ACT25 occurs on the ridgetop and slopes on generally poorer, shallower soils.

Table 2. PCTs recorded in the study area.

PCT	PCT name	PCT description	Occurrence in the study area
ACT16	<i>Eucalyptus melliodora</i> - <i>E. blakelyi</i> Tableland Grassy Woodland	ACT16 occurs on toe-slopes and other areas of similar elevation on soils of moderate to high fertility and generally moderate depth. In its climax form this community would have been characterised by an open canopy, sparse or absent mid- and shrubstorey, together with a defined grassy groundstorey supporting a high diversity of native forbs.	This PCT occurs across the lower slopes and drainage line.
ACT25	<i>Eucalyptus macrorhyncha</i> Tableland Grass/Shrub Forest	ACT25 occurs on low and exposed dry hills in the ACT, usually on well-drained skeletal soils.	This PCT occurs on the upper slopes and ridges.

3.1.1.2 Vegetation Zones

The following three vegetation zones were identified, assessed, and mapped during the field surveys.

ACT16 *Eucalyptus melliodora* - *E. blakelyi* Tableland Grassy Woodland

- PCT16 Zone 2 – scattered remnant canopy with young regeneration, mixed exotic/native groundstorey, low diversity.

ACT25 *Eucalyptus macrorhyncha* Tableland Grass/Shrub Forest

- PCT25 Zone 1 – remnant canopy, regeneration of the canopy, native groundstorey, moderate to high diversity.
- PCT25 Zone 2 – cleared canopy with young regeneration, mixed exotic/native groundstorey, low diversity.

Note: No Zone 1 was classified for the PCT-ACT16 in the study area, instead the first zone is Zone 2. This zone numbering has been applied to align the vegetation zones of the two PCTs based on condition (i.e. PCT-ACT16 Zone 2 is in a similar condition to PCT-ACT25 Zone 2).

These vegetation zones are described below, in Tables 3 to 5, and illustrated in Figure 5. A species list by plot and step-point transect data are provided in Appendix B.

3.1.2 Plots and Transects

The results of the nine floristic plot-transect combinations are provided in Appendix B. The results provide clear confirmation of the distinction in floristic structure and composition between the identified vegetation zones of ACT-PCT16 and ACT-PCT25.

3.1.3 Remnant Woodland Trees

As shown in Figure 6, 27 mature (i.e. >20 cm Diameter at Breast Height [DBH]) remnant woodland trees were identified in the study area, 15 of which occur in the deferred area. The data collected for these trees are provided in Appendix C, and Appendix D provides a photograph of each tree.

Note: This assessment recorded the features of each remnant woodland tree over 20 cm DBH, including dead trees (stags) and others that do not meet the criteria for a regulated tree under the ACT *Tree Protection Act 2005* (TP Act). As such, the trees recorded do not align with the Scenic Landscape Architecture (2011¹²) assessment and Redbox Design Group (2018¹³) reassessment which focussed on TP Act regulated trees.

¹² Scenic Landscape Architecture (2011). *Molonglo Stage 2 Tree Assessment*. Prepared for the ACT Land Development Agency. Dated 24/11/2011.

¹³ Redbox Design Group (2018). Reassessment of trees in the Denman Prospect 2 Estate study area. Undertaken for Capital Estate Developments. Dated 24/04/2018.

Table 3. Summary of ACT16 Zone 2

	PCT16 Zone 2
Description	<u>PCT = ACT16 – <i>Eucalyptus melliodora</i> - <i>E. blakelyi</i> Tableland Grassy Woodland</u> <u>Condition = Previously cleared / highly disturbed</u> Little remains of the climax vegetation due to the historical clearance and planting of the pine plantation and the clearance and modification following the 2003 bushfires. Zone 2 is now characterised by a highly modified groundstorey under a sparse canopy of young (<15 years old) Ribbon Gum <i>Eucalyptus viminalis</i> and Radiata Pine. Twenty-seven mature remnant Blakely's Red Gums also occur scattered along the central drainage line (refer Figure 6). The native midstorey and shrubstorey strata are limited to a few scattered Red-stemmed Wattle <i>A. rubida</i> and Rosemary Cassinia <i>Cassinia quinquefaria</i>, with Blackberry now dominating the shrubstorey. The groundstorey is characterised by a mix of common native grasses and forbs (notably Purple Wiregrass <i>Aristida ramosa</i>, Rough Speargrass <i>Austrostipa scabra</i>, Red-leg Grass <i>Bothriochloa macra</i>, and Small Crumbweed <i>Dysphania pumilio</i>) and exotic weeds (African Lovegrass <i>Eragrostis curvula</i>, St John's Wort <i>Hypericum perforatum</i>, Paterson's Curse <i>Echium plantagineum</i>, and Catsears <i>Hypochaeris</i> spp.). Tall Sedge <i>Carex appressa</i> and River Tussock <i>Poa labillardierei</i> also occur along the central drainage line.
Area – study area	13.83 ha.
Area – development footprint	3.29 ha.
Overstorey Species	Dominant = <i>E. blakelyi</i> (few scattered trees along central drainage line).
Overstorey Regeneration	Present – scattered.
Perennial Groundlayer (averaged across plots)	46.34% native. Note: much of the native cover was Small Crumbweed.
Understorey Diversity (averaged across plots)	9.33 native species, 6.66 native non-grass native species.
Significant Weeds	Blackberry, Radiata Pine, and Paterson's Curse.
EPBC Act and/or NC Act listed TEC	No.
	

Table 4. Summary of ACT25 Zone 1

	PCT25 Zone 1
Description	<u>PCT = ACT25 – <i>Eucalyptus macrorhyncha</i> Tableland Grass/Shrub Forest</u> <u>Condition = Relatively intact</u> Zone 1 comprises the band of relatively intact remnant Red Stringybark <i>E. macrorhyncha</i> and Long-leaved Bundy <i>E. goniocalyx</i> dry sclerophyll forest on the ridgetop and slopes in the northern portion of the study area. This area contains scattered mature trees and dense midstorey of canopy regeneration. The shrubstorey is characterised by a moderate diversity of common native shrubs, notably Burgan <i>Kunzea ericoides</i> and Long-leaved Cassinia <i>Cassinia longifolia</i>. The groundstorey supports a moderate to high diversity of native grasses (notably Purple Wiregrass, Red-Anther Wallaby Grass <i>Rytidosperma pallidum</i>, and Rough Speargrass) and forbs with a low cover of exotic species.
Area – study area	13.54 ha.
Area – development footprint	0.85 ha.
Overstorey Species	Codominant = <i>E. macrorhyncha</i> and <i>E. goniocalyx</i> .
Overstorey Regeneration	Present.
Perennial Groundlayer (averaged across plots)	78.25% native.
Understorey Diversity (averaged across plots)	19.33 native species.
Significant Weeds	Paterson’s Curse and St John’s Wort.
EPBC Act and/or NC Act listed TEC	No.
	

Table 5. Summary of ACT25 Zone 2

	PCT25 Zone 2
Description	<u>PCT = ACT25 – <i>Eucalyptus macrorhyncha</i> Tableland Grass/Shrub Forest</u> <u>Condition = Previously cleared / highly disturbed</u> Zone 2 comprises the highly modified patch downslope of the intact patch of Zone 1, together with a smaller spur extending into the southern portion of the study area. Zone 2 is characterised by young (<15 years old) regenerating Red Stringybark, Ribbon Gum, and Radiata Pine. The native midstorey and shrubstorey strata is largely absent and is dominated by Blackberry with a few small clumps of Burgan, Long-leaved Cassinia, and Wattles. The groundstorey is characterised by a mix of common native grasses and forbs (notably Purple Wiregrass, Rough Speargrass, Red-leg Grass, and Small Crumbweed) and exotic weeds (African Lovegrass, St John's Wort, Paterson's Curse, and Catsears).
Area – study area	10.51 ha.
Area – development footprint	3.00 ha.
Overstorey Species	Codominant = <i>E. macrorhyncha</i> and <i>E. goniacalyx</i> .
Overstorey Regeneration	Yes - scattered.
Perennial Groundlayer (averaged across plots)	39.10% native.
Understorey Diversity (averaged across plots)	16 native species.
Significant Weeds	Blackberry, Radiata Pine, and Paterson's Curse.
EPBC Act and/or NC Act listed TEC	No.
	

3.1.4 Threatened Ecological Communities (TECs)

3.1.4.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

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

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

Description – The NTG-SEH TEC 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 2016¹⁴) 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 m² (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.

Potential for occurrence in the study area – None – The entire study area would have historically been characterised as either an open woodland or dry sclerophyll forest PCT. Accordingly, the study area does not support the NTG-SEH TEC.

¹⁴ Commonwealth of Australia (2016). Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.

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 study area – Confirmed – The portion of the study area mapped as PCT-ACT16 would have once supported the climax community of this TEC.



An assessment of structure and floristic composition was undertaken for the single vegetation zone of PCT-ACT16 present in the study area. The purpose of this assessment is to determine whether the patch of PCT-ACT16 Zone 2 supports 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 6. As detailed in Table 6, the area mapped as PCT-ACT16 – Zone 2 does not meet the criteria for the EPBC Act listed TEC. This is consistent with both the NES Plan mapping and ACTmapi, neither of which identify the study area as supporting EPBC Act listed Box-Gum Woodland.

Table 6. 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
		PCT-ACT16 Zone 2
1	<i>Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?</i>	Yes Twenty-four remnant Blakely's Red Gums have been retained along the central drainage line, and this species is estimated to have been dominant throughout this zone. It is likely that Yellow Box also historically occurred throughout the portions of this zone upslope of the drainage line, however these trees would have been cleared for the pine plantation.
2	<i>Does the patch have a predominantly native understorey?</i>	No The understorey across PCT-ACT16 Zone 2 is predominantly exotic (average 46.34% cover native perennial). This is particularly the case throughout the substantial areas dominated by Blackberry (notably along the central drainage line).
3	<i>Is the patch 0.1 ha (1000 m²) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.</i>	N/A - refer to response to Criterion 2. In addition, the average number of native non-grasses per plot was only 6.66.
	<i>Or</i>	
	<i>Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?</i>	N/A - refer to response to Criterion 2. However it is noted that there is natural regeneration of Blakely's Red Gum in portions of PCT-ACT16 Zone 2.
Does the patch meet the criteria for the listed TEC?		No

3.1.4.2 Nature Conservation Act 2014 (ACT)

Two NC Act listed threatened ecological communities (TEC's) have the potential to occur in the study area, both listed as endangered under the NC Act: 'Natural Temperate Grassland' (NTG), and 'Yellow Box – Blakely's Red Gum Grassy Woodland' (NC Act Box-Gum Woodland).

Based on the recorded vegetation types, plant species, landscape position, the vegetation on adjoining and nearby properties, and current and historic aerial imagery, only NC Act Box-Gum Woodland is considered to have the potential to occur in the study area.

Yellow Box – Blakely's Red Gum Grassy Woodland

Woodland meeting the NC Act listed community was defined in the ACT Native Woodland Conservation Strategy and Action Plans (ACT Government 2019a¹⁵). The key defining characteristics of Yellow Box – Blakely's Red Gum Grassy Woodland are:

- a discontinuous stratum of trees of medium height (10-35 m) with canopies that are separated and with 4-30% foliage cover;
- dominated by Yellow Box (*Eucalyptus melliodora*) and/or Blakely's Red Gum (*Eucalyptus blakelyi*). Apple Box (*Eucalyptus bridgesiana*) and Candlebark (*Eucalyptus rubida*) are the most common co-dominant trees;
- remnants of the community in good condition have a ground cover dominated (50% or more of the perennial species) by native grasses and forbs;
- the ground cover of remnants in lower condition may not be dominated by native species, yet retain a canopy of mature trees (20 or more per hectare on average) and/or support natural regeneration;
- a patch size of at least 0.1 ha.

Polygons within which most or all of the trees have been cleared (described as secondary grassland) also constitute the NC Act listed community, provided:

- Yellow Box and/or Blakely's Red Gum are estimated to have previously been the dominant or co-dominant species;
- a relatively diverse native understorey is present; and
- the patch size is at least 0.1 ha.

Presence in the study area – Present – As discussed above, the areas mapped as ACT16 would have historically supported this TEC.

Despite the exotic groundstorey dominance, ACT16 Zone 2 has the appropriate canopy cover and regeneration of the overstorey to meet the NC Act listing criteria for Box-Gum Woodland in low condition. The study area therefore supports a total of 13.83 ha of NC Act Box-Gum Woodland in low condition, of which 4.78 ha occurs within the Deferred Area (Figure 5).

¹⁵ ACT Government (2019a). *ACT Native Woodland Conservation Strategy and Action Plans*. Environment, Planning and Sustainable Development, Canberra.

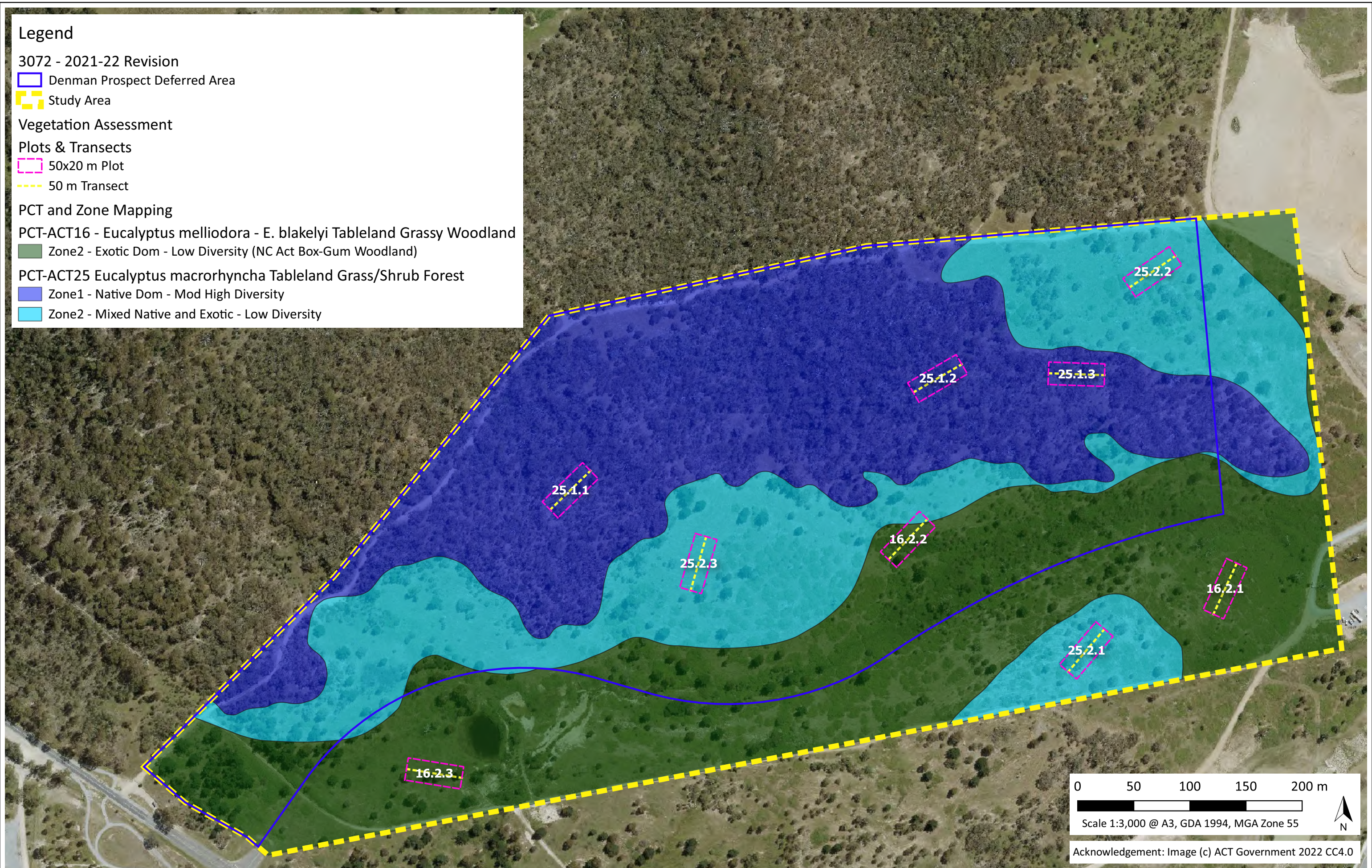


Figure 5. Vegetation Mapping and Survey

Capital Ecology Project No: 3072

Drawn by: C. Ross

Date: 12 July 2022

Legend

3072 - 2021-22 Revision

 Denman Prospect Deferred Area

 Study Area

Vegetation Assessment

 Mature Remnant Woodland Trees

PCT and Zone Mapping

PCT-ACT16 - *Eucalyptus melliodora* - *E. blakelyi* Tableland Grassy Woodland

 Zone2 - Exotic Dom - Low Diversity (NC Act Box-Gum Woodland)

PCT-ACT25 *Eucalyptus macrorhyncha* Tableland Grass/Shrub Forest

 Zone1 - Native Dom - Mod High Diversity

 Zone2 - Mixed Native and Exotic - Low Diversity

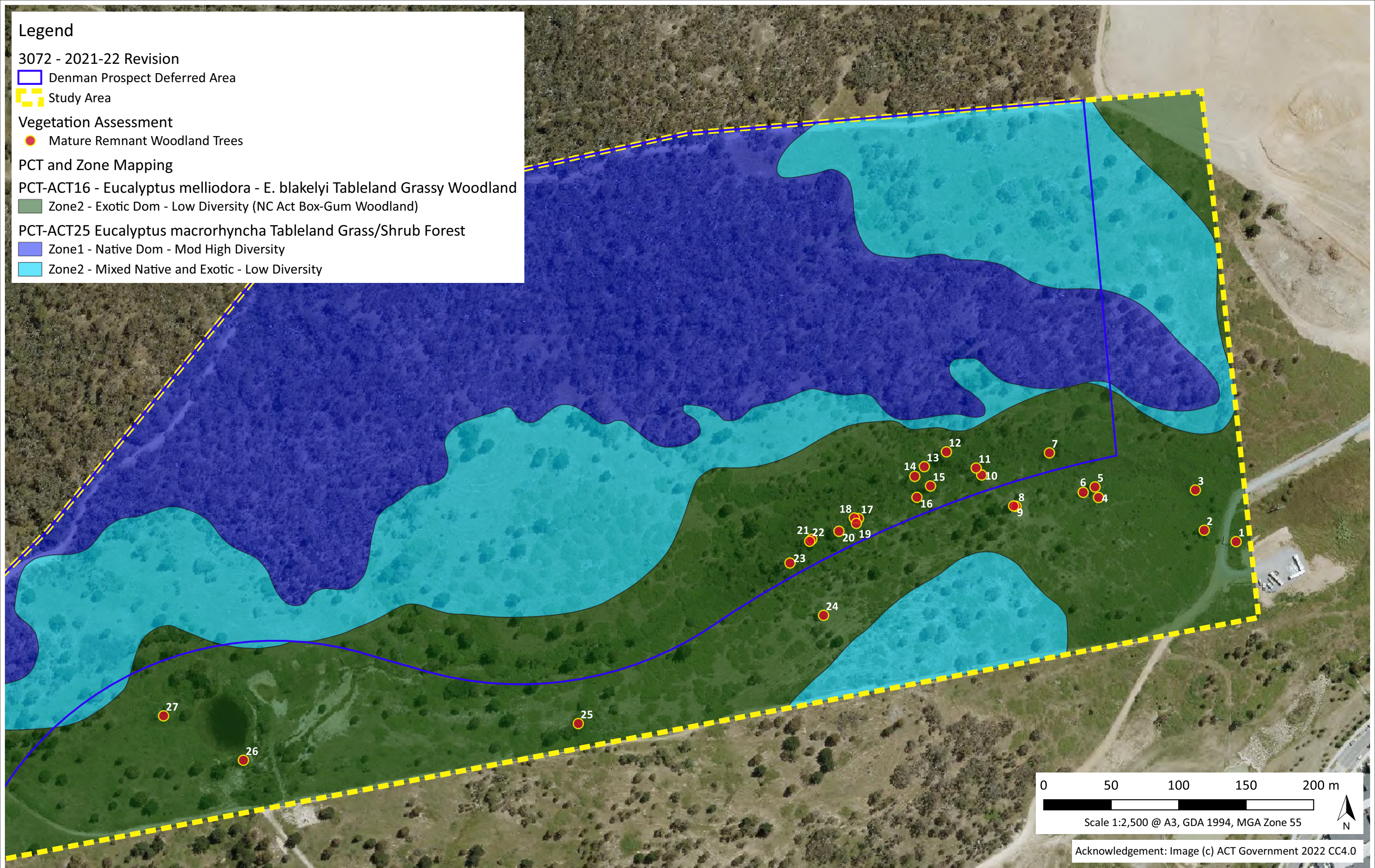


Figure 6. Mature Remnant Woodland Trees

Capital Ecology Project No: 3072
 Drawn by: C. Ross
 Date: 12 July 2022

3.2 Flora and Fauna Occurrence

3.2.1 Database and Literature Searches

The species listed in Table 7 are threatened, rare, protected, or otherwise of conservation focus, which have been identified within a 1 km radius from the centre of the study area, sourced from previous ecological studies, ACTMapi, Canberra Nature Map (CNMap), Atlas of Living Australia (ALA), eBird, and by Capital Ecology during the current surveys (CE). Species that were recorded within the 'Deferred Area' are shown in bold.

Appendix A provides a Likelihood of Occurrence Assessment for all species identified by the PMST and other database searches as potentially occurring in the study area.

Table 7. EPBC Act and/or NC Act threatened, rare or protected species recorded within 1 km of the study area. Species in bold were recorded within the Deferred Area.

Classification	Species Name	Common Name	Source	EPBC Act	NC Act
Bird	<i>Aphelocephala leucopsis</i>	Southern Whiteface	ALA, eBird	-	Rare
	<i>Artamus cyanopterus</i>	Dusky Woodswallow	CNMap, ALA, eBird	-	Rare
	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	CNMap, ALA, eBird	E	-
	<i>Chthonicola sagittata</i>	Speckled Warbler	CNMap, ALA	-	Rare
	<i>Daphoenositta chrysoptera</i>	Varied Sitella	eBird	-	V
	<i>Eurystomus orientalis</i>	Oriental Dollarbird	CNMap, eBird	-	Rare
	<i>Hieraaetus morphnoides</i>	Little Eagle	CNMap, ALA	-	V
	<i>Hirundapus caudacutus</i>	White-throated Needletail	ALA, eBird	V	V
	<i>Hirundapus caudacutus</i>	White-winged Triller	CNMap, ALA, eBird	-	V
	<i>Hylacola pyrrhopygia</i>	Chestnut-rumped Heathwren	CNMap, eBird	-	Rare
	<i>Petroica boodang</i>	Scarlet Robin	CNMap, ALA, eBird, CE	-	V
	<i>Petroica goodenovii</i>	Red-capped Robin	CNMap, ALA, eBird	-	Rare
	<i>Petroica phoenicea</i>	Flame Robin	ALA, eBird	-	Rare
	<i>Petroica rosea</i>	Rose Robin	CNMap, ALA, eBird	-	Rare
	<i>Polytelis swainsonii</i>	Superb Parrot	CNMap, ALA, eBird	V	V
	<i>Stagonopleura guttata</i>	Diamond Firetail	ALA, eBird	-	Rare
	<i>Taeniopygia bichenovii</i>	Double-barred Finch	eBird	-	Rare
	<i>Turnix varius</i>	Painted Button-quail	CNMap, eBird	-	Rare
Reptile	<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	CNMap	V	V
Mammal	<i>Sminthopsis murina</i>	Common Dunnart	ACT gov camera trap survey	-	-

Classification	Species Name	Common Name	Source	EPBC Act	NC Act
Plant	<i>Bunochilus montanus</i>	Montane Leafy Greenhood	CNMap	-	Protected
	<i>Caladenia carnea</i>	Pink Fingers	CNMap, ALA, CE	-	Protected
	<i>Caladenia congesta</i>	Pink Caps	CNMap, ALA, CE	-	Protected
	<i>Caladenia fuscata</i>	Dusky Fingers	CNMap, CE	-	Protected
	<i>Caladenia moschata</i>	Musky Caps	CNMap, CE	-	Protected
	<i>Caladenia parva</i>	Brown-clubbed Spider Orchid	CNMap	-	Rare
	<i>Caladenia ustulata</i>	Brown Caps	CNMap	-	Protected
	<i>Calochilus platyichilus</i>	Purple Beard orchid	CNMap, CE	-	Protected
	<i>Chiloglottis valida</i>	Large Bird Orchid	CNMap	-	Protected
	<i>Corunastylis clivicola</i>	Rufous Midge Orchid	CNMap, ALA, CE	-	Protected
	<i>Cyanicula caerulea</i>	Blue Fingers	CNMap, CE	-	Protected
	<i>Diplodium ampliatus</i>	Large Autumn Greenhood	CNMap, ALA	-	Protected
	<i>Diuris chryseopsis</i>	Golden Moths	CNMap	-	Protected
	<i>Diuris pardina</i>	Leopard Doubletail	CNMap	-	Protected
	<i>Diuris semilunulata</i>	Late Leopard Orchid	CNMap, CE	-	Protected
	<i>Diuris sulphurea</i>	Tiger Orchid	CNMap, CE	-	Protected
	<i>Eragrostis elongata</i>	Clustered Lovegrass	CNMap, ALA	-	Rare
	<i>Eriochilus cucullatus</i>	Parson's Bands	CNMap	-	Protected
	<i>Glossodia major</i>	Wax Lip Orchid	CNMap, CE	-	Protected
	<i>Hymenochilus cycnocephalus</i>	Swan Greenhood	CNMap	-	Protected
	<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	ACTMapi, CNMap, CE	E	Protected
	<i>Microtis</i> sp.	Onion Orchid	CNMap, CE	-	Protected
	<i>Oligochaetochilus aciculiformis</i>	Needle-point rustyhood	CNMap	-	Rare
	<i>Pterostylis nutans</i>	Nodding Greenhood	CE	-	Protected
	<i>Pterostylis pedunculata</i>	Maroonhood	CNMap	-	Protected
	<i>Senecio microbasis</i>	Narrow Fireweed	CNMap, ALA	-	Rare
	<i>Speculantha rubescens</i>	Blushing Tiny Greenhood	CNMap, CE	-	Protected
	<i>Thelymitra arenaria</i>	Forest Sun-orchid	CNMap	-	Rare
	<i>Thelymitra juncifolia</i>	Dotted Sun-orchid	CNMap	-	Protected
	<i>Thelymitra pauciflora</i>	Slender Sun-orchid	CNMap	-	Protected
	<i>Thelymitra peniculata</i>	Blue Star Sun-orchid	CNMap	-	Protected
	<i>Thelymitra simulata</i>	Graceful Sun-orchid	CNMap	-	Rare
	<i>Thelymitra</i> sp.	A Sun-orchid	CNMap, CE	-	Protected

3.2.2 Threatened Flora Occurrence

A total of 117 flora species were recorded during field surveys, comprising 86 native species and 32 exotic species (Appendix B).

3.2.2.1 Targeted flora surveys

Four surveys were completed in the study area, on 27 September, 25 and 27 October 2021, and 21 February 2022. These surveys involved walked transects through the areas mapped as PCT-ACT25 Zone 1 (Figure 7). Significant flora were recorded using a handheld GPS and are shown on Figure 8.

In total, 15 species of orchid were recorded in the study area during the targeted surveys, shown in bold in Table 7. All orchid species are listed as protected under the Nature Conservation Protected Native Species List 2015 (No 1) (ACT Government 2015e¹⁶). An additional four orchid species have been recorded in the study area by citizen scientists and uploaded to Canberra Nature Map. A single Hoary Sunray *Leucochrysum albicans* var. *tricolor* (EPBC Act Endangered) was also recorded. Other significant flora species previously recorded in the study area include Narrow Fireweed *Senecio microbasis* and Clustered Lovegrass *Eragrostis elongata* (see Table 7). These species are considered rare in the ACT.

All significant flora were recorded within the high quality dry forest (PCT-ACT25 Zone 1), with the majority concentrated along the northern edge of the study area, within 50 m of the fire trail.

3.2.3 Fauna Habitat and Threatened Fauna Occurrence

As recorded during the field surveys, the study area supports the following fauna habitat features.

- Canopy
 - Twenty-seven (27) mature remnant woodland trees occur in PCT-ACT16 Zone 2, primarily located along the central drainage line. Most of these trees are over 100 years old, with a few likely to be over 200 years old. Some of these trees contain hollows which would provide nesting/roosting habitat to a variety of native birds, insectivorous bats, and arboreal mammals.
 - Three of the mature remnant woodland trees (Trees 1, 14 and 16) were also observed to support active nests of the Coconut Ant *Papyrius nitidus*, the host species which is essential to the survival of the nationally rare Small Ant-blue Butterfly *Acrodipsas myrmecophila*.
 - The study area's remnant eucalypts would provide a nectar resource when in flower for a range of honeyeaters and other nectivorous birds and mammals. The mistletoe on some of these trees would also provide a nectar resource.
- Midstorey and shrubstorey
 - The midstorey and shrubstorey in PCT-ACT25 Zone 1 is largely intact with moderate cover, and is dominated by regenerating overstorey species, *Kunzea*, *Cassinia* and some scattered *Acacia* species. These habitat features are likely to be of value as refuge, foraging habitat, and/or nesting habitat for many species of woodland birds and small mammals such as Common Dunnart which has been recorded in Block

¹⁶ ACT Government (2015e). *Nature Conservation Protected Native Species List 2015 (No 1)*. Notifiable Instrument NI2015–317 made under the Nature Conservation Act 2014.

403. The midstorey and shrubstorey in PCT-ACT16 Zone 2 and PCT-ACT25 Zone 2 is characterised by a scattered and sparse cover of regenerating *Eucalyptus*, *Acacia*, and *Cassinia* species, with patches of dense Blackberry and to a lesser extent Briar Rose *Rosa rubiginosa*. These areas may be of value for many common bird species, and some threatened woodland bird species that use the forest/woodland edge (such as Scarlet Robin).

- Groundstorey
 - Most of the study area is characterised by a groundstorey dominated by common native and exotic grasses and forbs and is grazed by common fauna species such as Eastern Grey Kangaroos *Macropus giganteus* and European Rabbits *Oryctolagus cuniculus*. This native and exotic groundstorey in the study area is unlikely to be of specific significance to any threatened fauna species.
- Surface Rock
 - The surface rock in the study area may provide habitat for a range of native reptiles, including the vulnerable Pink-tailed Worm Lizard. Most of the surface rock is not naturally occurring, having been brought to the surface by the ripping and other landscape modification works undertaken following the 2003 bushfire. Most of the rock present is also of angular and boulder-like form which is not characteristic of Pink-tailed Worm-lizard habitat. However, the recorded presence of the species in two of the patches of surface rock generated by the ripping indicates that such habitat may be of some value to the species.
- Creeks and waterways
 - The study area contains one small dam, and a drainage line running along the southern boundary of the deferred area. Due to the lack of permanent water, extensive blackberry infestation and lack of native fringing vegetation, these waterways are unlikely to be of significant value to aquatic fauna, however they may provide habitat for various common amphibians, reptiles, and waterbirds.

3.2.3.1 Bird Surveys

A total of 34 bird species were recorded in the study area across the two surveys, including 32 native species and two exotic species, the Indian Myna *Acridotheres tristis* and Common Starling *Sturnus vulgaris* (Appendix E). The Scarlet Robin *Petroica boodang* (NC Act Vulnerable) was recorded at site CE_09 on 8 July 2022 (see Figure 9).

In addition to many common native birds, several EPBC Act and/or NC Act listed birds, and numerous other species considered rare or declining in the region, may forage and potentially breed in the study area. Several of these species have been recorded in the neighbouring Block 403, in contiguous habitat (See Table 7). The relatively intact PCT-ACT25 Zone 1 is the portion of the study area which has the greatest potential to be of value to such species, however PCT-ACT25 Zone 2 and PCT-ACT16 Zone 2 may also be of value to some species which prefer to forage in more open grassy habitat.

3.2.3.2 Anabat Surveys

A total of 14 species of insectivorous bats were detected during the Anabat surveys, of which 12 were identified to species level with a high level of confidence (Appendix F). Notably, three species

of conservation focus in the ACT were recorded, Large-eared Pied Bat *Chalinolobus dwyeri* (EPBC Act Vulnerable), Eastern False Pipistrelle *Falsistrellus tasmaniensis*, and Large Bent-winged Bat *Miniopterus orianae oceanensis*.

3.2.3.3 Pink-tailed Worm-lizard Habitat

As shown in Figure 10, the study area contains 3.97 ha of Pink-tailed Worm-lizard habitat, of which the majority is considered to be low condition and/or under tree canopy. A small patch (0.12 ha) in the northern part of the study area is of moderate quality. Despite the low condition of the habitat, two Pink-tailed Worm-lizards were found in November 2019, indicating that the habitat is able to support the species (Figure 10).



Plate 1. Rock brought to the surface by ripping and other landscape modification works.

Several small patches were previously identified by Osbourne and Wong (2010) (as shown on ACTMapi) as having moderate potential habitat value for the EPBC Act and NC Act listed Pink-tailed Worm-lizard (refer Figure 10). The surface rock in these identified patches and elsewhere in the study area is not characteristic of the occupied Pink-tailed Worm-lizard habitat in the Molonglo Valley as described by Osborne & Coghlan (2004¹⁷) and Osborne (2008¹⁸) (i.e. partially embedded granodiorite and/or other rocks of volcanic origin with a thickness of approx. 5 - 10 cm and a diameter of approx. 20 - 50 cm). Instead, most of the surface rock in the study area is not naturally occurring, having been brought to the surface by the ripping and other landscape modification works undertaken following the 2003 bushfire. As shown in Plate 1, most of the rock present is also of angular and boulder-like form which is not characteristic of Pink-tailed Worm-lizard habitat.

¹⁷ Osborne, W.S. & R. Coghlan (2004). *Distribution of the Pink-tailed Worm lizard in the Lower Molonglo Valley, ACT, with respect to strategic land planning*. Report commissioned by ACT Planning and Land Authority. Canberra, ACT: Applied Ecology Research Group, School of Resource, Environmental and Heritage Sciences, University of Canberra.

¹⁸ Osborne, W. (2008). *Environmental planning principles for the protection of the Pink-tailed Worm Lizard *Aprasia parapulchella* in the Lower Molonglo Valley, ACT*.

3.3 Pest Plants

Thirty-two exotic plant species were recorded in the study area. Whilst the majority of these are common weeds throughout the region, the species in Table 8 are listed as Weeds of National Significance (Weeds Australia 2021¹⁹) and/or are listed as declared pest plant species in the ACT (ACT Government 2015f²⁰).

Table 8. Noxious weed occurrence.

Name	Growth Form	Status	Description of Occurrence	Threat Level
<i>Echium plantagineum</i> Paterson's Curse	Forb <1.2 m	Must be contained	Scattered plants across all zones.	Low
<i>Eragrostis curvula</i> African Lovegrass	Tussock <1.2 m	Must be contained	Scattered plants within PCT-ACT16 Zone 2.	High – In the absence of concerted control the currently limited infestation will continue to spread throughout the study area.
<i>Hypericum perforatum</i> St John's Wort	Forb <1 m	Must be contained	Scattered plants across all zones.	High – control measures are required to prevent the infestation from proliferating.
<i>Nassella trichotoma</i> Serrated Tussock	Tussock <0.6 m	WoNS, Must be contained / prohibited	A few plants occur in PCT-ACT16 Zone 2.	High – control measures are required to prevent the current low infestation from proliferating.
<i>Pinus radiata</i> Radiata Pine	Large tree	Must be contained	Sub-dominant and scattered trees throughout the lower slopes. Most trees have self-sown following the 2003 bushfire.	Low
<i>Rosa rubiginosa</i> Briar Rose	Shrub <3 m	Must be suppressed / Prohibited	A few plants occur scattered in open areas throughout PCT-ACT16 Zone 2 and PCT-ACT25 Zone 2.	Moderate – Control of this species is recommended to prevent its proliferation in the study area.
<i>Rubus fruticosus</i> Blackberry	Shrub/bramble <3 m	WoNS, Must be contained / prohibited	Very extensive infestation, primarily along the central drainage line and adjoining lower slopes (PCT-ACT16 Zone 2).	High – The infestation is currently high to very high in some areas. This species should be controlled to prevent further proliferation within the study area.

Key for table. WoNS - (Commonwealth) Weed of National Significance. Declared pest plant species in the ACT under the Pest Plants and Animals (Pest Plants) Declaration 2005: Must be suppressed, Must be contained, Prohibited, Notifiable.

¹⁹ Weeds Australia (2021) *Weeds profiles*. <https://weeds.org.au/weeds-profiles/>

²⁰ ACT Government (2015f). *Pest Plants and Animals (Pest Plants) Declaration 2015 (No 1)*. <https://www.legislation.act.gov.au/di/2015-59>

3.4 Pest Animals

The exotic pest species European Rabbit, Indian Myna, and Common Starling were recorded in the study area during the surveys. In addition, the House Sparrow *Passer domesticus*, and Red Fox *Vulpes vulpes* is also expected to be present. Each of these species is commonly encountered on such peri-urban sites.

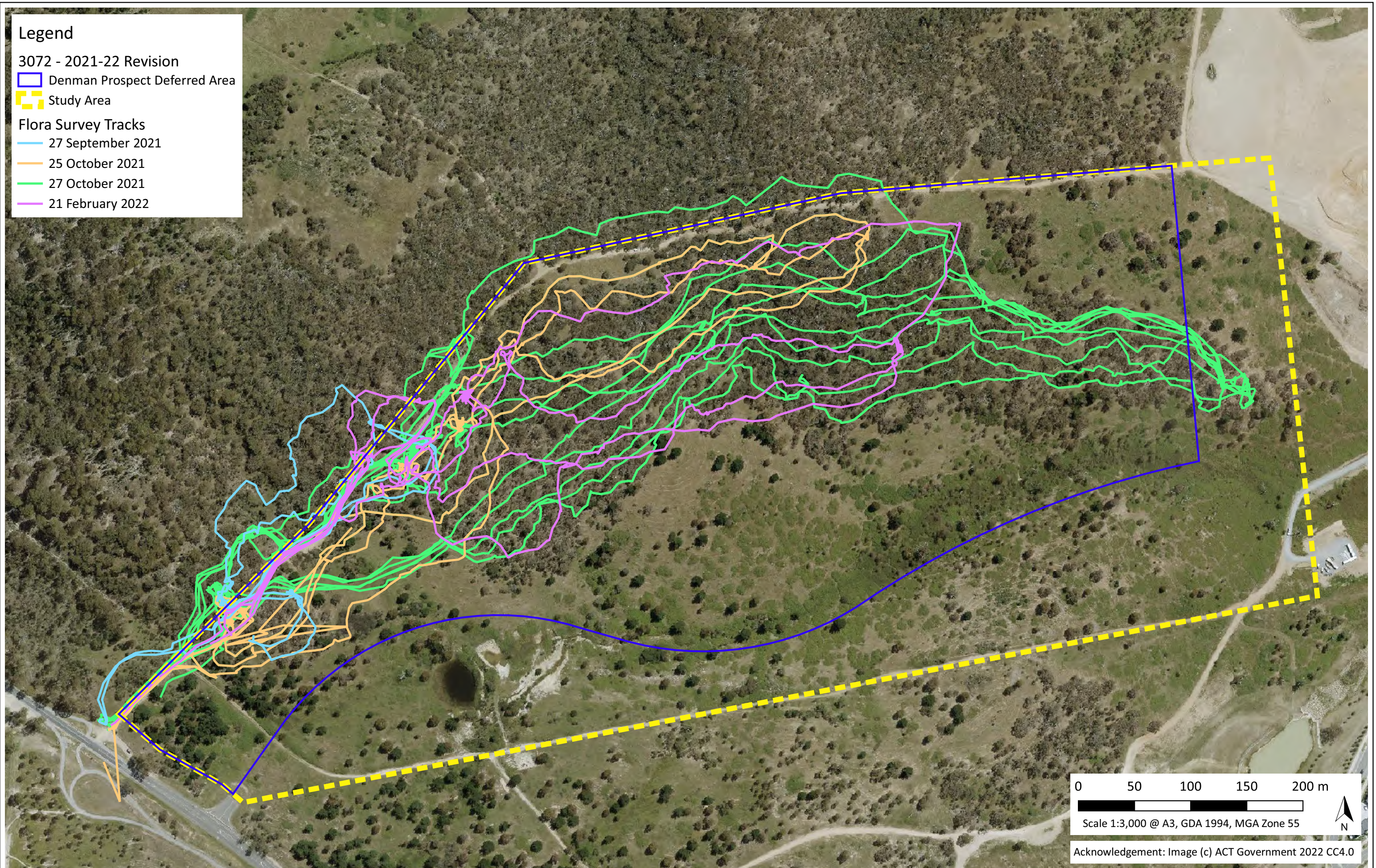


Figure 7. Flora Survey

Capital Ecology Project No: 3072
Drawn by: C. Ross
Date: 12 July 2022

Legend

3072 - 2021-22 Revision

 Denman Prospect Deferred Area

 Study Area

 Intact Dry Sclerophyll Forest - High Value Habitat for Rare Flora

Threatened/Rare/Protected Flora

Capital Ecology Surveys - Sep-Oct 2021

 Hoary Sunray

 Pink Caps

 Purple Beard Orchid

 Sun Orchid

Capital Ecology Surveys - Feb 2022

 Blushing Tiny Greenhood

 Rufous Midge Orchid

Canberra Nature Map - Rare Flora Records

 A donkey orchid

 A greenhood

 Bearded orchid

 Brown-clubbed spider orchid

 Clustered Lovegrass

 Forest Sun Orchid

 Graceful Sun-orchid

 Hoary Sunray

 Large autumn greenhood

 Montane Leafy Greenhood

 Narrow Fireweed

 Pink caps

 Pink fingers

 Rufous midge orchid

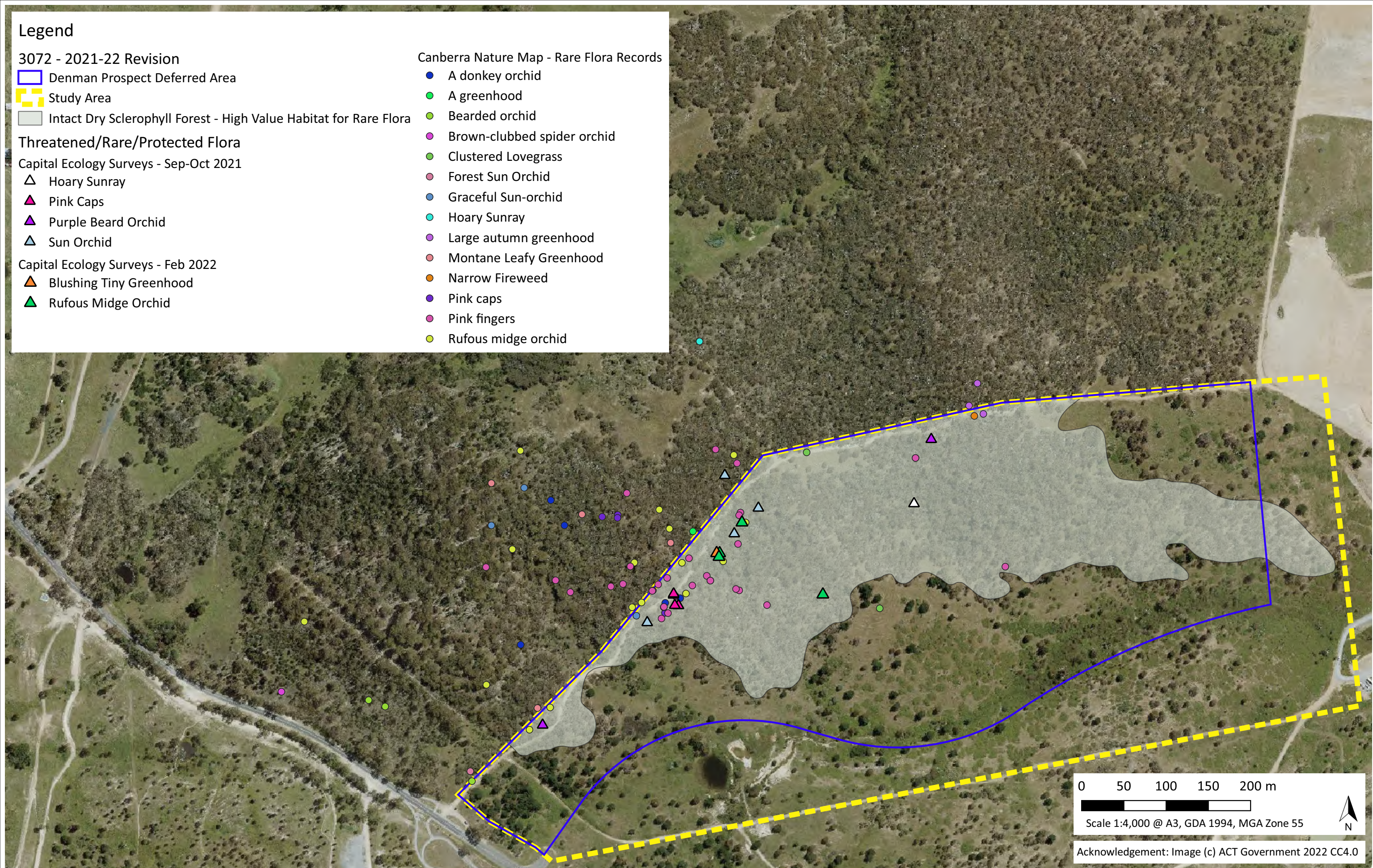


Figure 8. Threatened, Rare and Protected Flora Records

Capital Ecology Project No: 3072

Drawn by: C. Ross

Date: 12 July 2022

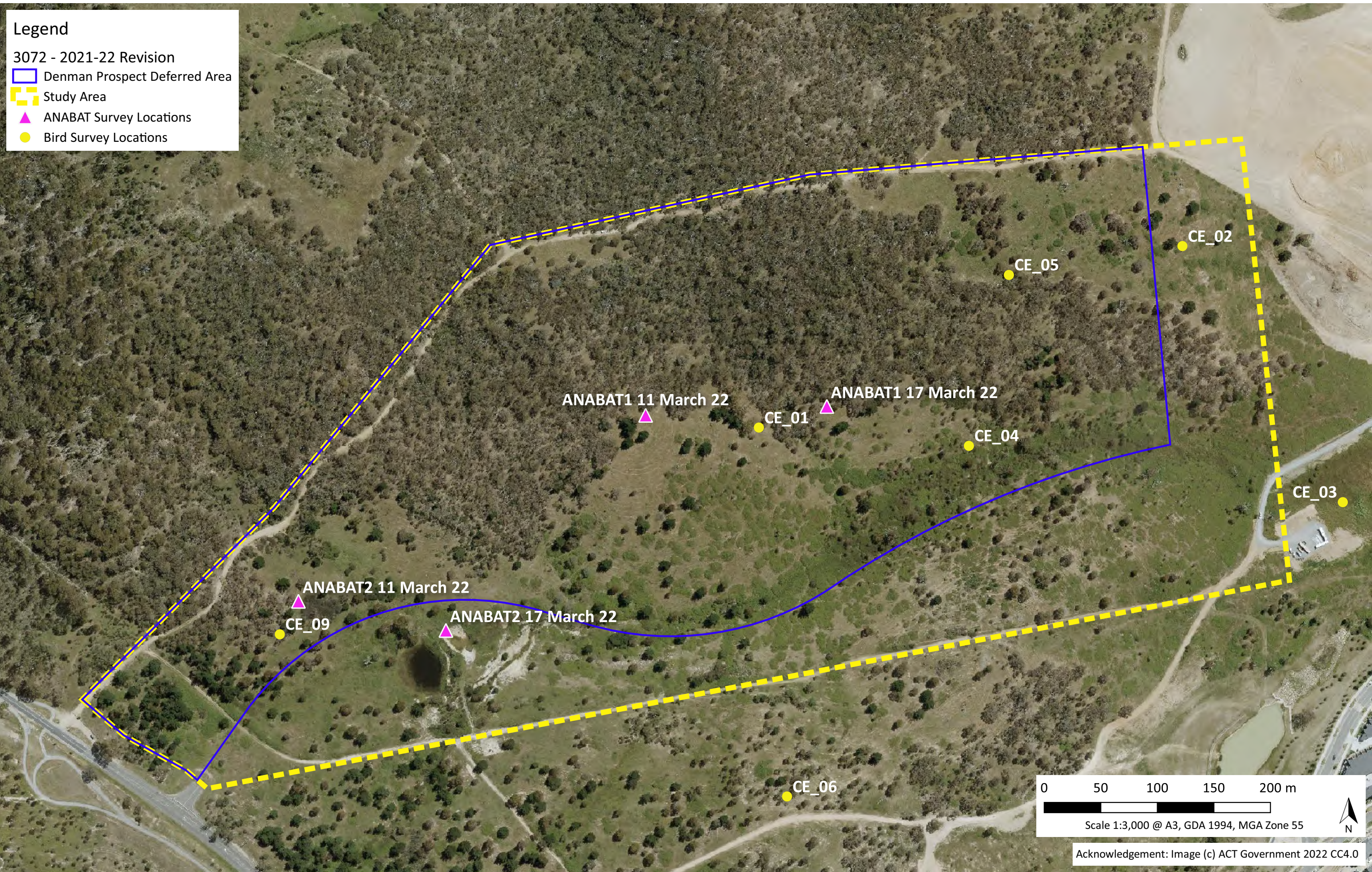


Figure 9. Bird and Bat Survey locations

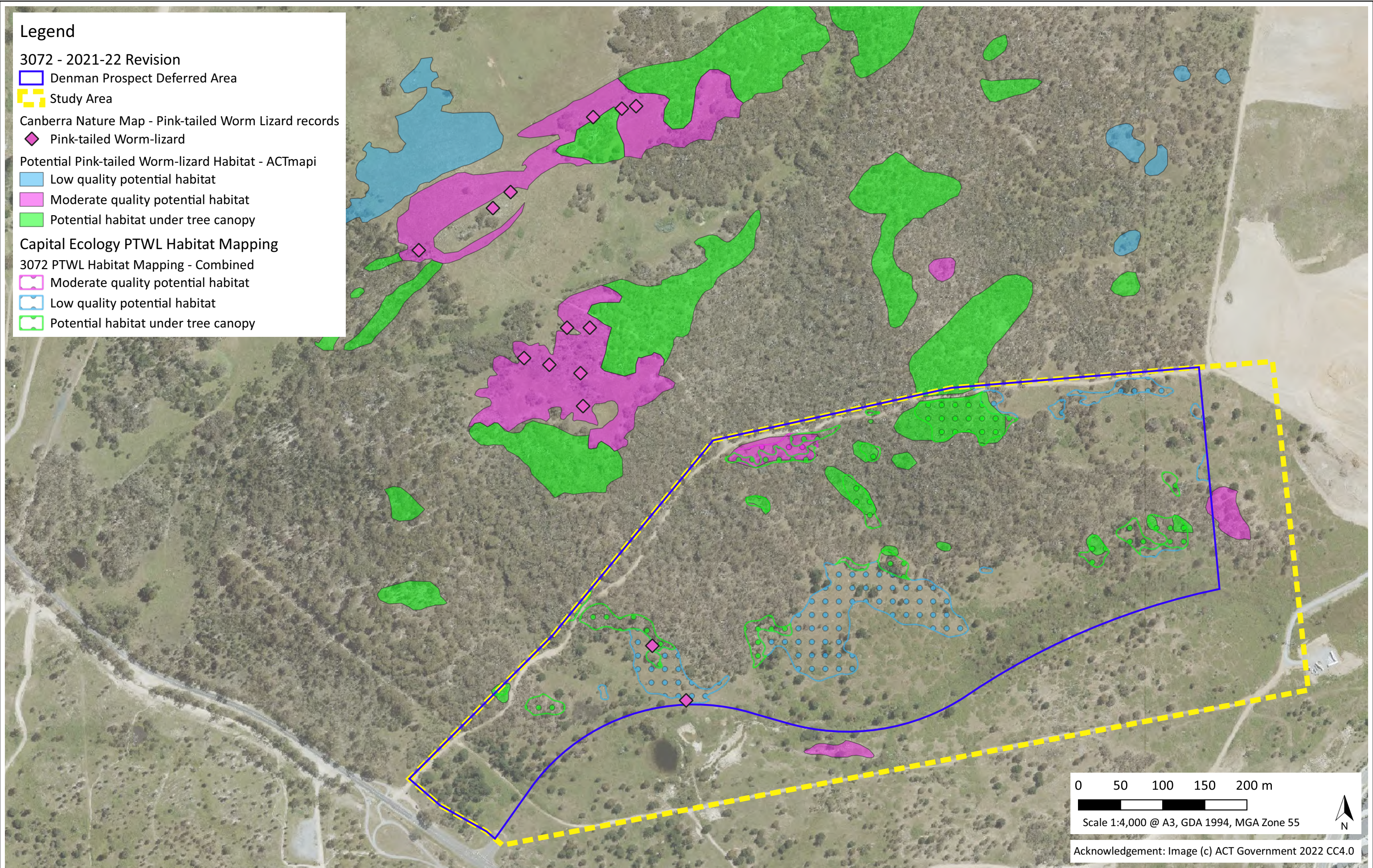


Figure 10. Pink-tailed Worm Lizard Habitat

4 Impacts of the Proposed Development

The proposed development will result in direct impacts to the ecological values of the study area, as well as a range of indirect impacts, both to the 'retained area' within Block 12 and extending beyond into Block 403.

It is important to clarify that the direct impacts considered in this assessment are only those which occur within the deferred area (Block 12). The study area also contains parts of Block 11, the development of which has been previously approved under the existing 2013 s.211 exemption for Denman Prospect 2 Estate (Figure 11).

We also note that many of the direct and indirect impacts of the proposed development of the deferred area would have occurred regardless, as a result of the previously approved development of Block 11. Therefore this assessment aims to determine whether there are any *additional* impacts, or an increase in *severity* of impacts, as a result of the extension of the development footprint into the deferred area. For the purposes of this assessment, the current proposed development footprint has been compared with that which was previously approved in 2017 (See Figure 12).

A number of measures have been incorporated into the design of the proposed development in order to avoid, minimise, and mitigate impacts on the ecological values of the study area, as well as the broader indirect impacts to Block 403. These measures are described in Section 5.

4.1 Direct Impacts

The proposed development has a total development footprint of 7.14 ha within the deferred area, which includes a 60 m IAPZ and a 0.32 ha allowance for walking trails (See Section 5.1.4). The development of the proposed urban area will result in the clearance of 0.85 ha of the relatively intact PCT-ACT25 Zone 1, as well as the clearance of 6.29 ha of lower quality vegetation within PCT-ACT16 Zone 2 and PCT-ACT25 Zone 2.

As shown in Figure 11, the proposed development will result in the following direct impacts:

- 7.14 ha of native vegetation;
- 3.29 ha of low quality NC Act Box-Gum Woodland (ACT16 Zone 2);
- 0.85 ha of high quality dry sclerophyll forest (ACT25 Zone 1); and
- 1.1 ha of low quality Pink-tailed Worm-lizard habitat.

Table 9 provides a summary of the direct impact areas for the current proposed development, compared with those that were previously approved under the 2017 s.211 exemption. The current proposal will result in an additional 2 ha of impact to native vegetation, and an additional 0.76 ha of low quality Pink-tailed Worm-lizard habitat. The current proposal also reduces the total impact to NC Act Box-Gum Woodland by 0.33 ha. Given this, it is unlikely that the development will result in significant direct impacts to NC Act Box-Gum Woodland.

Table 9. Vegetation Zones and Impact Areas.

Vegetation Zone ID	Proposed Development (2022)	Approved Development (2017)
Low quality PTWL Habitat	1.1 ha	0.34 ha
ACT-16-2 (NC Act BGW)	3.29 ha	3.62 ha
ACT-25-1	0.85 ha	0.46 ha
ACT-25-2	3.00 ha	1.06 ha
Total Area	7.14 ha	5.14 ha

Of the 27 remnant woodland trees recorded in the study area, 15 are located within the deferred area and are contained within the 60 m IAPZ (Figure 6). The final urban design will aim to retain as many of these trees as possible, whilst balancing this design outcome with the other competing priorities (such as safety outcomes, and engineering outcomes including cut and fill, Water Sensitive Urban Design [WSUD], and road alignment). The remaining 12 trees are located outside the 'deferred area', and as such, the clearance of these trees is covered by the existing 2013 s.211 exemption for Denman Prospect 2 Estate.

The development footprint includes a 60 m IAPZ which will result in the modification of vegetation in the subject portion in the manner prescribed in the Bushfire Protection Assessment (GHD 2022²¹) and in accordance with the ACT Bushfire Management Strategy. The APZ management will not further degrade the current vegetation where it covers areas of PCT-ACT16 Zone 2 and PCT-ACT25 Zone 2.

As noted in Section 3.2.2, all significant flora species were recorded within the intact dry forest area (PCT ACT25 Zone 1). No significant flora were recorded within the development footprint. Due to the past clearance and intensive modification, it is highly unlikely that any threatened flora species have persisted in PCT-ACT16 Zone 2 or PCT-ACT25 Zone 2. As such, it is unlikely that the proposed development will directly impact an EPBC Act and/or NC Act listed threatened flora species.

The proposed development will impact 1.1 ha of low-quality Pink-tailed Worm-lizard. Most of this habitat is contained within the IAPZ; as described in Section 5.3.1 the IAPZ will be managed to reduce adverse impacts on the species. Given this, it is unlikely that the development will result in significant direct impacts to the Pink-tailed Worm-lizard. Impacts to the Pink-tailed Worm-lizard are accounted for under the Molonglo Valley Strategic Assessment, and this impact will therefore be included in the NES Plan implementation report if any of the impact occurs in moderate to high quality habitat.

As discussed in Section 3.2.3, several EPBC Act and/or NC Act listed birds, and numerous other species of conservation interest in the region, may forage and potentially breed in the study area. The relatively intact PCT-ACT25 Zone 1 is the area which has the greatest potential to be of value to such species. The proposed development will encompass 0.85 ha of this potential habitat, most of which occurs in the IAPZ. Given this, it is unlikely that the development will result in significant direct impacts to habitat for threatened woodland bird species.

The Superb Parrot (EPBC Act Vulnerable, NC Act Vulnerable) has been previously recorded breeding within approximately 1.5 km of the study area, and the species is often observed flying over and foraging in Block 403. Superb Parrots are known to be increasing the southern part of their range in

²¹ GHD (2022) *Bushfire Protection Assessment Denman Prospect ACT - Stromlo Reach S211 EIS Exemption*. Prepared for Capital Estate Developments. Project no. 12578291

the ACT, likely due to climate change and loss of habitat (ACT Government 2019b²²). Superb Parrots are known to prefer mature Blakely's Red Gums for nesting sites, and the suitability of the remnant trees in the study area as potential Superb Parrot nest trees was raised in the Canberra Ornithologists Group's submission in response to the 2022 s.211 exemption application (COG 2022²³). As described in Section 3.1.4 and shown in Figure 6, the study area contains 27 mature Blakely's Red Gums, of which 15 occur within the deferred area. As detailed in Appendix C, seven of the trees in the deferred area contain hollows that may be suitable for the Superb Parrot (i.e. larger than 5 cm). As mentioned above, the final urban design will aim to retain as many of the trees as possible within the IAPZ. However, it is unlikely that Superb Parrots would nest in these trees in the future, as they have been shown to avoid nesting within 200 m of urban areas (ACT Government 2019).

4.2 Indirect Impacts

The proposed development has the potential to indirectly impact retained or adjacent native vegetation and habitat. Potential indirect impacts are listed below. These have been informed by the Kama Interface Management Strategy, prepared by Capital Ecology for the ACT Government in 2016²⁴.

During construction

- Increased sedimentation of receiving waterways.
- Increased noise, vibration, and dust.
- Weed introduction and/or spread.
- Incidental damage or removal of retained native vegetation and habitat.

During occupation

- Weed introduction and/or spread.
- Urban 'edge effects' e.g.:
 - noise and light spill;
 - 'urban-adapted' native fauna; and
 - proximity of urban edge on 'urban avoiding' bird species.
- Loss of habitat:
 - loss of remnant trees;
 - decreased foraging range; and
 - loss of connectivity.
- Management as a Strategic Firefighting Advantage Zone (SFAZ).

²² ACT Government (2019b). *Superb Parrot *Polytelis swainsoni* Action Plan*. Environment, Planning and Sustainable Development.

²³ Canberra Ornithologists Group (2022). *EIS Exemption Application (202100040) – Denman Prospect (Denman Prospect Deferred Area and Bushfire Management Zone)*.

²⁴ Capital Ecology (2016). *Kama Nature Reserve Interface Management Strategy*. Final 02 – December 2016. Prepared for ACT Government – Environment, Planning and Sustainable Development Directorate. Author: R. Speirs. Project no. 2717.

- Increase in pest animal populations as a result of increased human activity.
- Domestic animals (pets).
- Increased human use/disturbance.

The above potential indirect impacts may 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/or in the long-term during the occupation phase of the proposed development.

Table 10 provides a threat-sensitivity matrix outlining the degree of sensitivity each significant value is likely to have to each identified potential indirect impact. As shown in Table 10, the most significant threat is weed invasion. The introduction, establishment, and proliferation of weeds as a result of the proposed development, notably African Lovegrass and Serrated Tussock, poses a very high degree of threat to the condition and overall integrity of Box-Gum Woodland, Pink-tailed Worm-lizard habitat, and significant flora.

The NC Act listed and/or regionally declining (significant) woodland birds are likely to be the most sensitive of the values within the adjoining retained habitat. As noted herein, whilst many of these species are not currently listed as threatened species, their occurrence within a patch of native vegetation is a key indicator of the ecological integrity and overall value of the patch. The greatest impacts to these species are likely to be urban 'edge effects', which are known to have a significant impact on the abundance and behaviour of 'urban-avoiding' bird species.

The extent to which edge effects penetrate into reserves and other retained habitat adjoining urban areas is not well understood. However, results from a study on bird communities across Canberra woodland/urban fringes suggested that the effects of the suburban matrix penetrate into reserves for greater distances than previously thought. Some studies have found that even sites 250 m from the reserve edge were perceived as edge habitat by birds (Ikin *et al.* 2014). A study in the United States of America recommended restricting housing development within one kilometre of protected areas (Wood *et al.* 2015) and a study in the ACT detected urban proximity effects on species frequently beyond three kilometres (and up to five kilometres) from the urban boundary (Rayner *et al.* 2015).

The Kama Interface Management Strategy (Capital Ecology 2016) recommended a buffer of at least 200 m to provide effective protection to significant woodland birds from urban edge effects. Although there is a paucity of Australian research directly relating to the effectiveness of specific buffer widths, the available international research (Martino 2001; Thorell & Gotmark 2005; Wood *et al.* 2014; Wood *et al.* 2015) suggests that 200 m is likely to greatly reduce the impact of roaming cats and dogs, human disturbance, and competition from urban-adapted fauna species.

Figure 12 shows a 200 m buffer from the extent of the proposed development (outer edge of the IAPZ), together with a 200 m buffer from the development extent approved under the 2017 s.211 exemption. This provides a comparison of the likely penetration of urban edge effects into the retained area of Block 12 and Block 403 beyond. The figure demonstrates that there is very little difference between the two, such that it is unlikely that the proposed development will have any notable *additional* indirect impacts, or substantially increase the *severity* of indirect impacts, when compared with the previously approved development.

In addition, the proposed development reduces the likelihood and severity of indirect impacts by enacting a range of measures to avoid, minimise and mitigate impacts to native vegetation and habitat. These measures are detailed in Section 5.

Table 10. Threat-sensitivity matrix

Degree of threat		Very High	High	Moderate	Low
Threat		Value			
		Box-Gum Woodland	Pink-tailed Worm-Lizard	Significant Woodland Birds	Significant Flora (e.g. Orchids)
	1.				
	Weed invasion	The majority of the ecological community in the study area is already dominated by Blackberry. Whilst groundcover weed invasion does not impact overstorey species (although it may reduce recruitment in the long term), it may significantly reduce the overall value and function of the habitat.	The Pink-tailed Work-lizard is only known to occur in rocky habitat within native-dominated grassland. Weed invasion may reduce the quality of habitat for this species, possibly resulting in local extinction.	Weed invasion may reduce the quality of available foraging resources for woodland birds and may change the structure of the habitat. May also benefit competing species.	May lead to degradation of high quality habitat for significant flora.
	2.				N/A
	Noise and light spill	May have some minor impact upon the habitat values of the community.	Unlikely to significantly affect the species.	Likely to reduce the frequency of foraging and nesting near the urban edge of some urban avoiding species. May impact behaviour.	
	3.				N/A
	'Urban-adapted' native fauna	May impact upon the functioning of the community through changes in predator-prey and competition dynamics, leading to a reduction in diversity and abundance of characteristic woodland species.	Unlikely to be a threat although may increase predation.	Highly likely to compete with small woodland birds. May reduce the abundance and diversity of woodland dependant species.	
	4.		N/A		N/A
	Proximity of urban edge on 'urban-avoiding' bird species	May impact upon the functioning of the community through changes in fauna species composition.		Overarching threat – proximity of urban development likely to permanently change the species composition.	
	5.		N/A		N/A
	Loss of remnant trees	Remnant trees are valuable for fauna habitat. All mature remnant woodland trees in the deferred area will be retained within the IAPZ (pending final designs).		May lead to a reduction in abundance and diversity of woodland dependant species. Some species unlikely to be affected.	
	6.	N/A	N/A		N/A
	Decreased foraging range			May lead to a reduction in abundance and diversity of woodland dependant species. Some species likely to be unaffected.	
	7.				
	Loss of connectivity	Development is unlikely to significantly affect connectivity for characteristic flora and fauna of this community.	Development may have some impact upon connectivity for the species through loss of potential habitat, however this is unlikely to be significant for the conservation of the species in the locality.	Development may have some impact upon connectivity for some species through loss of potential habitat, however this is unlikely to be significant for their conservation in the locality.	Development is unlikely to significantly affect connectivity for significant flora.

		Value			
		Box-Gum Woodland	Pink-tailed Worm-Lizard	Significant Woodland Birds	Significant Flora (e.g. Orchids)
	8. Bushfire management (SFAZ)	Management of the area as a SFAZ may involve some clearance along existing access tracks, and fuel reduction burns and/or thinning as required. May impact upon the functioning of the community through disturbance and changes to fire regimes.	May have minor impacts through changes to fire regimes and clearing some areas for vehicle access.	May have minor impacts through changes to fire regimes and clearing some areas for vehicle access.	May have minor impacts through changes to fire regimes and clearing some areas for vehicle access.
	9. Exotic pest animals				
		May impact upon the functioning of the community through changes in predator-prey and competition dynamics, leading to a reduction in diversity and abundance of characteristic woodland species.	Certain pest fauna may prey upon the species. Unlikely to be a significant threat.	Highly likely to compete with or prey upon small woodland birds. May reduce the abundance and diversity of woodland dependant species.	High grazing pressure from rabbits may impact significant flora or increase weed invasion.
	10. Domestic animals (pets)				N/A
		May cause physical disturbance, carry weeds and prey upon native fauna.	May prey upon the species, reducing its occurrence in the study area.	Likely to prey upon small woodland birds. May prevent breeding and foraging near the urban edge.	
	11. Increased human use/disturbance				
		Physical disturbance may reduce abundance and diversity of sensitive native flora.	Physical disturbance of rocky habitat likely to occur. Collection of rocks and animals may impact upon population density and distribution.	Human disturbance may reduce abundance and diversity of sensitive woodland dependant species.	Human disturbance (i.e. trampling, collection of plants) may reduce abundance and diversity of sensitive flora species.

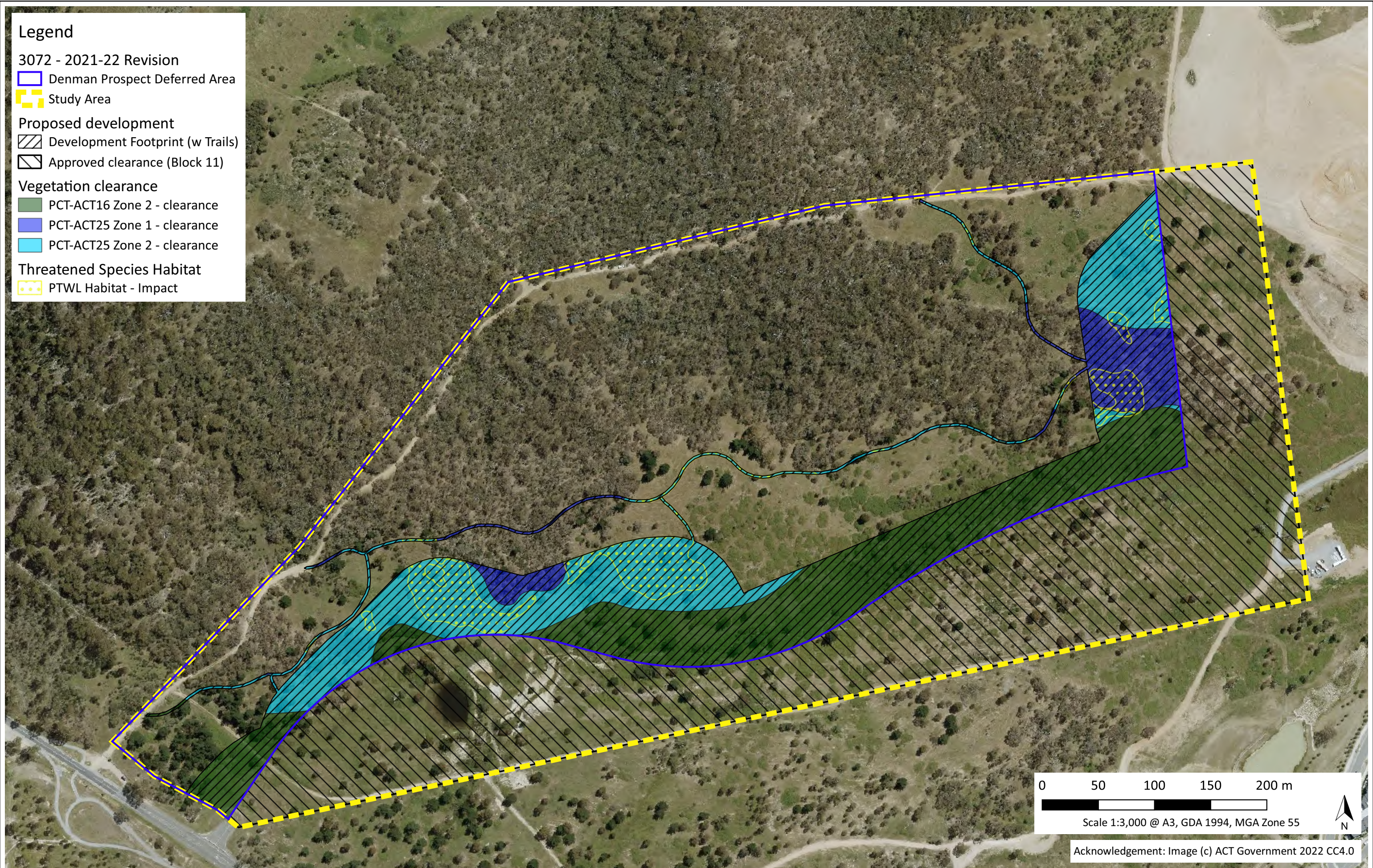


Figure 11. Residual Impacts of the Proposed Development

Legend

3072 - 2021-22 Revision

 Denman Prospect Deferred Area

 Study Area

Proposed development

200m buffer from proposed development

 Proposed Development (2017)

 Proposed Development (2022)

 Proposed Development (2017) - 200m buffer

 Proposed Development (2022) - 200m buffer

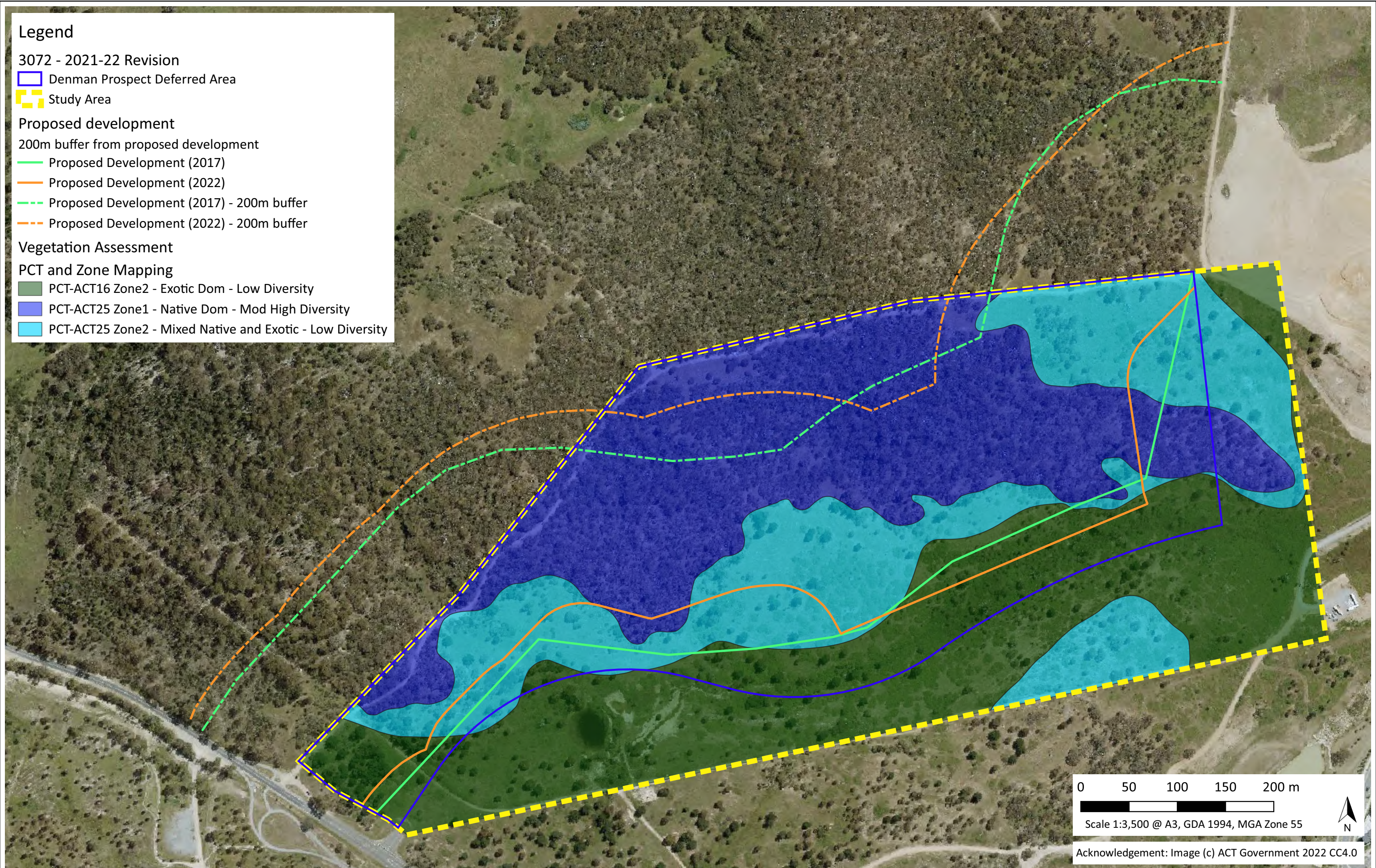
Vegetation Assessment

PCT and Zone Mapping

 PCT-ACT16 Zone2 - Exotic Dom - Low Diversity

 PCT-ACT25 Zone1 - Native Dom - Mod High Diversity

 PCT-ACT25 Zone2 - Mixed Native and Exotic - Low Diversity



0 50 100 150 200 m

Scale 1:3,500 @ A3, GDA 1994, MGA Zone 55

Acknowledgement: Image (c) ACT Government 2022 CC4.0

Figure 12. Indirect Impacts of the Proposed Development

Capital Ecology Project No: 3072

Drawn by: C. Ross

Date: 12 July 2022

5 Measures to Avoid, Minimise and Mitigate Impacts on Biodiversity

A number of measures have been incorporated into the design of the proposed development in order to avoid, minimise, and mitigate impacts on the ecological values of the study area, as well as the broader indirect impacts to Block 403, which contains highly significant ecological values. These measures are described below.

5.1 Avoidance and Minimisation

5.1.1 Design

The previous version of this EIA presented a preliminary layout with a development footprint of 16.1 ha. This design would have resulted in the IAPZ extending to the northern boundary of the deferred area in some locations. The lot layout has since been substantially refined (Figure 4) to reduce the extent of the development and the associated IAPZ, and to avoid the majority of the high quality vegetation and threatened species habitat (PCT-ACT25 Zone 1).

As a result of these avoidance measures, the proposed development will result in the clearance of 7.14 ha of native vegetation, of which 0.85 ha is in high condition (PCT-ACT25 Zone 1), as well as 1.1 ha of Pink-tailed Worm-lizard habitat, all of which is in low condition.

By reducing the impact footprint, the proposed development will retain:

- 30.9% (1.48 ha) of the NC Act Box-Gum Woodland that occurs in the deferred area;
- 72.3% (2.87 ha) of the Pink-tailed Worm-lizard habitat that occurs in the deferred area; and
- 93.5% (12.23 ha) of the high-quality threatened flora and fauna habitat that occurs in the deferred area.

It is also noted that the revised design results in a significant increase in the distance between development and the northern boundary with Block 403, particularly in the western part of the deferred area where the majority of threatened flora have been recorded. In this area, the minimum distance from the boundary is approximately 75 m.

5.1.2 Urban Edge Road

A minimum 18-metre wide road reserve will be established along the northern edge of the urban area. This road reserve is included in the 60 m IAPZ, which extends from the edge of the residential blocks. Within this road reserve an edge road will be constructed consisting of a two lane (i.e. a single lane each way) asphalt road. This urban edge road will be designed in a manner that creates a slow speed environment and prevents it from becoming a major vehicular thoroughfare. The establishment of this urban edge road will provide the following.

1. Reliable and unobstructed access along the entire length of the interface between urban development and land designated for conservation and/or open space purposes (i.e. the remnant vegetation within Block 12 and Block 403 beyond). This access is beneficial as it will provide effective and efficient:

- entry and egress for residents and emergency services during a bushfire or other emergency;
 - monitoring and maintenance of the ecological values and built infrastructure; and
 - monitoring and control of weeds by ACT Government staff, contractors and others (i.e. there are no hidden or hard to access places which may be missed during weed control works).
2. A substantial separation between private properties and land designated for conservation and/or open space purposes. This separation will reduce the risk of weed introduction by preventing dumping of garden waste etc. over the back fence.
 3. Increased public surveillance along the urban edge which will reduce the incidence of illegal or antisocial activities and increase the likelihood of reporting of such activities.
 4. Simplified administration and maintenance works required to appropriately maintain the interface between private land and the adjacent native vegetation.

A buffer verge will also be established on the northern side of the edge road. A concrete path will be constructed on the outside of the edge road (which may or may not be within the verge) providing for pedestrian and bicycle traffic. Establishment of this verge and path will provide for and encourage people to walk dogs along the edge of the retained native vegetation.

5.1.3 Urban Edge Retaining Walls and Batters

The study area is characterised by a moderate slope downhill to the southeast (i.e. from the retained area down to the urban area). The natural topography of the site necessitates the construction of retaining walls and/or batters along the outer edge road (within the IAPZ). The height of the retaining walls and batters will vary along the boundary depending upon the amount of cut or fill required (and other engineering considerations).

Incorporation of this retaining wall into the interface will provide a number of benefits including:

- providing a 'catch' for headlight shine and vehicle noise, reducing the reach of these impacts into the retained area;
- controlling weed spread by reducing the likelihood that detached seed and/or seed heads will blow upslope from urban areas into the retained area (noting that westerly winds prevail across the Molonglo Valley meaning that weeds are more likely to blow east into the urban area);
- making it difficult for residents to carry garden refuse and other waste (i.e. lawn clippings, prunings, unwanted plants etc.) into the retained area; and
- encouraging people to follow designated tracks into and within the buffer by only providing stepped sections which direct to tracks.

5.1.4 Public Walking Trails

The fire trail on the northern boundary of the deferred area with Block 403 is a popular walking track. In addition, there is demand for mountain bike access from the Denman Prospect shops through to Stromlo Forest Park on the western side of the study area. Walkers and cyclists have the potential to impact sensitive areas such as orchid habitat by trampling, increasing erosion and

spreading weeds through the area. In order to minimise these impacts and facilitate movement through the retained areas of Block 12, designated public walking and cycling trails will be established.

The design and route of the walking trails will be determined in the final urban design. Indicative routes are shown in Figure 4, including a shared walking/mountain bike track extending from east to west along the northern edge of the proposed development, and several walking only tracks connecting the main path to the suburb and the existing fire trail along the northern boundary.

The trails will be 1.3 m in width, with a natural mineral surface following a similar design to that used recently at Ginninderry²⁵. As the topography across portions of the proposed development is characterised by sloping terrain, sections of the trail construction will require bench cuts and thus cut and fill retention. Apart from groundstorey disturbance, only a small amount of vegetation clearing is expected to occur (e.g. removal of shrubs in certain sections). No substantial trees will be impacted by the proposed development.

While the proposed development is likely to only impact a width of 1.3 m across the majority of its length, during construction certain sections will disturb a maximum width of up to 2.2 m (i.e. 1.3 m trail width plus 0.45 m either side for cut and fill retention). In order to capture all potential impacts, the trails are assumed to disturb a width of 2.2 m along the entire length (i.e. 1.3 m trail width plus 0.45 m either side for cut and fill retention).

5.1.5 Boundary Fencing

Given the attractiveness of the buffer for trail bike riding and other activities undesirable for the protection of ecological values within the retained area, a fence will be constructed along the entire outer boundary of the IAPZ. The fence will be a three-strand low height rural fence. The establishment of this boundary fencing will provide the following benefits:

- delineating management areas; and
- reducing human impacts to areas of high ecological value.

The fence will not be constructed in a manner that restricts kangaroo movement more than standard stock fencing. Fences which restrict kangaroo movement may increase incidents with dogs and would likely result in kangaroos being funnelled towards Uriarra Road. In this regard, fences will not incorporate barbed wire which also has the potential to injure wildlife and restrict movement.

Access gates will be constructed at several points along the urban edge to provide public access to the walking trails which will connect with the fire trail along the boundary of Block 12 and Block 403.

5.1.6 Retention of Remnant Trees

The majority of remnant trees in the study area are located in PCT-ACT25 Zone 1, with 27 scattered remnant woodland trees also located along the drainage line in PCT-ACT16 Zone 2 (refer Figure 6).

In 2018 the ACT Government listed the *'The loss of mature native trees (including hollow-bearing trees) and a lack of recruitment'* as a key threatening process under the NC Act. The aim of this listing is to recognise the significant biodiversity values that mature native trees possess, and to

²⁵ Capital Ecology (2022). *Ginninderry Trails Phase 2, Ginninderry, ACT – Ecological Impact Assessment and Defined Process Strategy*. Authors: R. Speirs and S. Reid. Project no. 3023.

encourage their preservation. Actions suggested in the associated Conservation Advice²⁶ to mitigate against the loss of mature native trees include the following.

- Restrict as far as possible, clearing of:
 - mature eucalypts over 50 cm diameter at breast height; and
 - mature native trees that contain nest hollows.
- Promote retention of standing dead trees wherever possible.
- Encourage retention of non-mature native trees across urban and rural landscapes to ensure a future supply of mature trees and avoid lag times.

It is noted that the urban design process must prioritise retention of 'high value trees' as assessed by Scenic Landscape Architecture (2011) and Redbox Design Group (2018) given the urban setting (i.e. the higher the quality of trees, the greater priority given). The optimal outcome will be that any trees retained within the urban area will safely contribute to the habitat, amenity, and visual quality within the urban setting.

Of the 27 remnant trees recorded in the study area, 15 are located within the deferred area (refer Figure 6). The remaining 12 trees are located outside the 'deferred area', and as such the clearance of these trees is covered by the existing 2013 s.211 exemption for Denman Prospect 2 Estate. The previous development layout would have resulted in the clearance of all or most of these trees and the loss of the habitat features they possess. However, the revised layout has significantly reduced the extent of the development, such that all the remnant trees are contained within the 60 m IAPZ. The final urban design will aim to retain as many of the trees as possible, whilst balancing this design outcome with the other competing priorities (such as safety outcomes, and engineering outcomes including cut and fill, WSUD, and road alignment).

In addition to the above, any remnant trees that need to be removed will be incorporated into the nearby bushland to contribute to fauna habitat. Felled remnant trees will not be destroyed, and they will only be removed from the study area if they are to be used for habitat augmentation works elsewhere in the Molonglo Valley.

It is noted that while the retention of mature trees in the IAPZ would provide habitat for many species, the proximity to the urban edge means that the trees would be unlikely to be occupied by Superb Parrots in the future.

5.2 Mitigation – Construction

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

Construction activity can only commence after the CEMP has been endorsed by EPSDD and related referral entities. At a minimum the CEMP will include:

- appropriate definition of clearing boundaries;
- protective fencing around sensitive values;

²⁶ ACT Government (2018). *Nature Conservation (Loss of Mature Native Trees) Conservation Advice 2018*. ACT Government, Canberra.

- buffer zones around sensitive values;
- clearing procedures;
- weed management procedures;
- pathogen management procedures (e.g. phytophthora);
- 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 study 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 study 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.

5.3 Mitigation – Occupation

5.3.1 Management of the Proposed Asset Protection Zone (APZ) and Strategic Firefighting Advantage Zone (SFAZ)

The APZ will be managed as per the Bushfire Protection Assessment (GHD 2022, see Section 3.2).

The SFAZ requirements for the proposed development are outlined in the Bushfire Protection Assessment (GHD 2022). This proposal does not require the establishment of a Strategic Fire Advantage Zone (SFAZ) as the 60 m IAPZ provides the required treatment to protect the residential development area. Notwithstanding this, the retained area of Block 12 and Block 403 is already identified as an existing SFAZ area under the 2017 s.211 exemption, and no changes are proposed to the existing SFAZ planning or establishment undertaken to date in Block 12.

5.3.2 Artificial Light and Noise Control

The impacts of artificial light and noise on native fauna in and adjacent to urban areas are not currently well understood. Nevertheless, it is reasonable to assume that the foraging behaviour and potentially breeding behaviour of insectivorous or omnivorous nocturnal vertebrate fauna (i.e. owls, frogmouths, nightjars, microbats, gliders etc.) would be influenced by both artificial light itself and the changes to invertebrate activity associated with the light sources. Although at present none of the nocturnal vertebrate species occurring in the lowland areas of the ACT are listed as threatened in the ACT, a number of the insectivorous bats listed as vulnerable under the EPBC Act or NSW BC Act have been recorded in the study area. The persistence of each component of this fauna group is important for ecosystem function.

In light of the above, the following measures will be incorporated into the urban design to protect the biodiversity values of the study area and beyond from artificial light and noise.

1. As detailed in Section 5.1.3, retaining walls and/or batters will be constructed along the outside of the edge road. This will provide a 'catch' for headlight shine and vehicle noise, reducing the reach of these impacts into the retained area.
2. All street lights along the urban edge road will include a shield which limits the light arc to 180°, directed towards the urban area.
3. The urban edge road will be designed in a manner that creates a slow speed environment and prevents it from becoming a major vehicular thoroughfare.

5.3.3 Pest Plant and Animal Management

A weed control program will be developed and implemented to address the existing significant weeds in the study area, primarily the infestation of Blackberry. This program will focus on initial intensive treatment to remove the current weeds prior to development.

Best practice weed management will be implemented during all management/maintenance works to minimise the spread of the significant weeds present within the study area and surrounds (notably Blackberry, African Love Grass, St John's Wort, and Serrated Tussock). This will include:

- appropriate vehicle hygiene – all vehicles and machinery will be cleaned of weed seed or propagules prior to entry to the work site; and
- only sterile materials such as hessian/jute or rice straw will be used for soil stabilisation or similar purposes.

5.3.4 Domestic Animal Control

The following measures will be implemented to protect the significant values of the retained area from domestic animals.

- Denman Prospect is a designated cat containment area, the enforcement of which is facilitated by the ACT Government.
- Dogs will not be permitted in the retained area and Block 403. These designations will be clearly conveyed to the public via signage and other community education (refer Section 5.3.5). Active enforcement of these designations will be undertaken by the ACT Government.

5.3.5 Signage

Signage will be installed at public access points and along the boundary fence (see Sections 5.1.4, 5.1.5). This will provide information regarding:

- the significant natural and cultural values of the retained area;
- the activities which are permitted and those that are prohibited (e.g. dog-on-leash area, dumping prohibited);
- the entity responsible for management;
- contact details for the party whom members of the public should contact should they observe illegal or degrading activities being conducted; and
- contact details for active community conservation ('friends of') groups which interested people can join, together with the ACT Government Access Canberra contact details for general information.

5.3.6 Landscaping

Plant species that are sympathetic to the ecology of the surrounding area will be used for landscaping to the fullest extent practicable. Where practicable within open space areas, all strata will be re-established (i.e. groundcover, midstorey shrubs, and canopy trees) to create habitat complexity. This will discourage urban adapted species and encourage small woodland birds to visit the area. Open space plantings will comprise only species appropriate for the applicable plant community type.

6 Legislative Requirements

6.1 Commonwealth

6.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act requires that proposed 'actions' be assessed in terms of their potential to impact upon 'Matters of National Environmental Significance' (MNES) as defined under the Act.

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Guideline criteria for determining whether an impact is significant are provided under the Act. Where a proposed action will, or is likely to, have a significant impact on a MNES, the proposed action must be referred to the Commonwealth Minister for the Environment. The purpose of the referral is to determine whether a proposed action requires approval and/or controls under the EPBC Act.

The deferred area is entirely within 'development area' identified in the Molonglo Valley Strategic Assessment. Therefore, as a component of the Molonglo Valley urban development the potential impacts on MNES have been previously addressed and approved via the Molonglo Valley Strategic Assessment. Accordingly, development of the proposed urban area must occur in a manner consistent with the NES Plan and referral as a standalone action is not required.

Notwithstanding the above, it is noted that development of the proposed urban area is unlikely to significantly impact upon a MNES given that:

- the study area does not support EPBC Act listed Box-Gum Woodland;
- the study area is unlikely to support EPBC Act listed flora species (other than the single Hoary Sunray plant which is not located in the proposed development footprint);
- the impact to 1.1 ha of low quality Pink-tailed Worm-lizard habitat is unlikely to be significant; and
- the vegetation to be impacted is unlikely to be of potential importance to EPBC Act listed threatened or migratory fauna species.

6.2 Australian Capital Territory

6.2.1 Planning and Development Act 2007

Pursuant to the ACT *Planning and Development Act 2007* (P&D Act), a development proposal will be assessed via the 'impact track' and require the preparation of an Environmental Impact Statement (EIS) if the development will have any of the impacts listed under Parts 4.2 and 4.3 of Schedule 4 of the Act.

The ecological impacts that trigger the requirement to prepare an EIS of relevance to the development of proposed urban area are detailed below, together with an assessment of the development of proposed urban area against each of these triggers. The ecological impacts that trigger the requirement to prepare an EIS, of relevance to the proposal are as follows.

Item 1. *Proposal that is likely to have a significant adverse environmental impact on 1 or more of the following, unless the conservator of flora and fauna provides an environmental significance opinion indicating that the proposal is not likely to have a significant adverse environmental impact:*

- (a) a critically endangered species;
- (b) an endangered species;
- (c) a vulnerable species;
- (d) a conservation dependent species;
- (e) a regionally threatened species;
- (f) a regionally conservation dependent species;
- (g) a provisionally listed threatened species;
- (h) a listed migratory species;
- (i) a threatened ecological community;
- (j) a protected native species;
- (k) a Ramsar wetland;
- (l) any other protected matter

With respect to the above, the study area supports NC Act listed Box-Gum Woodland, and a number of threatened and/or protected species, including Pink-tailed Worm-lizard, Scarlet Robin, other significant woodland birds, and protected flora (e.g. orchid species).

In light the above, the proposed development does trigger the requirement to prepare an EIS due to the potential for a significant adverse environmental impact upon NC Act listed values.

Item 2. *Proposal involving—*

the clearing of more than 5.0 ha of native vegetation in a native vegetation area, on land that is designated as a future urban area under the territory plan, unless the conservator of flora and fauna produces an environmental significance opinion that the clearing is not likely to have a significant adverse environmental impact.

Pursuant to the NC Act, native vegetation is defined as present if:

- trees or shrubs indigenous to the area have a canopy cover of 10% or greater in any stratum; or
- native plants indigenous to the area comprise 50% or more of the cover of the groundstorey (grasses, small shrubs, forbs, sedges etc.).

According to this definition, all of the vegetation zones in the study area constitute native vegetation as:

- PCT-ACT16 Zone 2 has >10% canopy and/or >10% regeneration as shrubstorey/midstorey;

- PCT-ACT25 Zone 1 has >10% canopy, >10% regeneration as shrubstorey/midstorey, and >50% native groundstorey cover; and
- PCT-ACT25 Zone 2 has >10% canopy and/or >10% regeneration as shrubstorey/midstorey.

Given that each vegetation zone meets the definition of NC Act native vegetation, development of the proposed urban area will result in a total clearance of 6.84 ha of native vegetation.

In light of the above, the proposed development does trigger the requirement to prepare an EIS due to the clearance of greater than 5.0 ha of native vegetation on land that is designated as a future urban area under the Territory Plan.

Assessment of Significant Adverse Environmental Impacts

Pursuant to the P&D Act, the meaning of a significant adverse environmental impact is defined as follows.

- 1) *For this Act, an adverse environmental impact is significant if—*
 - a) *the environmental function, system, value or entity that might be adversely impacted by a proposed development is significant; or*
 - b) *the cumulative or incremental effect of a proposed development might contribute to a substantial adverse impact on an environmental function, system, value or entity.*
- 2) *In deciding whether an adverse environmental impact is significant, the following matters must be taken into account:*
 - a) *the kind, size, frequency, intensity, scope and length of time of the impact;*
 - b) *the sensitivity, resilience and rarity of the environmental function, system, value or entity likely to be affected.*
- 3) *In deciding whether a development proposal is likely to have a significant adverse environmental impact it does not matter whether the adverse environmental impact is likely to occur on the site of the development or elsewhere.*

In light of the above, the proposed development is considered unlikely to have a significant adverse environmental impact on any NC Act listed entity (see Section 4). While there is a potential for the proposed development to have significant indirect impacts on regionally important woodland birds and protected flora, these impacts are unlikely to be additional or of increased severity compared with the previously approved development.

6.2.2 Tree Protection Act 2005

The development footprint includes 0.77 ha of remnant Red Stringybark dry forest and up to fifteen large remnant woodland trees. The remnant trees are of high ecological value, and as noted in Section 5.1.5, these trees will be retained if the urban design allows and they can safely contribute to the habitat, amenity, and visual quality within the urban setting. Those which are over twelve metres in height and/or 1.5 m in circumference are also designated as regulated trees under the TP Act (note: the TP Act status of the trees in the study area has been determined by the Scenic Landscape Architecture (2011) assessment and Redbox Design Group (2018) reassessment). Accordingly, advice will be sought from the ACT Conservator of Flora and Fauna regarding requirements for approval under the TP Act. It is noted that it is proposed to retain any felled

remnant trees on site for habitat augmentation purposes, this will mitigate the impact of their felling to some degree.

6.2.3 Pest Plants and Animals Act 2005

Seven species listed on the *ACT Pest Plants and Animals (Pest Plants) Declaration 2015 (no 1)* under the *ACT Pest Plants and Animals Act 2005*, were recorded within the study area (refer Table 3). Works for the development of proposed urban area have the potential to increase the spread and/or dominance of significant weed species, however, as described in Section 5.3.3, the implementation of appropriate weed control measures is proposed to be to prevent weed spread and/or proliferation within the study area and surrounds.

7 Conclusion and Recommendations

As detailed herein and illustrated in Figures 11 and 12, the proposed development:

- will result in the clearance or modification (for APZ management) of 7.14 ha of NC Act native vegetation, which is slightly greater than the 5.14 ha which was previously approved under the 2017 s.211 exemption;
- is unlikely to significantly impact any EPBC Act and/or NC Act listed threatened ecological community;
- is unlikely to significantly impact any EPBC Act and/or NC Act listed threatened flora species;
- is unlikely to significantly impact any EPBC Act and/or NC Act listed threatened or migratory fauna species (or species of conservation focus in the region); and
- is unlikely to have any *additional* indirect effects, or to increase the *severity* of these effects compared with the previously approved development.

A number of measures have been incorporated into the design of the proposed development in order to avoid, minimise, and mitigate impacts on the ecological values of the retained areas, as well as the broader indirect impacts to Block 403.

As a component of the Molonglo Valley urban development the potential impacts to MNES have been previously assessed and approved via the Molonglo Valley Strategic Assessment. Accordingly, the proposed development must occur in a manner consistent with the NES Plan and referral as a standalone action is not required.

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Appendices

Appendix A. Likelihood of Occurrence Assessment

Appendix B. Vegetation Survey Results Tables

Appendix C. Remnant Tree Assessment Data

Appendix D. Remnant Tree Photo Plates

Appendix E. Bird Survey Results

Appendix F. Anabat Survey Results

Appendix A. Likelihood of Occurrence Assessment

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
Plants				
<i>Ammobium craspedioides</i> Yass Daisy	V	-	The Yass Daisy is a perennial herb that bears large yellow flowerheads, with each flowerhead supported by a 30-60 cm stem. It is found from Crookwell (north of Goulburn) to near Wagga Wagga, with most populations occurring in the Yass District. The Yass Daisy occurs in dry forest, Box-Gum Woodland and secondary derived grassland of these communities. It tolerates light grazing and areas that are irregularly mown or slashed. Flowering occurs from October to November.	Negligible The species is not known to occur in the locality and was not recorded during field surveys. Furthermore, the grassy woodland within most of the study area is too modified to constitute potential habitat for the species.
<i>Amphibromus fluitans</i> River Swamp Wallaby-grass	V	-	River Swamp Wallaby-grass has been recorded along the Lachlan River at sites at Laggan near Crookwell and the headwaters of the Wollondilly River. The species grows mostly in permanent swamps, as well as lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground, such conditions being caused by seasonally fluctuating water levels.	Negligible There is no potential habitat in the study area for the species.
<i>Caladenia actensis</i> Canberra Spider Orchid	CE	E	This orchid is endemic to the ACT and is only known from two populations on the western lower slopes of Mount Ainslie and Mount Majura. It was previously recorded at Aranda and Campbell, but no longer exists at those locations. The Canberra Spider Orchid grows on shallow, gravelly, brown clay loam soils. The species occurs amongst a groundcover of grasses, forbs and low shrubs, often among rocks. It grows on the transition zone (ecotone) between grassy woodland and dry sclerophyll forest.	Low The species is not known to occur near the study area.
<i>Dodonea procumbens</i> Trailing Hop-bush	V	-	Trailing Hop-bush is found in the dry areas of the Monaro, between Michelago and Dalgety where it occurs mostly in Natural Temperate Grassland or Snow Gum <i>Eucalyptus pauciflora</i> Woodland. A single known population occurs at Lake Bathurst (the northern-most occurrence of the species) where it occurs adjacent to the lake bed in grassland dominated by Corkscrew Grass <i>Austrostipa scabra</i> and Curly Sedge <i>Carex bichenoviana</i> . The species grows on sandy-clay soils in open bare patches where there is little competition from other species. The species often occurs on roadside batters and does not persist in heavily grazed pastures.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Eucalyptus aggregata</i> Black Gum	V	-	Black Gum occurs on the central and southern tablelands of NSW, and in a small disjunct population in Victoria. In NSW, it occurs predominantly in the South Eastern Highlands Bioregion. The species is a small to medium-sized woodland tree which grows in grassy woodlands on alluvial soils in moist sites along creeks on broad, cold and poorly drained flats and hollows. It commonly occurs with Candlebark <i>Eucalyptus rubida</i> , Ribbon Gum <i>E. viminalis</i> , and Snow Gum <i>E. pauciflora</i> , with a grassy understorey of River Tussock <i>Poa labillardieri</i> . Most populations are located on private land or road verges and travelling stock routes.	Negligible The species is not present in the study area.
<i>Lepidium ginninderrense</i> Ginninderra Peppercross	V	E	The species is known from two natural sites in northern ACT, both within Natural Temperate Grassland.	Negligible There is no potential habitat in the study area for the species.
<i>Lepidium hyssopifolium</i> Basalt Peppercross	E	-	This species is known from a few populations in NSW, Victoria and Tasmania. The Basalt Pepper-cross is known to establish on open, bare ground with limited competition from other plants. It was previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance such as road and rail verges, on the fringes of developed agricultural land or within small reserves in agricultural land. Many populations are now generally found amongst exotic pasture grasses and beneath exotic trees.	Negligible The species is not known to occur near the study area and it was not recorded during the field surveys.
<i>Leucochrysum albicans</i> var. <i>tricolor</i> Hoary Sunray	E	-	The Hoary Sunray occurs from Queensland to Victoria and in Tasmania. In the ACT the species can be seen in spring in abundance on the roadside along Fairbairn Avenue and into Mt Ainslie Nature Reserve, on the western slopes of Mt Majura and adjacent to the Federal Highway road easement. The species is usually found in ungrazed and lightly grazed areas, along roadsides in particular. It appears to be very sensitive to grazing but responds to disturbance as a coloniser and appears to tolerate mowing. Flowers spring to summer.	Confirmed A single plant was recorded during the spring 2021 targeted surveys. This plant is located in the least modified vegetation in the study area. Given the degree of survey effort expended, and that the species is conspicuous when present, it is unlikely that plants occur elsewhere in the study area.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Pomaderris pallida</i> Pale Pomaderris	V	-	A compact perennial shrub, growing to 1.5 m high. It is found in the ACT, southern NSW and eastern Victoria. In the ACT it is scattered along the Cotter, Paddy's and Murrumbidgee Rivers and through the Molonglo Gorge. It is found along the plateau edge and very steep upper slopes and cliffs of river valleys, in shallow, pale brown sandy loam soil over granite rock. It grows in shrubland, surrounded by <i>Eucalyptus</i> or <i>Callitris</i> woodland. In the ACT, it is only found on the eastern banks of the rivers.	Negligible The species is not known to occur near the study area. Furthermore, the species is reasonably conspicuous during any season to those familiar with it. It is unlikely that the species is present and was not identified.
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	E CE (listed as <i>Prasophyllum</i> sp. Wybong)	E	When first described in 1991, the Tarengo Leek Orchid was known only from the Hall Cemetery in the ACT. It has since been found at four sites in New South Wales: Captains Flat Cemetery, Ilford Cemetery, Steves Travelling Stock Route (TSR) at Delegate and the Tarengo TSR near Boorowa. The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The three cemetery sites originally contained grassy woodland, dominated by Snow Gum <i>Eucalyptus pauciflora</i> and Black Gum <i>E. aggregata</i> at Captains Flat, and Blakely's Red Gum <i>E. blakelyi</i> and Yellow Box <i>E. melliodora</i> at Hall and Ilford. Both Tarengo TSR and Steves TSR are natural grasslands. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and TSRs, land from which grazing has been restricted.	Negligible The grassy woodland in the study area is too modified to constitute potential habitat.
<i>Rutidosia leptorrhynchoidea</i> Button Wrinklewort	E	E	In the ACT and NSW, Button Wrinklewort occurs in box-gum woodland, secondary grassland derived from box-gum woodland or in natural temperate grassland. It prefers open spaces where it does not have to compete for light. It is known from several sites in the ACT, NSW and Victoria, where it is threatened by habitat loss, grazing and weed encroachment.	Negligible The species was not recorded during field surveys despite being conspicuous throughout the year when present. It is unlikely that the species is present and was not identified.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Senecio macrocarpus</i> Large-fruit Groundsel	V	-	The Large-fruit Groundsel is a small perennial plant endemic to south-eastern Australia. While most known populations occur within Victoria and South Australia, the species has been recorded within the NSW southern tablelands. This species occurs in a variety of habitats, including grasslands, shrublands and woodlands. The species is known to grow in association with Teatree and Kangaroo Grass populations, as well as Yellow Box woodlands. The species appears to be intolerant of grazing and agricultural pressures. Main loss of habitat is thought to be due to sheep grazing and pasture improvement of relevant habitat.	Negligible The species is also not known to occur in the locality.
<i>Swainsona recta</i> Small Purple-pea	E	E	The Small Purple-pea occurs in the grassy understorey of woodlands and open forests dominated by Blakely's Red Gum, Yellow Box, Candlebark and Bundy. The species grows in association with understorey dominants that include Kangaroo Grass, Poa tussocks and Spear-grasses. Plants die back in summer, surviving as rootstocks until they shoot again in autumn. The species is intolerant of grazing but generally tolerant of fire, which also enhances germination by breaking the seed coat and reducing competition from other species.	Negligible The majority of the woodland component of the study area is too modified/disturbed to constitute potential habitat for this species. The species was not recorded during the field surveys.
<i>Thesium australe</i> Austral Toadflax	V	-	Found in very small to large populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is often found in damp sites in association with Kangaroo Grass, but it is also found on other grass species at inland sites. Occurs on clay soils in grassy woodlands or coastal headlands.	Negligible The study area is unlikely to constitute potential habitat for this species. The grassy woodland is too modified and the usual host species are not present.
Other protected flora species	-	Protected	The <i>Nature Conservation Protected Native Species List 2015 (No 1)</i> under the NC Act lists a number of flora species as 'protected'. All orchid species are included in this list.	Confirmed The study area contains a high diversity of orchid species, several of which are considered rare in the ACT. All records of protected flora were in the high quality dry forest area (PCT ACT25 Zone 1).

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
Mammals				
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	-	The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. The species roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin <i>Petrochelidon ariel</i> . The species frequents low to mid-elevation dry open forest and woodland close to roosts and is often found in well-timbered areas containing gullies.	Moderate Anabat surveys recorded this species with a moderate level of certainty. The species may periodically forage within the study area, but no potential roosting habitat is present in the study area or nearby.
<i>Dasyurus maculatus maculatus</i> Spot-tailed Quoll (SE mainland population)	E	V	The Spot-tailed Quoll occurs along the east coast of Australia and the Great Dividing Range. The species uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000ha, while males have larger home ranges of between 2000 and 5000ha. Breeding occurs from May to August.	Low The species is not known to occur in the locality and majority of the study area is too heavily modified to constitute significant habitat for the species.
<i>Petaurus australis</i> Yellow-bellied Glider	V	-	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Negligible The species is not known to occur in the lowland/peri-urban areas of the ACT.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Petrogale penicillate</i> Brush-tailed Rock-wallaby	V	E	The Brush-tailed Rock-wallaby was once widespread in south-eastern Australia, but its range and numbers have contracted, particularly in Victoria and southern NSW. The last sighting of this species in the ACT was in Tidbinbilla Nature Reserve in 1959. Populations are comprised of small, isolated groups or 'colonies'. Each colony may occupy a territory of up to 35 ha. The species prefers rocky habitats/outcrops and steep slopes/cliffs, combined with dense arboreal cover. They are associated with rainforest, wet and dry sclerophyll forest, vine thicket, and open forest.	Negligible The species is not known to occur in the lowland/peri-urban areas of the ACT.
<i>Phascolarctos cinereus</i> Koala (combined populations of Qld, NSW and the ACT)	V	-	In NSW, the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. They are solitary with varying home ranges. In high quality habitat home ranges may be 1 -2 ha and overlap, while in semi-arid country they are usually discrete and around 100 ha.	Negligible The species is not known to occur in the lowland/peri-urban areas of the ACT.
<i>Pteropus poliocephalus</i> Grey-headed Flying Fox	V	-	The Grey-headed Flying Fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. Whilst Brisbane, Newcastle, Sydney and Melbourne are occupied continuously, the species is widespread throughout their range during summer. In autumn the species occupies coastal lowlands and is uncommon inland. In winter the species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW and on the northwest slopes (associated with flowering eucalypts of these areas). The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. The roost at Commonwealth Park in Canberra is the only known roost in the ACT region.	Low The species may periodically forage within the study area on flowering eucalypts, however the study area is highly unlikely to contain habitat of significance to the species. The study area is not located near any known camps.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
Birds				
<i>Anthochaera phrygia</i> Regent Honeyeater	E	E	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. It also utilises a number of other eucalypt species. Nectar and fruit from the mistletoes <i>Amyema miquelii</i> , <i>A. pendula</i> , and <i>A. cambagei</i> are also eaten during the breeding season. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and sheoaks as well as within mistletoe haustoria (section of the root which connects with the host tree). An open cup-shaped nest is constructed by the female of bark, grass, twigs and wool.	Low The species may periodically visit the study area to forage, however it is not known to nest in the locality.
<i>Botaurus poiciloptilus</i> Australasian Bittern	E	-	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	Negligible The study area does not support potential habitat for this species.
<i>Calidris ferruginea</i> Curlew Sandpiper	CE	-	The Curlew Sandpiper occurs around the coast of Australia, and are also widespread inland, albeit in smaller numbers. In the south-east they are occasionally recorded in the Tablelands and often in the Riverina. When inland, they are found around ephemeral and permanent lakes, dams, waterholes and bore drains. Curlew Sandpipers prey mainly on invertebrates, foraging on mudflats and at the edge of shallow pools, wading up to depths of 60 mm deep. They generally roost on dry shingle or sandy beaches, sandspits, and islets. Curlew Sandpipers are migratory, and adults are found in Australia from August to April, juveniles are found year-round. This species does not breed in Australia.	Negligible The study area does not support potential habitat for this species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	E	-	In summer the Gang-gang Cockatoo occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, the species occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas.	High It is likely that the species may visit the study area to forage, however it is unlikely to nest in the study area and the potential foraging resources are not of significance to the species.
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	-	V	In the ACT region, Brown Treecreepers occur in dry woodlands and open forest below 1,000 metres. The species is relatively common along the Clear Range and along the Lower Naas River. Other populations occur at Mulligans Flat Reserve, Campbell Park, Burbong and former quarries south of the airport in the northern part of the ACT, and at Castle Hill, north of Tharwa. Brown Treecreepers also frequent paddocks and grasslands where there are sufficient logs, stumps and dead trees nearby. The species prefers relatively undisturbed woodland and dry open forest where the native understorey, especially grasses, has been preserved. The species usually prefers predominantly rough-barked trees such as Stringybarks and rough barked Boxes.	High The species is likely to occur in the study area. The more intact dry sclerophyll forest (i.e. PCT-ACT25 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.
<i>Daphoenositta chrysoptera</i> Varied Sittella	-	V	In the ACT region, the Varied Sittella occurs in a wide variety of woodland and forest habitats, particularly in lowland areas. The species prefers areas with a dominance of rough barked trees, notably Red Stringybark at relatively high density. The species is rarely recorded in sparsely treed areas.	High The species is likely to occur in the study area. The more intact dry sclerophyll forest (i.e. PCT-ACT25 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.
<i>Falco hypoleucos</i> Grey Falcon	V	-	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. The species is usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Negligible The species has not been recorded in the locality. The study area does not contain any foraging or breeding habitat for this species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Grantiella picta</i> Painted Honeyeater	V	V	The Painted Honeyeater is found in Queensland and New South Wales west of the Great Dividing Range, through to northern Victoria. The species displays some migratory movement and is occasionally found in the Northern Territory and is a vagrant to South Australia and the ACT. The species frequents eucalypt forests and woodlands, particularly those that are infested heavily with mistletoes. In the ACT, the species' primary habitat is River Oak <i>Casuarina cunninghamiana</i> along river systems, especially the Murrumbidgee River.	Low The species may periodically visit the study area to forage, however it is not known to nest in the locality.
<i>Hirundapus caudacutus</i> White-throated Needletail	V	V	The White-throated Needletail is a trans-equatorial migratory bird species which has been recorded in all coastal regions of Queensland and New South Wales and is widespread throughout Victoria. Breeding sites have been primarily located in Asia. In Australia, this species is often recorded above open forest and rainforest, and coastal areas. Feeds on a wide variety of insects during non-breeding season then returns north. Roosts amongst dense tree foliage and in tree hollows.	Moderate The species has been recorded in the locality, in habitat contiguous with the study area. The species may periodically visit the study area to forage, however the study area does not contain nesting resources or potentially significant foraging resources for the species.
<i>Hieraaetus morphnoides</i> Little Eagle	-	V	The Little Eagle is distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment and occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. The species is sensitive to human disturbance.	High The study area may be part of the range of an individual or pair of Little Eagles and the remnant eucalypts in the study area provide potential nest sites. The species has previously been recorded in the study area.
<i>Lalage tricolor</i> White-winged Triller	-	V	The White-winged Triller is found all over the Australian mainland but is more common in the south-east, the far north of Northern Territory and in the Kimberleys and the west of Western Australia. There are casual sightings in northern Tasmania. The White-winged Triller is found in open woodlands and forest, tree-lined waterways in semi-arid regions and the nearby scrub. This is mainly lightly timbered country with an open shrub layer and grassy ground-cover.	High The species has been recorded in the locality, in habitat contiguous with the study area. The more intact dry sclerophyll forest (i.e. PCT-ACT25 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Lathamus discolor</i> Swift Parrot	E	V	The Swift Parrot occurs in woodlands and forests of NSW (and occasionally the ACT) from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low The species may move through the study area during winter, however this is unlikely due to the paucity of records of the species in the region.
<i>Melanodryas cucullata cucullata</i> Hooded Robin (southeastern form)	-	V	The Hooded Robin occupies drier eucalypt forest, woodland and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps. The species uses stumps, posts or fallen timber from which to locate prey on the ground. In the ACT region, the species is found in woodland, often with scattered Yellow Box and/or Blakely's Red Gum, with long grass and low shrubs, or fallen logs.	Moderate The species may periodically visit the study area to forage, however there are no records in the locality. The more intact dry sclerophyll forest (i.e. PCT-ACT25 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.
<i>Numenius madagascariensis</i> Eastern Curlew	CE	-	The eastern curlew is Australia's largest shorebird and a long-haul flyer. The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It is extremely shy and will take flight at the first sign of danger.	Negligible The study area does not support potential foraging habitat for the species.
<i>Petroica boodang</i> Scarlet Robin	-	V	The Scarlet Robin is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes, breeding in drier eucalypt forests and temperate woodlands.	Confirmed The species was recorded during surveys in the study area. The more intact dry sclerophyll forest (i.e. PCT-ACT25 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Polytelis swainsonii</i> Superb Parrot	V	V	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Breeds in hollow branches of tall eucalypt trees within 9 km of feeding areas.	High The species may occasionally forage within the study area. Breeding has been recorded approximately 1.5 km to the north-west of the study area, and the remnant eucalypts could provide potential future breeding habitat.
<i>Pycnoptilus floccosus</i> Pilotbird	V	-	Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter. Flight is described as fairly weak, though, if disturbed, birds can sometimes ascend into shrubs (less than 1–2 m from the ground). They are typically seen in pairs or occasionally in family parties, occupying small territories all year round. There are two recognised subspecies of Pilotbird - <i>P. f. floccosus</i> (Upland Pilotbird) occur above 600 m in the Brindabella Ranges in the ACT, in the Snowy Mountains and north-east Victoria. <i>P. f. sandlandi</i> (Lowland Pilotbird) occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to the Dandenong Ranges near Melbourne.	Negligible The study area does not contain any foraging or breeding habitat for this species.
<i>Rostratula australis</i> Australian Painted Snipe	E	-	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. The species prefers freshwater wetlands, ephemeral or permanent, although it has been recorded in brackish waters.	Negligible The study area does not provide potential habitat for the species and it is only rarely recorded at a few locations in the ACT region (i.e. Jerrabomberra Wetlands, upper Yerrabi Ponds etc.).

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
Other declining woodland birds	-	Rare/ uncommon	A number of woodland bird species are considered to be rare or uncommon in the ACT, and are noted due to their declining status. Several of these species are listed in NSW. Many are ground feeders and need a complex ground layer of native grasses and shrubs, leaves, and fallen timber. Different layers of vegetation are important for woodland birds, with cover of trees and shrubs for nesting and open space to feed in. Mature eucalypts as well as standing, dead trees provide nesting hollows for some species.	High The following species have been recorded in the study area or in contiguous habitat: Southern Whiteface <i>Aphelocephala leucopsis</i> , Double-barred Finch <i>Taeniopygia bichenovii</i> , Mistletoebird <i>Dicaeum hirundinaceum</i> , Tree Martin <i>Petrocheilidon nigricans</i> , Speckled Warbler <i>Pyrrholaemus sagittatus</i> , Dusky Woodswallow <i>Artamus cyanopterus</i> .
Amphibians				
<i>Litoria aurea</i> Green and Golden Bell Frog	V	-	The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks, although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land.	Negligible The study area does not support potential habitat for this species.
<i>Litoria booroolongensis</i> Booroolong Frog	E	-	The Booroolong Frog is restricted to tablelands and slopes in NSW and north-east Victoria at 200–1300 m above sea level. The species is predominantly found along the western-flowing streams and their headwaters of the Great Dividing Range, and a small number of eastern-flowing streams in the north end of its range. The Booroolong Frog occurs along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins, or near slow-flowing connected or isolated pools that contain suitable rock habitats. Streams range from small slow-flowing creeks to large rivers in dissected mountainous country, tablelands, foothills and lowland plains. Primary habitat requirements for the Booroolong Frog are extensive rock bank structures along permanent rivers. The species can occur in cleared grazing land and pasture.	Negligible There is no potential habitat in the study area for this species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Litoria castanea</i> Yellow-spotted Tree Frog	E	-	The Yellow-spotted Tree Frog previously had a disjunct distribution, being recorded on the New England Tablelands and on the Southern Tablelands from Lake George to Bombala. The species has only recently (2010) been rediscovered on the Southern Tablelands. Prior to this the species had not been recorded on the Southern Tablelands since the 1970s. Found in large permanent ponds, lakes and dams with an abundance of bulrushes and other emergent vegetation, it shelters during autumn and winter under fallen timber, rocks, other debris or thick vegetation.	Negligible The study area does not support potential habitat for this species.
<i>Litoria raniformis</i> Growling Grass Frog	V	-	In NSW, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. The species has also been found in irrigated rice crops. Outside the breeding season animals disperse away from water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks. The species previously occurred on the Southern Tablelands at a number of sites within the Murrumbidgee River corridor, however it is now widely considered to have become extinct on the Southern Tablelands.	Negligible There is no potential habitat in the study area for the species.
Reptiles				
<i>Aprasia parapulchella</i> Pink-tailed Worm-lizard	V	V	The Pink-tailed Worm-lizard is a fossorial species which lives beneath surface rocks and occupies ant burrows. It feed on ants, particularly their eggs and larvae. Thought to lay eggs within the ant nests under rocks that it uses as a source of food and shelter and for thermoregulation. Key habitat features are a cover of native grasses, particularly Kangaroo Grass, sparse or no tree cover, little or no leaf litter, and scattered small rock with shallow embedment in the soil surface.	Confirmed The study area contains several small patches mapped as low-moderate quality potential habitat for this species. There are two known records of the species in the study area from 2019.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Delma impar</i> Striped Legless Lizard	V	V	The Striped Legless Lizard is patchily distributed in grasslands of south-eastern NSW, the ACT, north-eastern, central and south-western Victoria, and south-eastern South Australia. In the ACT, the species is known to occur at four separate locations - in grassland areas of Gungahlin, Majura and Jerrabomberra Valleys, and Yarramundi. Unsuitable habitat, roads and urban development separate these sites. Most areas where the species persists are thought to have had low to moderate levels of agricultural disturbance in the past and it has been suggested that ploughing in particular may be incompatible with the survival of the species. Until recently, the species was thought to inhabit only native grasslands dominated by species such as Tall Speargrass and Kangaroo Grass. In recent years, surveys have revealed the Striped Legless Lizard in many sites dominated by exotic species such as Phalaris, Serrated Tussock and Flatweed (Biosis Research 2012). They have also been found in several secondary grassland sites, generally within two kilometres of primary grassland.	Negligible The study area does not support potential habitat for this species.
Fish and Crustacea				
<i>Macquaria australasica</i> Macquarie Perch	E	E	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their substantial tributaries.	Negligible There is no potential habitat within the study area for this species.
Insects				
<i>Synemon plana</i> Golden Sun Moth	CE	E	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut and the species has been recorded at many sites in the lowland areas of the ACT. The species occurs in Natural Temperate Grasslands and Box-Gum Grassy Woodland in which the groundcover is dominated by Wallaby Grasses (<i>Rytidosperma</i> spp.). It is believed that the females lay up to 200 eggs at the base of the Wallaby Grass tussocks. After hatching, the larvae tunnel underground where they remain feeding on the roots of Wallaby Grass tussocks. The species is also known to feed on the introduced species (and Weed of National Significance), Chilean Needle Grass <i>Nassella neesiana</i> .	Low The study area does not support potential habitat for this species.

Appendix B. Vegetation Survey Results Tables

Table B1. Vegetation Step-point Transect data

Habitat Attributes	Step-point Transect								
	16.2.1	16.2.2	16.2.3	25.1.1	25.1.2	25.1.3	25.2.1	25.2.2	25.2.3
Cryptogams (Moss/Lichen)	0	0	0	6	6	4	0	0	2
Bare Earth	4	2	2	5	3	3	6	6	2
Rock	3	0	0	2	19	0	0	0	1
Litter	1	0	0	23	0	15	19	2	1
Annual Exotic Grass	1	0	0	0	0	0	0	0	0
Perennial Exotic Grass	0	3	0	0	5	0	10	0	0
Exotic Broadleaf	25	18	27	1	7	1	10	25	19
Perennial Native Grass	7	22	10	2	10	20	5	17	20
Other Native	9	5	11	11	0	7	0	0	5
% Native Perennial	39.02	56.25	43.75	92.86	45.45	96.43	20.00	40.48	56.82
% Native Perennial – average for zone	46.34			78.25			39.10		

Table B2. Vegetation Plot data

Species Name	Common Name	Plot/transect									Recorded Elsewhere in Study Area
		16.2.1	16.2.2	16.2.3	25.1.1	25.1.2	25.1.3	25.2.1	25.2.2	25.2.3	
Exotic											
<i>Acetosella vulgaris</i>	Sheep’s Sorrel		X						X	X	
<i>Arctotheca calendula</i>	Cape Weed								X		
<i>Avena sp.</i>	Wild Oats						X				
<i>Carthamus lanatus</i>	Saffron Thistle						X				
<i>Chondrilla juncea</i>	Rush Skeleton-weed							X			
<i>Cirsium vulgare</i>	Spear Thistle					X					
<i>Conyza sp.</i>	Fleabane	X									
<i>Digitaria sanguinalis</i>	Summer Grass	X									
<i>Echium plantagineum</i>	Paterson’s Curse			X	X	X	X		X	X	
<i>Eragrostis cilianensis</i>	Stinkgrass	X									
<i>Eragrostis curvula</i>	African Lovegrass			X							
<i>Erodium cicutarium</i>	Common Stork's-bill		X						X	X	
<i>Gnaphalium americanum</i>	Purple Cudweed	X									
<i>Hypericum perforatum</i>	St John’s Wort	X	X	X		X	X		X	X	
<i>Hypochaeris glabra</i>	Smooth Cats-ear		X			X	X	X		X	
<i>Hypochaeris radicata</i>	Flatweed		X		X	X	X	X		X	
<i>Nassella trichotoma</i>	Serrated Tussock			X							
<i>Onopordum acanthium</i>	Scotch Thistle										X
<i>Paspalum dilatatum</i>	Paspalum Grass	X									
<i>Pinus radiata</i>	Radiata Pine			X						X	
<i>Plantago lanceolata</i>	Plantain / Lamb’s Tongue	X	X	X				X			
<i>Plantago sp.</i>	Plantain				X						
<i>Prunus sp.</i>	Plum	X								X	
<i>Rosa rubiginosa</i>	Briar Rose		X	X					X	X	X
<i>Rubus fruticosus</i>	Blackberry	X	X	X			X	X	X	X	X
<i>Salvia verbenaca</i>	Wild Sage						X				

Species Name	Common Name	Plot/transect									Recorded Elsewhere in Study Area
		16.2.1	16.2.2	16.2.3	25.1.1	25.1.2	25.1.3	25.2.1	25.2.2	25.2.3	
<i>Setaria parviflora</i>	Slender Pigeon Grass			X							
<i>Solanum nigrum</i>	Black-berry Nightshade						X				
<i>Taraxacum officinale</i>	Common Dandelion					X	X		X		
<i>Trifolium sp.</i>	Clover	X	X	X			X		X		
<i>Verbascum thapsus</i>	Common Mullein	X	X	X					X		
<i>Verbascum virgatum</i>	Twiggy Mullein		X								
Native											
<i>Acacia mearnsii</i>	Black Wattle									X	
<i>Acacia rubida</i>	Red-stemmed Wattle			X				X		X	
<i>Acacia baileyana</i>	Cootamundra Wattle										X
<i>Acaena ovina</i>	Sheep's Burr		X	X			X				
<i>Amyema sp.</i>	Box Mistletoe						X				
<i>Aristida ramosa</i>	Purple Wiregrass	X		X	X	X		X	X	X	
<i>Austrostipa bigeniculata</i>	Tall Speargrass								X		
<i>Austrostipa scabra</i>	Rough Spear-grass						X	X	X	X	
<i>Bossiaea buxifolia</i>	Matted Bossiaea						X				
<i>Bothriochloa macra</i>	Red-leg Grass	X	X				X	X	X	X	
<i>Brachyloma daphnoides</i>	Daphne Heath				X						
<i>Caladenia caerulea</i>	Blue Fingers										X
<i>Caladenia congesta</i>	Pink Caps										X
<i>Caladenia fuscata</i>	Dusky Fingers										X
<i>Caladenia moschata</i>	Musky Caps										X
<i>Calochilus platychilus</i>	Purple Beard Orchid										X
<i>Carex appressa</i>	Tall Sedge	X	X	X							
<i>Carex inversa</i>	Knob Sedge					X					
<i>Cassinia longifolia</i>	Long-leaf Cassinia										X
<i>Cassinia quinquefaria</i>	Rosemary Cassinia	X				X	X	X			
<i>Cheilanthes sieberi</i>	Rock Fern	X				X	X	X		X	
<i>Chloris truncata</i>	Windmill Grass	X									

Species Name	Common Name	Plot/transect									Recorded Elsewhere in Study Area
		16.2.1	16.2.2	16.2.3	25.1.1	25.1.2	25.1.3	25.2.1	25.2.2	25.2.3	
<i>Chrysocephalum semipapposum</i>	Yellow Buttons					X					
<i>Convolvulus erubescens</i>	Australian Bindweed			X		X					
<i>Corunastylis clivicola</i>	Rufous Midge Orchid										X
<i>Daucus glochidiatus</i>	Native Carrot					X					
<i>Desmodium varians</i>	Slender Tick-trefoil					X	X				
<i>Dillwynia sericea</i>	Showy Parrot-Pea				X						
<i>Diuris semilunulata</i>	Late Leopard Orchid										X
<i>Diuris sulphurea</i>	Tiger Orchid										X
<i>Dysphania pumilio</i>	Small Crumbweed	X	X	X		X	X	X	X	X	
<i>Einadia nutans</i>	Climbing Saltbush								X		
<i>Elymus scaber</i>	Common Wheat Grass							X			
<i>Enneapogon nigricans</i>	Nineawn grass			X							
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum		X					X			
<i>Eucalyptus goniocalyx</i>	Long-leaved Bundy				X	X	X		X		
<i>Eucalyptus macrorhyncha</i>	Red Stringybark				X	X	X	X			
<i>Eucalyptus rossii</i>	Scribbly Gum				X						
<i>Eucalyptus rubida</i>	Candlebark										X
<i>Eucalyptus viminalis</i>	Ribbon Gum							X			
<i>Exocarpos cupressiformis</i>	Native Cherry			X						X	
<i>Geranium solanderi</i>	Native Geranium					X			X		
<i>Glossodia major</i>	Wax-lip Orchid										X
<i>Glycine clandestina</i>	Twining Glycine							X			
<i>Gonocarpus tetragynus</i>	Common Raspwort				X			X			
<i>Goodenia hederacea</i>	Ivy Goodenia				X			X			
<i>Hardenbergia violacea</i>	Native Sarsaparilla								X		
<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower				X	X					
<i>Hovea heterophylla</i>	Common Hovea				X						
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort					X	X				

Species Name	Common Name	Plot/transect									Recorded Elsewhere in Study Area
		16.2.1	16.2.2	16.2.3	25.1.1	25.1.2	25.1.3	25.2.1	25.2.2	25.2.3	
<i>Hypericum gramineum</i>	Native St John's Wort					X					
<i>Hypoxis hygrometrica</i>	Golden Weather-grass			X							
<i>Indigofera australis</i>	Australian Indigo					X					
<i>Juncus australis</i>	Austral Rush			X							
<i>Kunzea ericoides</i>	Burgan				X						
<i>Lepidosperma laterale</i>	Variable Swordsedge				X						
<i>Leucochrysum albicans</i> var <i>tricolor</i>	Hoary Sunray										X
<i>Leucopogon fletcheri</i>	Twin Flower Beard-heath										X
<i>Lissanthe strigosa</i>	Peach Heath				X	X	X			X	
<i>Lomandra coriacea</i>	Wattle Mat-rush			X	X	X	X	X			
<i>Lomandra filiformis</i>	Wattle Mat-rush										X
<i>Lomandra longifolia</i>	Spiny-head Mat-rush						X	X	X		
<i>Microlaena stipoides</i>	Weeping Grass	X		X		X			X	X	
<i>Microtis unifolia</i>	Common Onion Orchid										X
<i>Oxalis perennans</i>	Woody-Root Oxalis		X	X		X	X	X	X	X	
<i>Panicum effusum</i>	Hairy Panic		X	X			X		X	X	
<i>Plantago varia</i>	Variable Plantain				X	X					
<i>Poa labillardieri</i>	River Tussock-grass			X							
<i>Poa sieberiana</i>	Snowgrass					X					
<i>Pterostylis nutans</i>	Nodding Greenhood										X
<i>Pultenaea procumbens</i>	Heathy Bush-pea							X			
<i>Rumex brownii</i>	Swamp Dock			X							
<i>Rytidosperma pallida</i>	Red-Anther Wallaby Grass				X			X			
<i>Rytidosperma</i> sp.	Wallaby Grass			X			X	X			
<i>Scleranthus biflorus</i>	Knawel		X								
<i>Senecio quadridentatus</i>	Cotton Fireweed	X									
<i>Solanum cinereum</i>	Narrawa Burr									X	
<i>Solenogyne dominii</i>	Smooth Solenogyne					X					

Species Name	Common Name	Plot/transect									Recorded Elsewhere in Study Area
		16.2.1	16.2.2	16.2.3	25.1.1	25.1.2	25.1.3	25.2.1	25.2.2	25.2.3	
<i>Specularantha rubescens</i>	Blushing Tiny Greenhood										X
<i>Stypandra glauca</i>	Nodding Blue Lily										X
<i>Thelymitra sp.</i>	A sun orchid										X
<i>Themeda triandra</i>	Kangaroo Grass										X
<i>Tricoryne elatior</i>	Yellow Rush-lily	X		X				X			
<i>Viola betonicifolia</i>	Showy Violet					X					
<i>Wahlenbergia sp.</i>	Native Bluebell	X									X
<i>Xerochrysum viscosum</i>	Sticky Everlasting									X	
Number of native		11	8	18	16	24	18	21	13	14	
Number of native – average for zone		9.33			19.33			16			
Number of native non-grasses		7	4	9							
Number of native non-grasses – average for zone		6.66									

Appendix C. Tree Assessment Data

Tree number	Easting	Northing	Species Name	Common Name	DBH (cm)	Height (m)	Alive / Dead	Hollows (*)			Comments
								S	M	L	
1	683716	6092019	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	73,20	18	Remnant tree is dead with a live associated trunk.	2			Coconut Ant <i>Papyrius nitidus</i> nest in live trunk.
2	683693	6092028	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	79	18	Dead	1	2		
3	683686	6092057	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	106	15	Dead	3	2	1	
4	683614	6092052	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	54,46	17	Dead				
5	683612	6092060	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	78,51	18	Alive	2	3		
6	683603	6092056	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	72	19	Dead	2	2	3	
7	683578	6092085	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	47	13	Alive				
8	683553	6092045	<i>Eucalyptus melliodora</i>	Yellow Box	45	16	Alive				
9	683551	6092046	<i>Eucalyptus melliodora</i>	Yellow Box	46	17	Alive				
10	683528	6092069	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	70,60	16	Alive	4	7		
11	683524	6092074	<i>Eucalyptus bridgesiana</i>	Apple Box	34,35	12	Alive				
12	683502	6092086	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	86	17	Alive	2			
13	683485	6092075	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	75	12	Alive	3	1		
14	683478	6092068	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	78	14	Alive		1		Coconut Ant nest in trunk.
15	683490	6092060	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	82	14	Alive	2	2		
16	683480	6092052	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	69,50	13	Dead	1		1	Coconut Ant nest in trunk.
17	683437	6092036	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	67	12	Alive				
18	683433	6092037	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	42,41	9	Dead	2		1	
19	683435	6092033	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	39	11	Alive				
20	683422	6092027	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	91	12	Alive		1		
21	683402	6092021	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	42	11	Alive				
22	683400	6092019	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	31	7	Alive				
23	683386	6092003	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	122	18	Alive	2	1		
24	683411	6091965	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	72	14	Alive	1	1		
25	683229	6091884	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	89	7	Alive		2	2	
26	682981	6091857	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	40	7	Alive				
27	682922	6091890	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	82	18	Dead	2	1		

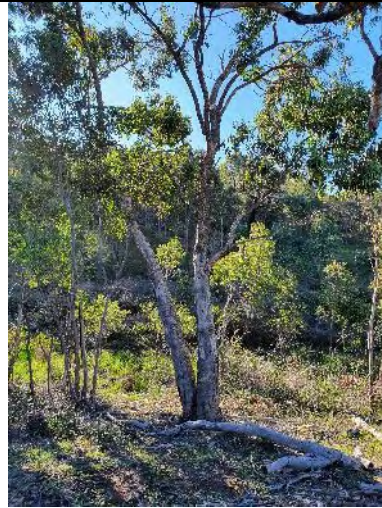
*Estimated size class of hollow based on entrance diameter (i.e. Small <5 cm, Medium 5-15 cm, Large >20 cm).

Appendix D. Remnant Tree Photo Plates





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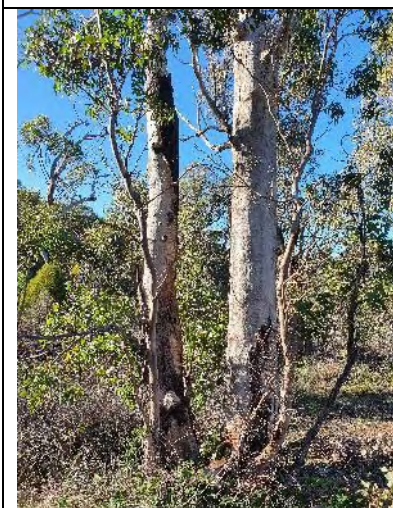
13



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15



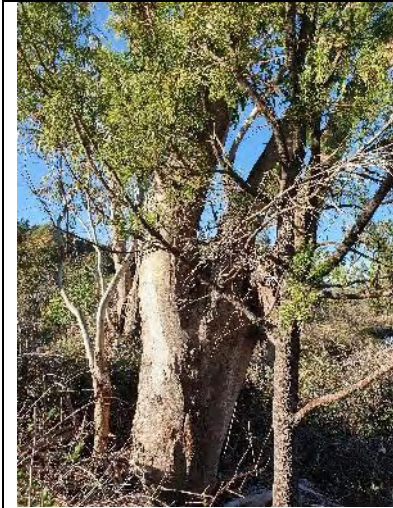
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17



18



19



20



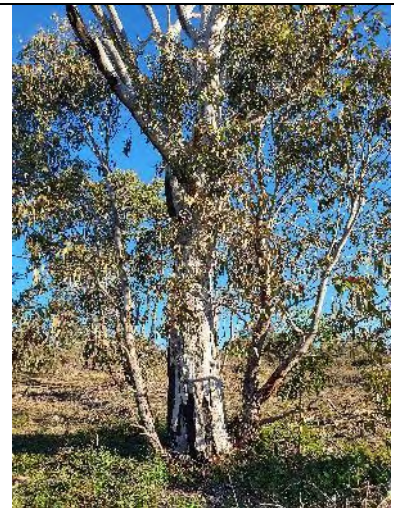
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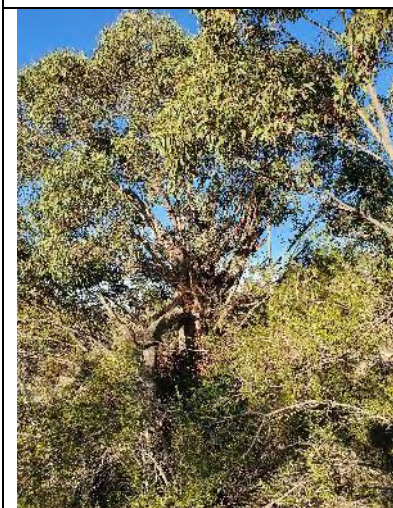
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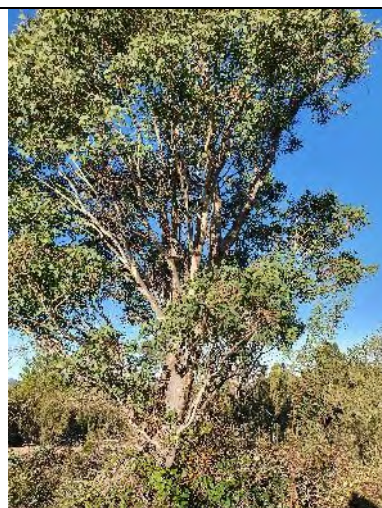
23



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25



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Appendix E. Bird Survey Results

Bird surveys undertaken on 11 May and 8 July 2022 at nine sites (see figure **). Light grey = species recorded 50-200 m from site, Medium grey = species recorded with 50 m of site, Dark grey = species recorded both within 50 m and 50-200 m. Numbers indicate number of individuals within 50 m of site.

Scientific Name	Common Name	Classification	Exotic / Native	11/05/2022									8/07/2022								
				CE_01	CE_02	CE_03	CE_04	CE_05	CE_06	CE_07	CE_08	CE_09	CE_01	CE_02	CE_03	CE_04	CE_05	CE_06	CE_07	CE_08	CE_09
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	Aves	Native																		6
<i>Acanthiza lineata</i>	Striated Thornbill	Aves	Native																		1
<i>Acanthiza pusilla</i>	Brown Thornbill	Aves	Native		2			3													
<i>Acridotheres tristis</i>	Indian Myna	Aves	Exotic			1															
<i>Alisterus scapularis</i>	Australian King-Parrot	Aves	Native																		
<i>Anthochaera carunculata</i>	Red Wattlebird	Aves	Native																		
<i>Aquila audax</i>	Wedge-tail Eagle	Aves	Native								1										
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Aves	Native			1															
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	Aves	Native				4									3					
<i>Chenonetta jubata</i>	Australian Wood Duck	Aves	Native																		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Aves	Native																2		2
<i>Cormobates leucophaea</i>	White-throated Treecreeper	Aves	Native																1		2
<i>Corvus coronoides</i>	Australian Raven	Aves	Native					1													
<i>Cracticus torquatus</i>	Grey Butcherbird	Aves	Native																		
<i>Eolophus roseicapilla</i>	Galah	Aves	Native													2					
<i>Fulica atra</i>	Eurasian Coot	Aves	Native																		
<i>Gerygone albogularis</i>	White-throated Gerygone	Aves	Native																		
<i>Grallina cyanoleuca</i>	Magpie-lark	Aves	Native			1															
<i>Gymnorhina tibicen</i>	Australian Magpie	Aves	Native												4						
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	Aves	Native	11			9														
<i>Malurus cyaneus</i>	Superb Fairy-wren	Aves	Native		2	1		1			3		2	9	1	1	2		2		5
<i>Neochmia temporalis</i>	Red-browed Finch	Aves	Native								3										
<i>Nesoptilotis leucotis</i>	White-eared Honeyeater	Aves	Native																		1
<i>Pardalotus punctatus</i>	Spotted Pardalote	Aves	Native		1																
<i>Petroica boodang</i>	Scarlet Robin	Aves	Native																		1
<i>Platycercus elegans</i>	Crimson Rosella	Aves	Native			2	7	3				1									1
<i>Psephotus haematonotus</i>	Red-rumped Parrot	Aves	Native																		
<i>Rhipidura albiscapa</i>	Grey fantail	Aves	Native					1			1										
<i>Sericornis frontalis</i>	White-browed Scrubwren	Aves	Native										1								2
<i>Smicrornis brevirostris</i>	Weebill	Aves	Native		2				2	1	2		1			1	1	2			
<i>Strepera graculina</i>	Pied Currawong	Aves	Native																		
<i>Sturnus vulgaris</i>	Common Starling	Aves	Exotic			2									3						
<i>Vanellus miles</i>	Masked Lapwing	Aves	Native																		
<i>Zosterops lateralis</i>	Silvereye	Aves	Native				6														
Total species richness				10	10	10	7	10	13	9	10	9	3	2	12	6	4	5	7	2	11
Total count (within 50m)				11	7	8	26	9	2	1	10	1	4	9	8	7	3	2	5	0	21

Appendix F. Anabat Survey Results

Scientific name	Common name	11/03/22	12/03/22	13/03/22	14/03/22	11/03/22	12/03/22	13/03/22	14/03/22	17/03/22	18/03/22	19/03/22	20/03/22	17/03/22	18/03/22	19/03/22	20/03/22	Presence (Confidence)	BC Act Status	EPBC Act status	ACT status
		Site A				Site B				Site C				Site D							
<i>Austronomus australis</i>	White-striped Free-tailed Bat	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	Confident	-	-	-
<i>Chalinolobus dwyeri</i>	Large-eared pied Bat	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	Possible	V	V	Rare
<i>Chalinolobus gouldii</i>	Gould’s Wattled Bat	5	9	6	1	16	17	9	1	54	20	26	30	1	0	2	3	Confident	-	-	-
<i>Chalinolobus morio</i>	Chocolate Wattled bat	14	36	33	27	10	34	29	17	18	5	9	10	23	24	17	16	Confident	-	-	-
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	0	Possible	V	-	Rare
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	3	0	1	0	1	4	2	0	1	1	1	0	1	3	2	4	Confident	V	-	Rare
<i>Mormopterus petersi</i>	Inland Free-tailed Bat (sp.3)	0	1	0	1	1	3	4	0	8	5	7	6	2	0	0	0	Confident	-	-	-
<i>Mormopterus planiceps</i>	South Eastern Free-tailed Bat (sp.4)	0	1	0	1	2	2	0	0	3	1	0	5	1	0	0	1	Confident	-	-	-
<i>Mormopterus ridei</i>	Eastern Free-tailed Bat (sp.2)	0	0	0	1	0	5	0	0	6	3	8	4	1	0	0	0	Confident	-	-	-
<i>Myotis macropus</i>	Southern Myotis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	V	-	Rare
<i>Nyctophilus corbeni</i>	Corben’s Long-eared Bat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	V	V	-
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	3	3	6	2	5	1	3	0	1	0	0	3	1	7	0	2	Confident	-	-	-
<i>Nyctophilus gouldii</i>	Gould’s Long-eared Bat	2	3	3	0	1	0	2	0	2	0	1	1	1	0	4	0	Confident	-	-	-
<i>Rhinolophus megaphyllus</i>	Eastern Horseshoe Bat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	V	-	Rare
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	V	-	Rare
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	Confident	-	-	-
<i>Scotorepens orion</i>	Eastern Broad-nosed Bat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
<i>Vespadelus darlingtoni</i>	Large Forest Bat	1	0	0	1	0	0	0	0	0	0	1	0	1	0	1	0	Confident	-	-	-
<i>Vespadelus regulus</i>	Southern Forest Bat	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0		-	-	-
<i>Vespadelus vulturnus</i>	Little Forest Bat	45	44	78	27	61	131	130	30	19	4	3	5	58	26	33	82	Confident	-	-	-
	Total Passes	140	147	179	104	150	278	258	113	146	71	91	106	127	83	90	137				