Ecological Assessment Report

ACT Government Horse Paddock: Block 1563 Tuggeranong

Environment, Planning and Sustainable Development Directorate;ACT Government



P A T H
CO. PTY LTD

ACN 623 982 061

108 Shipton Lane
Verona NSW 2550

SAM PATMORE - Director

email:
sam.p@path-co.com.au

KARYN THOMPSON - Director

email:
karyn@path-co.com.au

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Acronyms, Abbreviations and Glossary of Terms

ACT	Australian Capital Territory
AHD	Australian Height Datum
ASL	Above Sea Level
BC Act	NSW *Biodiversity Conservation Act 2016*
BGGW	Box Gum Grassy Woodland
CoA	Commonwealth of Australia
C'wealth	Commonwealth (of Australia)
dbh	Diameter at Basal Height (1.3m above ground level - for tree trunk measurements)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (**C'wealth**)
(C)EEC	(Critically) Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC Act	(C'wealth) *Environment Protection and Biodiversity Conservation Act 1999*
EPSDD	Environment Planning and Sustainable Development Directorate
ESO	Environmental Significance Opinion
Gov.	Government
GSM	Golden Sun Moth (*Synemon plana*)
ha	hectare
HBT	Hollow-bearing Tree
KTP	Key Threatening Process listed under the ACT *Nature Conservation Act 2014*.
m	Metres
NC Act	ACT *Nature Conservation Act 2014*
NSW	New South Wales
NTG	Natural Temperate Grassland
OEH	(NSW) Office of Environment and Heritage
PCS	Parks and Conservation Service
PTW	Potential Threatened Woodland (ACTmapi layer)
PTWL	Pink-tailed Worm-lizard (*Aprasia parapulchella*)
SLL	Striped Legless Lizard (*Delma impar*)
sp.	species (singular)
spp.	species (plural)
TCCS	Transport Canberra and City Services
TEC	Threatened Ecological Community

1 INTRODUCTION AND PROJECT BACKGROUND

1.1 Project description

The ACT Government is understood to be currently seeking to identify a suitable parcel of Industrial zoned land for future development purposes, and to date has identified Block 1563 Tuggeranong as a potentially suitable site. It is also understood that some preliminary investigations (understood to be primarily desktop based at this stage) have been undertaken on a 24-hectare portion of the northern part of Block 1563.

It is further understood that some early feedback has been received from the office of the ACT Conservator of Flora and Fauna based on early correspondence between Environment Planning and Sustainable Development Directorate (EPSDD) and the Conservator, which included the findings of the preliminary desktop analysis. The desktop analysis noted that the site has the potential to contain several significant ecological values and consequently, the Conservator has stated that an ecological assessment of the site would be required to identify and map these values to support any future development or land use changes. Specifically, the Conservator has identified a number of threatened species and ecological communities that would need to be assessed including the following:

- Mapping of potential occurrence of the following listed threatened ecological communities (TEC):
    - Box Gum Grassy Woodland (BGGW)
    - Natural Temperate Grassland (NTG)
- Surveys for Striped Legless Lizard (*Delma impar*), Golden Sun Moth (*Synemon plana*).
- Mapping of potential habitat for the Pink-tailed Worm-lizard (*Aprasia parapulchella*; using Molonglo standards).
- Surveys/Mapping of Small Purple-pea (*Swainsona recta*) in the adjacent rail reserve.
- Mapping of mature native trees and assessment of tree-hollows.
- Habitat assessment and surveys for the Gang-gang Cockatoo (*Callocephalon fimbriatum*) as well as other (threatened) woodland bird surveys.

This ecological assessment of the site has therefore been completed to address the above matters. The specific aims and general content of this assessment are described below as well as the overall assessment approach and scope of works undertaken, including a summary of the site assessment results and the resultant potential constraints to the future development of the site (if pursued).

1.2 Aims of this Assessment

The overall aims of this assessment are to complete the detailed and targeted surveys for threatened entities (species and ecological communities) as requested by the Conservator, to report on the findings of these surveys and to identify potential constraints these findings may have on the potential future development of the site. The specific aims of this assessment are to:

- Assess the general/ overall biodiversity values of the site via a combination of both desktop and field-based methods.

- Undertake detailed and targeted surveys for the listed threatened entities under the ACT *Nature Conservation Act 2014* (NC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) identified in the Conservator's comments (listed above)
- Report on the findings of these surveys and confirm the likelihood of occurrence of listed threatened entities to occur at the site based on both the survey results as well as with consideration of the potential occurrence of threatened species based on their reported occurrence in the local area and their known ecology (even if not positively recorded during the surveys undertaken).
- Provide a summary (including site map) of the likely biodiversity constraints present at the site based on the observed ecological values, including delineation of areas of the site that could (potentially) support the threatened entities listed above or any other threatened entities that could potentially occur at the site based on the broader site assessment findings. In summary, this would include identification of those parts of the site that may be developed with a low probability of impacting any significant features versus those parts of the site which, if developed, could potentially result in a significant adverse environmental impact and subsequently, could affect the approvals pathway/process.
- Provide recommendations where appropriate for either further assessment requirements (if necessary) or design measures that could be implemented to avoid or minimise potential impacts to biodiversity (if deemed appropriate).

It is noted that at present, there are no detailed development plans for the site. Consequently, there is no ability to undertake a detailed assessment of the potential ecological impacts (including the likelihood of a significant impact) associated with the future development of the site. As such, this constraints assessment does not include an assessment of the (significance of) impacts and subsequent confirmation of whether development could trigger the requirement for either referral of the action under the EPBC Act, or the requirement to complete an EIS (or otherwise obtain an ESO) in accordance with the provisions of Section 105 of the *Planning Act 2023*, (and as established under Schedule 1 of the *Planning (General) Regulation 2023*; specifically item(s) 16 and/or 17 of Schedule 1).

1.3 Site Context

The subject site of this assessment is the northern part of Block 1563 Tuggeranong, ACT. Note however that for this ecological assessment, parts of the immediately adjoining Block 88 Section 22 Hume to the north of Block 1563, as well as the immediately adjoining Blocks 1294 and 1295 Tuggeranong to the east and Blocks 1670 and 1469 to the west of Block 1563, as well as part of NSW State Rail corridor along the eastern boundary of Block 1563 were also included in the overall site assessment (see Figures 1 and 2).

The site is located to the south of the broader Hume Industrial Precinct and is accessed via (the southern end of) Tralee Street. It is bordered by the Monaro Highway along much of the west, southwestern boundary and the NSW State Rail corridor (and state border) along the eastern boundaries. To the northeast of the site lies industrial land that is currently under construction (note that a small strip of undeveloped land; (part) Block 88,

Section 22, Hume, occurs within the same fenced paddock of the subject site and lies between the boundary of Block 1563 and the industrial land).

To the northwest of the site lies undeveloped open land, including Block 1670 (part of which is included in this investigation area) and an unregistered parcel of land further north about the lower end of the waterway channel running across the northern margins of the site. These areas (Block 1670 and the unregistered parcel of land) are part of the broader horse agistment paddocks. To the north of this lies developed industrial land uses (Blocks 10 and 11, Section 21 Hume). Undeveloped land (part of Block 1563) continues for a long distance further south of the subject site (investigation area).

Block 1563 (in total) occupies an area of 516,296m^2 (51.63ha). However, the area of investigation for this assessment, limited to the northern portion of the block (as well as the parts of the immediately adjoining blocks referred to above as shown in Figures 1 and 2) occupies an area of about 38ha. This area is hereafter referred to in this report as the 'subject site', or just the 'site' (unless specified otherwise).

The subject site (with the exception of the portion of the NSW State Rail corridor included in the investigation area) is owned and managed by ACT Government and under the management responsibility of Parks and Conservation Service (PCS) for Block 1563 and Transport Canberra and City Services (TCCS), for Block 88, Section 22 Hume. The entirety of the subject site (excluding the NSW State Rail corridor; as well as fenced-off sections of woodland along the western site boundaries) is currently used for Horse Agistment by the general public. At the time of the inspection, the northern margins of the site, being the area north of the main access track, was not used being used for agistment by horses (although it is believed that horses were occasionally taken into this area as evidenced by some reasonably fresh manure).

Under the ACT Territory Plan, the subject site is zoned a combination of *CZ6: Leisure and Accommodation* (across much of the western half of the site) and *IZ1: General Industry* (across much of the eastern half of the site), with a narrow strip of the far eastern site boundary (including within Blocks 1294 and 1295 Tuggeranong) zoned *TSZ2: Services*. Immediately south of the subject site (but still within Block 1563) the land is zoned NUZ3: Hills, Ridges and Buffer Areas and is also subject to the *Pd: Special Purpose Reserve* Overlay Zone. The far western site boundaries are also subject to the MAAR: Main Avenues and Approach Routes Overlay Zone of the Territory Plan.

The site is generally characterised as a predominantly open cleared grassland, although some remnant paddock trees occur sporadically across the site, as well as an area of relatively intact (riparian) woodland in the northeast margins of the site about a small (1st order[1]) natural waterway. Two perpendicular strips of fenced tree planting also occur within the central areas of the site, with the planted trees/shrubs appearing to be of about 10 years age. The site support two mostly natural 1st order waterways, including across the northern margins as mentioned above, as well as in the central and western margins, terminating in a small farm dam.

[1] Per the Strahler Stream Ordering Method

portion of the block is zoned IZ1 (General Industry) under the Territory Plan. Respectively the CZ6 zone is approximately 7.37 hectares and the IZ1 zone is 16.18 hectares. The combined area of the two zones is approximately 23.55 hectares according to ACTmapi.



Figure 1 – Tuggeranong Block 1563 (ACTmapi, July 2022)

Figure 1. Project Study Site; Block 1563, Hume
(image courtesy Clinton Cashen; ACT Government, EPSDD)

2 ASSESSMENT APPROACH

The assessment of the site's biodiversity values included a combination of both desktop searches as well as a brief site inspection, as described further below.

2.1 Desktop Assessment

Background database searches were conducted to identify any existing known or recorded environmental values within the study site that may provide a potential constraint to the development, or otherwise impact upon the planning and approval requirements to allow the works to proceed. These database searches include the following:

- Online Database mapping searches including:
  - ACT ACTmapi *Significant Species, Vegetation Communities and Registered Trees* database maps (http://app.actmapi.act.gov.au/actmapi/),
  - Canberra Nature Map biodiversity database (https://canberra.naturemapr.org/).
  - Atlas of Living Australia biodiversity database (https://www.ala.org.au/)
  - EPBC protected Matters Search Tool (http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf) applying a 10 km search area centred at the mid-point of the project area). A copy of the search results is included at Appendix A.
- Commonwealth Threatened Species Profiles (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl)
- ACT NC Act Action Plans (https://www.environment.act.gov.au/nature-conservation/conservation-and-ecological-communities/threatened-species-action-plans)
- NSW OEH Threatened Species Profiles (https://threatenedspecies.bionet.nsw.gov.au/profile)

The results of these background searches are summarised briefly in the assessment findings below and in the Threatened Species Evaluation Table (Appendix B).

2.2 Site Survey

A preliminary site-based survey of the subject area was undertaken on the 1st and 2nd of August 2023. The aim of this preliminary survey was to ascertain the overall vegetation values of the site, as well as to conduct preliminary fauna surveys as described further below.

In addition to the preliminary site survey and based also on the results of that assessment and with consideration of the comments from the Conservator (described in Section 1), a number of follow-up targeted flora and fauna surveys were conducted in accordance with relevant (prescribed) survey methods, including addressing seasonal timing and effort requirements.

The various site survey methods are described in further detail below. The study site investigation area and location of the various surveys undertaken are shown in Figures 2 and 3 below.

Note, the investigation area extends beyond the actual boundaries of Block 1563 to ensure that any important biodiversity features located immediately adjacent to the block (and which could be impacted by the future development of the site) are adequately assessed.

2.2.1 Vegetation surveys

The vegetation surveys of the subject site for this assessment included a combination of (several) random meander traverses about the entire subject site for compiling a general flora species list (for the entire site), targeted threatened flora species surveys (described further below), as well as the establishment of seven (7) rapid assessment flora plots (see Figure 2).

The rapid assessment plots involved the establishment of a (general/estimated) 20m x 20m (400m^2) survey 'plot'[2]. Within these plots, a detailed compilation of all flora species present, including their estimated cover (abundance) values was collected. These rapid assessment survey plots were completed in early August 2023 (as part of the initial preliminary assessment of the site).

The floristic values obtained from these plots was then used for an early determination of the vegetation community status (i.e. likely occurrence of the BGGW and/or NTG TEC).

2.2.2 Targeted (threatened) flora surveys

Targeted threatened flora surveys were undertaken for the Small Purple-pea and Hoary Sunray, as requested by the Conservator in their initial comments (see Section 1) and based on previous records of these species in/near the subject site (see Section 3 for further information). The approach for these threatened flora surveys involved undertaking a random meander traverse within those parts of the site where the species is considered likely to occur (and in close proximity to the historic records of the species). In this instance, this involved focussing on the railway corridor and immediately adjacent areas where both species have been previously recorded and, based on their known ecology (described further in section 3) are considered to have the highest probability of occurring/being found.

For this survey, a single random meander traverse was undertaken on 30/10/2023. This timing is believed to be within the typical flowering period reported for the Small Purple-pea and considered to also be suitable for detection of the Hoary Sunray. The traverse was approximately 1.2km in length (see Figure 2) and undertaken over a time period of approximately 60 minutes. Typically, a single survey occasion is considered adequate for completion of these flora surveys (i.e. repeat survey occasions are not necessary for flora, unlike many fauna survey requirements). However, in addition to the single formalised survey occasion, opportunistic observations of these and/or other threatened flora

[2] Note: for this preliminary assessment, tape measures were not used to establish the 20mx20m plots, but rather, were estimated in order to reduce time spent setting out tape measures and to increase the overall site coverage – hence the term 'rapid' plot. Effort within each plot was commensurate with requirements to identify all flora species and the visually estimated abundance/cover within the plot.

species were also possible to be made during other traverses of the site (such as for the Golden Sun Moth and dawn bird surveys, see further below).

2.2.3 General fauna and habitat surveys

The assessment of the fauna habitat values of the site involved initially a daytime random meander traverse of the entire subject site (and incorporated into the flora surveys described above) to enable opportunistic fauna observations, as well as mapping of specific or notable fauna habitat features including mainly hollow-bearing trees (HBT), tree nests, fallen timber, rocky outcrops, burrows or dens, or other structures that could provide potential breeding habitat or shelter sites. This initial daytime traverse was undertaken on 1/8/2023, however, any opportunistic observations of fauna or their habitats made during other site surveys/visits was also recorded.

Specific fauna surveys (targeted mainly for the detection of threatened fauna species) are described below.

2.2.4 Targeted (threatened) fauna surveys

Targeted threatened fauna surveys were undertaken at the site to address the comments made by the Conservator as well as based on observations of fauna habitat values and/or historic records of threatened fauna species in the local area (see Section 3 fort further information). Each targeted threatened survey undertaken at the site is described separately below.

Striped Legless Lizard

Surveys for this species were conducted in the northeastern margins of the site only. The justification for this, as opposed to undertaking targeted surveys elsewhere across the site was that all of the central parts of the site, south of the main access track, had been subject to extensive grazing pressure from the horse agistment activities and consequently, supported minimal groundcover biomass. Specifically, the grasses in this area have a (very) low sward height of generally less than 100mm and practically no tussock structure, whereas the northeastern margins of the site has not been subject to extensive grazing and still maintained some tussock structure. Tussock structure, with inter-tussock spaces, is regarded as being a very important component of suitable habitat for the Striped Legless Lizard (SLL) and therefore, sites without this physical/structural aspect are generally considered to be unlikely to support the species.

The surveys for this species were undertaken in accordance with the recommendations in the Commonwealth *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (CoA, 2011) as well as the *Environment Protection and Biodiversity Conservation Act 1999: referral guidelines for the vulnerable striped legless lizard, Delma impar* (CoA, 2011). Specifically, this involved the deployment of (100) roof tiles as artificial shelter site surveys.

For this survey, and based on the observed area/extent of potentially suitable habitat within the site as described above, the 100 tiles were placed in 3 separate areas in grids of 20, 30 and 50 tiles per grid, dictated largely by the area/shape of potentially suitable habitat. Each tile was placed about 5m apart in each grid, in dimensions of 2x10, 3x10

and 5x10 tiles for the 20, 30 and 50 tile grids respectively. The location of the three tile grids is shown in Figure 3 and described in Table 1 below. The tiles were deployed on 30/8/2023 and then left for a two-week settlement period before (generally) weekly checks were commenced on 14/9/2023. A total of 12 checks were then conducted through to 12/12/2023 (see Table 2 for dates and weather conditions for each check). Photos of each tile grid site are provided at Appendix F.

In addition to the tile surveys, for sites that are generally devoid of rocky habitats (including many sites in the ACT where the species is known to occur), the guidelines recommend supplementing the tile surveys with active hand searches within tussocks for sheltering individuals or skin sloughs. For this survey, in addition to the tile checks, a minimum of 30-minutes was also spent on every second survey occasion undertaking active hand searches of tussocks in the general area of the tiles (equating to a total of 2.5 hours of survey time/effort for active hand searches at each of the three tile grid sites).

Table 1. Location (co-ordinates) of tile grid arrays

Grid Corner/Number	Northing	Easting
Grid 1 (50 tiles; 5x10 arrangement)		
1A (NE corner)	695351.4	6079427.0
1B (NW Corner)	695329.8	6079421.3
1C (SE Corner)	695369.6	6079392.1
1D (SW Corner)	695349.9	6079383.8
Grid 2 (20 tiles; 2x10 arrangement)		
2A (NE corner)	695185.9	6079474.5
2B (NW Corner)	695178.6	6079475.6
2C (SE Corner)	695183.9	6079428.3
2D (SW Corner)	695178.5	6079428.6
Grid 3 (30 tiles; 3x10 arrangement)		
3A (NE corner)	695258.6	6079263.4
3B (NW Corner)	695246.1	6079262.0
3C (SE Corner)	695262.1	6079219.3
3D (SW Corner)	695251.8	6079217.4

Table 2. Striped Legless Lizard Survey Dates and Conditions

Survey No	Survey Date	Start Time	Temp (⁰C)	Cloud cover (-/8)	Wind (kph)	Rainfall (mm) – during and 3 days prior to surveys
Deploy	30/08/2023	09.30	14	3	5-10	1mm (comb) in prev 3 days
1	14/09/2023	11.00	20	2	5-10	Nil during and in prev 3 days
2	21/09/2023	11.30	17	4	10-15	Nil during and in prev 3 days
3	28/09/2023	12.00	21	4	10-15	Nil during and in prev 3 days
4	03/10/2023	13.00	22	6	10-15	Nil during and in prev 3 days
5	12/10/2023	11.30	24	6	5-10	Nil during and in prev 3 days
6	20/10/2023	11.30	24	2	5-10	Nil during (7mm on 17/10
7	30/10/2023	11.00	25	3 (high)	20-30	Nil during and in prev 3 days
8	07/11/2023	12.15	25	4	10	Nil during (0.6mm on 4/11 and 0.2mm later in day/evening)
9	14/11/2023	11.30	20	6 (high)	10	Nil during (0.6mm on 12/11)
10	23/11/2023	11.00	22	8	0-5	Nil during (0.2mm on 22/11 and 22.6mm on 21/11)
11	6/12/2023	13.30	30	1	5-10	Nil during (6mm on 4/12 and 0.2mm on 3/12)
12*	12/12/2023*	11.40	29	3	5-10	Nil during (0.2mm on 10/12 and 3.8mm on 9/12)

*collection and removal of tiles from site

Golden Sun Moth

Although no suitable habitat for this species was observed within the site during the flora surveys conducted in early August 2023 (and subsequently during later visits to the site), targeted surveys for this species were undertaken to address the request made by the Conservator.

The general approach to the surveys was in accordance with the Commonwealth *Survey Guidelines For the Golden Sun Moth* (CoA, 2009[3]). This involved the completion of four (4) separate surveys during suitable conditions and during the species' known activity period. For this study, a regular review of the online webpage for ACT Ecologists Golden Sun Moth (GSM) survey results was undertaken to confirm the surveys were completed within the activity period of the GSM for this season in the ACT region.

Each individual survey was conducted between the recommended daily peak activity times of (generally) 10am to 2pm and during (generally) suitable weather conditions. This includes days that are warm (between about 17-28⁰C, although slightly hotter can be

[3] *Commonwealth of Australia (2009). Significant impact guidelines for the critically endangered golden sun moth* (Synemon plana) Nationally threatened species and ecological communities EPBC Act policy statement 3.12.

acceptable), and clear/mostly cloudless with *relatively* still/light winds (although moths have occasionally been observed flying on cloudy days and/or with moderate winds).

During each survey, a random meander traverse was conducted on foot and walking in a generally zig-zag pattern across the site in an attempt to flush any adults which can then be observed and recorded.

A summary of the survey dates, timing and weather condition are provided in Table 3 below. For this study, each survey was conducted by Sam Patmore and for a period of at least 1 hour. The location of each random meander traverse for the four separate surveys is shown in Figure 3 below.

Table 3. GSM Survey timing, effort and weather conditions

Date	Survey Start Time	Duration (mins)	Temp (^{0}C)	Cloud (-/8)	Wind (kph)
6/12/2023	12:00	75	30	1	5-10
10/12/2023	12:15	65	24	7	10-15
11/12/2023	10:30	60	25	7	0-5
12/12/2023	12:30	75	29	4	5-10

Pink-tailed Worm-lizard

Based on the presence of mapped habitat for the species (described further in Section 3.2) the Conservator's comments included a request to undertake mapping of potential habitat for the Pink-tailed Worm-lizard (*Aprasia parapulchella*; using the 'Molonglo standards'). This involved assessing each rocky outcrop for the degree of embeddedness, as well as assessing the floristic composition of each outcrop, with a particular focus on determining the species richness and cover/abundance values for native grasses, forbs and graminoids within each outcrop. The determination of habitat quality using this approach is described further in Section 3.2.1. This assessment was completed during a single diurnal site visit on 1/8/2023.

Note that due to potential concerns over impacts to the species, including the (assumed) requirement to obtain a Scientific Licence and/or Animal Ethics Permit, targeted surveys for individual lizards via turning over rocks for inspection was not completed for this assessment. Should the Conservator seek further confirmation of the likely presence of the species, this activity (including obtaining the relevant licence/permit) could be undertaken later if required (and likely on the basis of whether any future development proposals would impact on the rocky outcrops).

Threatened Woodland Birds

As noted in Section 1, the Conservator's comments included a request for the study to undertake surveys at the site for the Gang-gang Cockatoo as well as other threatened woodland birds (including notably, the Superb Parrot, *Polytelis swainsonii*). To address this request, a total of four (4) separate diurnal (dawn) bird surveys were conducted within suitable areas (i.e. in/around the woodland patches) at the site. The dawn bird survey

involved the 2-hectare area search method (per Loyn, 1986[4]) which involves recording all bird species seen or heard calling during a timed one-hour search conducted within a defined 2-hectare survey area. For this survey, the four separate 2-hectare area searches were conducted about the woodland patch in the northern margins of the site as well as within the central woodland patch (see Figure 3 for the (approx.) location of each 2ha survey area).

For this study, the four diurnal bird surveys were conducted on the following dates: 2/8/2023; 30/8/2023; 12/10/2023 and 12/12/2023. The timing and weather conditions for each survey are shown in Table 4 below.

Table 4. Diurnal (dawn) threatened bird surveys: timing, effort and weather conditions

Date	Site No.	Survey Start Time	Duration (mins)	Temp (^{0}C)	Cloud (-/8)	Wind (kph)
2/8/2023	A	06:50	60	4	8	0-5
30/8/2023	B	06:30	60	3	7	10-15
12/10/2023	C	06:30	60	7	6	5-10
12/12/2023	D	06:10	60	19	4	5-10

The Conservator's comments also included a request to undertake a habitat assessment for the Gang-gang Cockatoo. In this instance, this involved primarily the mapping of all hollow-bearing trees (HBT) at the site, including recording the size of hollows which could potentially be used as breeding habitat for this (or other) species.

In addition to the diurnal (dawn) bird surveys, two nocturnal spotlight surveys were also conducted, commencing from dusk/sunset and completed over a minimum one-hour period. The nocturnal spotlight surveys involved a traverse about the site with a particular focus on surveying/inspecting the identified hollow-bearing trees at the site (mapped during the earlier daytime site traverse). The location of the nocturnal survey site traverses is shown in Figure 3 and the survey timing and conditions described in Table 5 below.

Table 5. Nocturnal spotlighting surveys: timing, effort and weather conditions

Date	Survey Start Time	Duration (mins)	Start Temp (^{0}C)	Cloud (-/8)	Wind (kph)
1/8/2023	18:15	75	6	1	0-5
30/10/2023	19:20	80	17	3	15-20

[4] As included in the NSW *Threatened Species Survey and Assessment Guidelines*, Working Draft, 2004

2.3 Survey Limitations

The spring and summer timing of the surveys as well as the overall survey effort, including the application of targeted surveys in accordance with the relevant guidelines, were adequate for the identification of the overall vegetation community, EEC status, condition and potential for threatened species.

This assessment does not include an Assessment of Significance (in accordance with the Commonwealth's Significant Impact Guidelines or the ACT Government's *Guide to Environmental Significance Opinions* (Territory Planning Authority, 2023; ESO Proponent's Guide). It is expected that this would be completed once the design and siting stage of any future development of the site has been finalised and ready for submission.

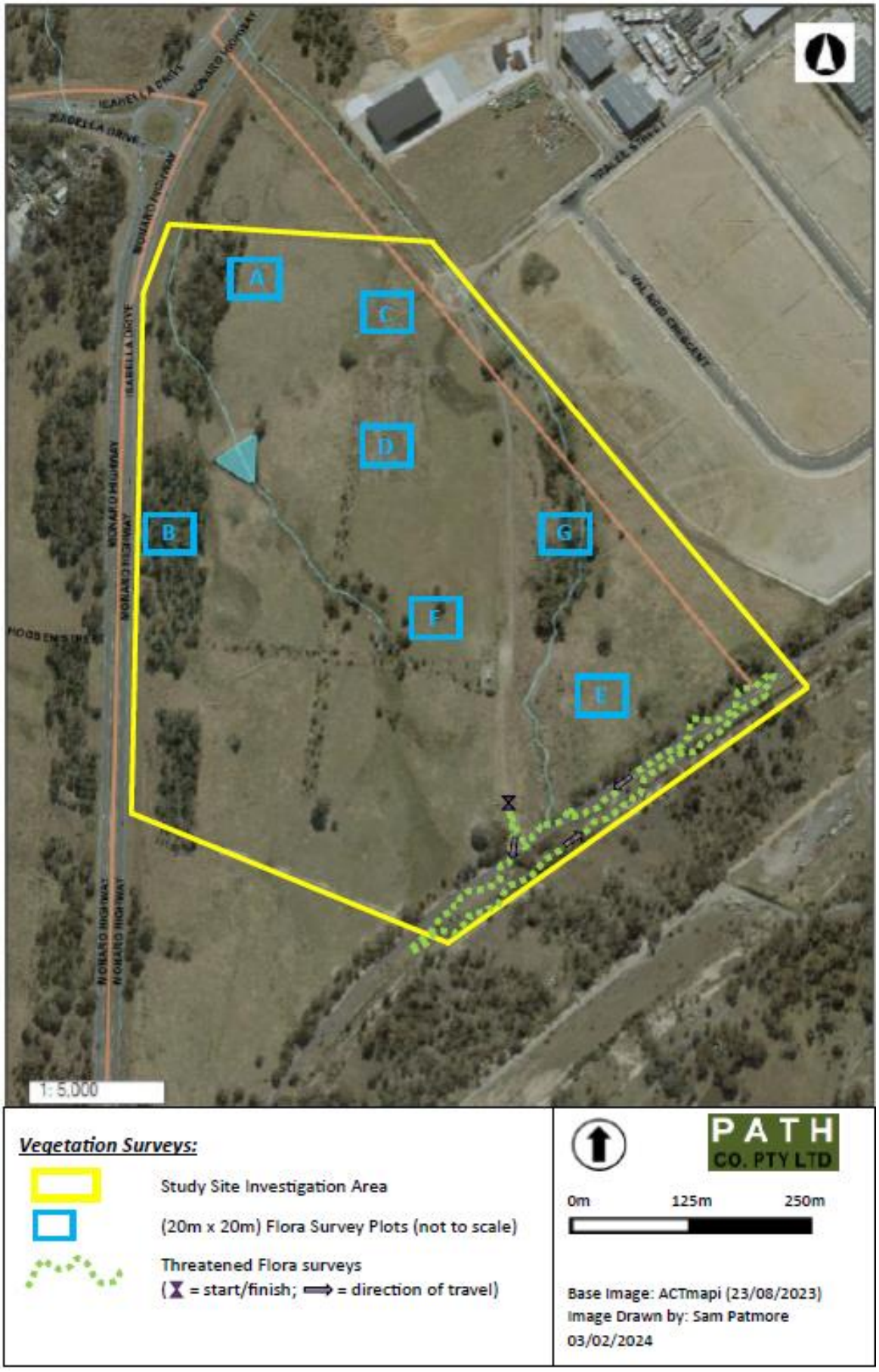


Figure 2. Flora surveys undertaken at the site

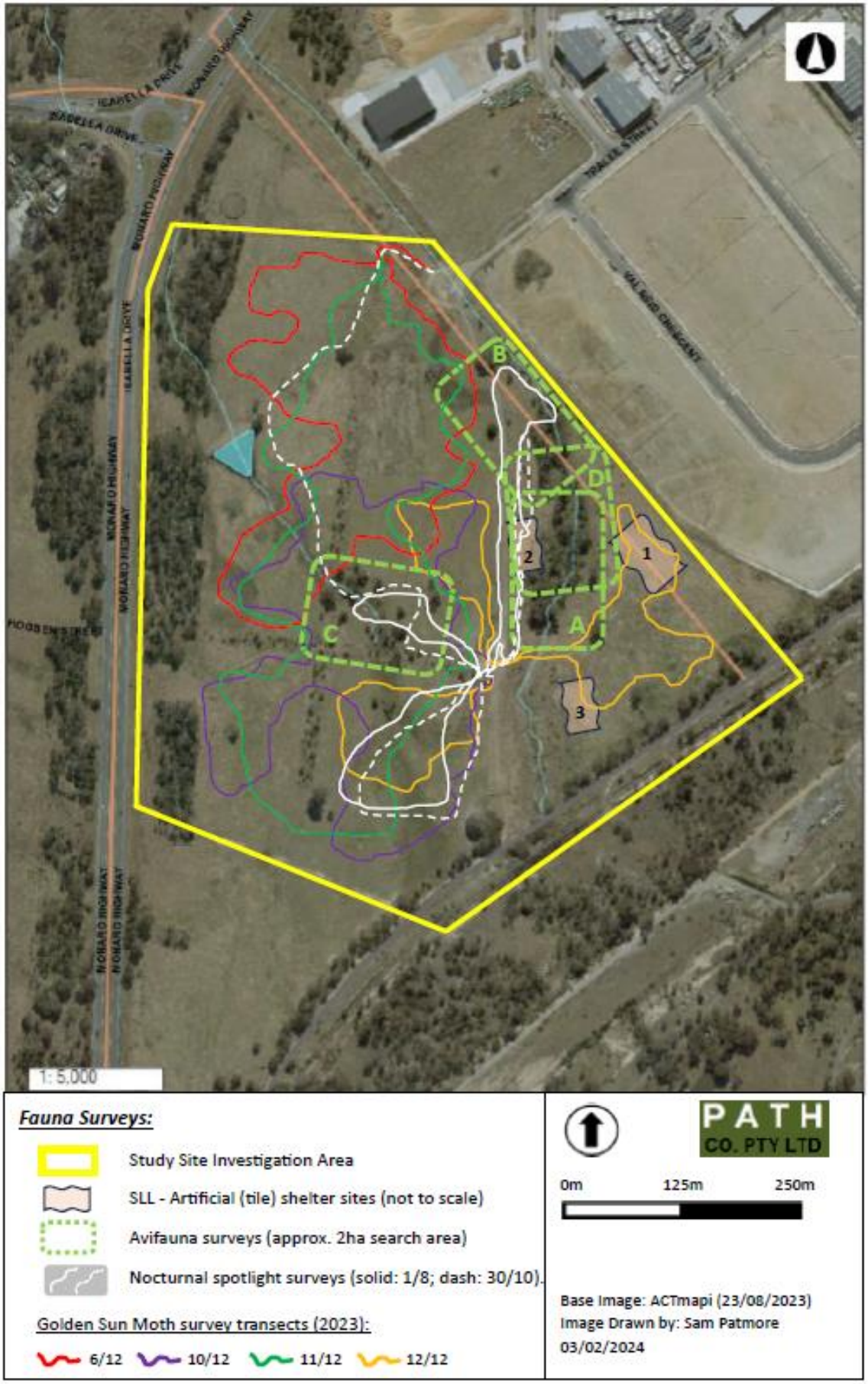


Figure 3. Fauna surveys undertaken at the site

3 VEGETATION VALUES

3.1 General Flora Values

The vegetation at the site includes areas of cleared open grasslands with pockets of woodland including mainly along the northern margins of the site as well as along the outer eastern and western boundaries. Two long, narrow perpendicular strips of immature planted vegetation occur within the central parts of the site. Several isolated 'paddock' trees are also scattered about the site.

The woodland areas along the outer western boundaries as well as within the central parts of the site are comprised of almost exclusively planted native trees, with the western patches supporting semi-mature/mature specimens dominated by Brittle Gum (*Eucalyptus mannifera*) and Apple Box (*E. bridgesiana*), with occasional/sub-dominant Red Box (*E. polyanthemos*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Candlebark (*E. rubida*). The understorey vegetation in this area includes numerous shrubs of both native and non-native origin, while the groundcover vegetation layer was observed to be dominated by mostly non-native grasses, herbs and forbs.

The narrow linear planted rows within the central parts of the site include a similar mixed composition of native species with Red Box being the most common species observed. However, the trees in this area are much younger (appearing to be of <10 years age) and also, in many places appear to have failed (died) and now dominated mostly by a variety of Wattles (*Acacia spp*.). A small clump (of about 30 trees) also occurs in the central parts of the site near the intersection of the two planted tree rows. This clump of trees includes about 10 larger, mature[5][6] trees, most of which are Apple Box and some Blakely's Red Gum. The remaining trees are immature/juvenile specimens of the same species (most of which were either not present or were very small in the 2004 historic aerial imagery; see Figure 8). Despite the presence of some younger, immature specimens, there does not appear to be any active natural regeneration of trees, with no young (<5 years age) saplings present in this area. This is likely a function of the horse agistment which would prevent growth of younger saplings without any protection (such as tree guards/fencing) from horse grazing.

The northern woodland patch located about the existing minor waterway channel in this area was observed to include a mixed-age woodland of both large remnant trees, as well as semi-mature trees. A number of younger regrowth/regenerating saplings are also present in this area. The majority of the trees in this patch are Blakely's Red Gum, with some Apple Box and a Narrow-leaf Peppermint (*E. radiata*). The understorey vegetation includes a relatively low-moderate abundance/cover of shrubs of both native and non-native origin, while the groundcover vegetation layer was observed to be dominated by mostly non-native grasses, herbs and forbs.

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[5] Based on review of historic aerial imagery – see Appendix for copy of 2004 imagery. See Section 3.1.3 on Threatened Ecological Communities for further definition of mature tree.

[6] A 'Mature' tree is not defined under the ACT BGGW criteria but is defined elsewhere under the ACT NC Act as trees with a trunk dia >50cm dbh; this definition from the: *CONSERVATION ADVICE LOSS OF MATURE NATIVE TREES (INCLUDING HOLLOW BEARING TREES) AND A LACK OF RECRUITMENT* for the listing of the Threatening Process: *Nature Conservation (Loss of Mature Native Trees) Conservation Advice 2018* Notifiable Instrument NI2018-536.

The cleared open grassland areas of the remaining parts of the site were observed to be dominated by non-native species while the scattered/isolated paddock trees in these areas include mostly Blakely's Red Gum with some occasional Yellow Box.

In summarising the flora survey results, a total of 73 plant species were recorded at the site including 34 native and 39 exotic species. Of the 34 native species, there are nine trees, six shrubs, 18 groundcovers (including grasses, herbs, forbs and sedges (and a bryophyte/moss)) and one epiphytic parasite (Mistletoe; *Amyema sp*.). Of the exotic species there are no trees, three shrubs and 36 groundcovers (including grasses, herbs, forbs and sedges), indicating a predominantly non-native groundcover composition across the site generally. A full list of the flora species recorded in each of the flora survey plots is provided at Appendix C. The implications of the floristic composition and structure across the site with respect to the potential occurrence of any listed threatened ecological communities as well as the likelihood of any listed threatened flora species occurring at the site is discussed further below.

3.2 Threatened flora

No threatened flora species were recorded during any of the surveys conducted at the site including specifically, the targeted surveys conducted along the eastern margins of the site nearest to where previous records of threatened species occur.

As noted in Sections 1 and 2, the particular threatened species that were targeted during the survey included the Small Purple-pea and Hoary Sunray. These species were targeted for survey because of their previous records in the far eastern margins of the site, immediately adjacent to the NSW State Rail corridor as well as to respond to the specific request from the Conservator that these two species be subject to targeted survey.

Despite the extensive surveys conducted at the site, including the targeted random meander traverse along the boundary and within the rail corridor itself, as well as numerous visits in the general area for the Striped Legless Lizard tile checks and the Golden Sun Moth survey traverse in this area (on 12/12/2023), neither of these species were able to be detected either within the site, or within the section of railway corridor immediately adjacent to Block 1563 Tuggeranong and Block 88 Section 22 Hume within the site investigation area.

It is noted that for the Small Purple-pea in particular, this species may be long-lived with a large underground taproot, and that flowering may be sporadic and reportedly can be related to the number of frost nights in the preceding year, with a plant most likely to flower when there are between 7 and 15 nights equal to or less than -4^{0}C. Fire is also believed to facilitate re-sprouting and stimulate seed germination (ACT Gov. 1998).

The species is also reported to be typically associated with open woodlands that have a predominantly native understorey of grasses including Kangaroo Grass, Speargrasses and Poa tussocks, but may also have some native shrubs present as well (ACT Gov. 1998). These floristic values/conditions are not present within the open, cleared parts of the subject site and therefore, the open cleared grassland areas of the site are generally not regarded as providing suitable habitat for this species. The railway corridor however still supports some suitable habitat values, although the presence and abundance of certain weeds may over time have reduced the habitat quality for the species.

Given the above, it is possible that the species still persists in the railway corridor, but due to seasonal climate and other factors, was not flowering at the time of the survey and therefore not detected. However, it is considered very unlikely that the species would occur within the main parts of the subject site and particularly within the cleared open grassland areas of the site immediately adjacent to the wooded railway corridor where it has been previously recorded.

The mapped occurrence of the Small Purple-pea on the most recent/up-to-date search of ACTmapi (1/2/2024) show the polygon record extending some distance into Block 1563 (see Figure 5). This is a substantial extension of the previous mapped polygon record when viewed as part of the original preliminary advice provided for this project (23/8/2023) where the polygon centre is located within the rail corridor (see Figure 4). However, it is noted from further consultation with the ACT Government Office of Nature Conservation (provided on 27/02/2024; *in-confidence*) that although the most recent mapped polygon extends further into Block 1563, that this is a function of a new mapping procedure that applies a 500m Area of Occupancy grid. Importantly, no new records of the species have been made since the last records in 2021 which are located within/restricted to the railway corridor.

Given the above, including the location of previous records, lack of sighting during the recent surveys for this assessment and the known ecology of the species, it is considered very unlikely that the Small Purple-pea would occur within the open-cleared areas of Block 1563 (and immediately adjacent grassland areas) and that it remains restricted to its existing known occurrence within the rail corridor (despite not being recorded in those areas during the recent surveys for this assessment).

The Hoary Sunray can occur in a wide variety of grassland, woodland and forest habitats, including modified habitats such as semi-urban areas and roadsides. It is highly dependent on the presence of bare ground for germination, and in some areas, disturbance is required for successful establishment (OEH, 2023). Based on this and the previous mapped records of the species in the local area, there is considered to be some limited potential for the species to occur at the site, however, this would be limited to defined areas such as along existing tracks or other locations where some bare earth exists. Despite the potential for occurrence, this species is readily identifiable and very obvious/easy to detect when in flower. It was not seen during any of the site visits, including the targeted random meander traverse as well as the Golden Sun Moth surveys across the site and the repeat visits to the site for checking the roof tiles for the Striped Legless Lizard surveys. Based on the survey effort and lack of observations it is considered unlikely that this species would be present within the subject site (but could still potentially occur in sections of the rail corridor further away from where the surveys were completed).

Other threatened flora species known from the broader Jerrabomberra Valley area including (but not limited to) the Button Wrinklewort (*Rutidosis leptorrhynchoides)* and Ginninderra Peppercress (*Lepidium ginninderrense*) may also have some, albeit limited, potential to occur at the site. Neither of these or any other threatened flora species were recorded at the site despite the survey effort described above for the other flora species. Consequently, there is considered to be very low potential for these species to occur at the site.

With regard to other threatened flora species included in the EPBC PMST results (Appendix A), the previous clearing of large parts of the site, including the degree of ongoing management (i.e., intensive grazing from horse agistment as well as degree of non-native groundcover species composition) suggest that there is little potential of any of these species occurring at the site. Refer to the threatened species evaluations (Appendix B) for further information on the potential likelihood of occurrence of these species at the site.

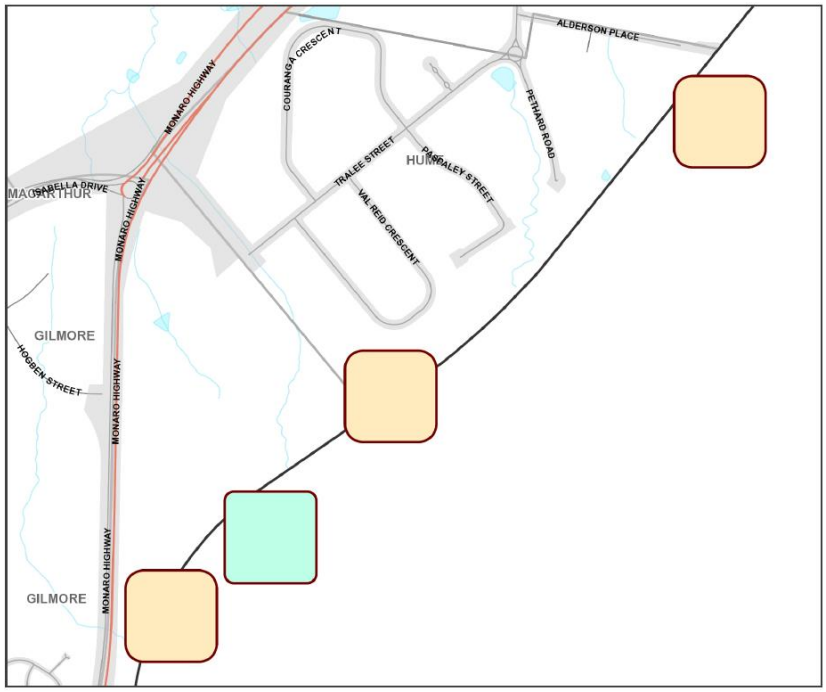


Figure 4. ACTmapi records of threatened flora in the local area (23/8/2023)
(Image legend: Orange (accent) = Small Purple-pea; Blue = Hoary Sunray)

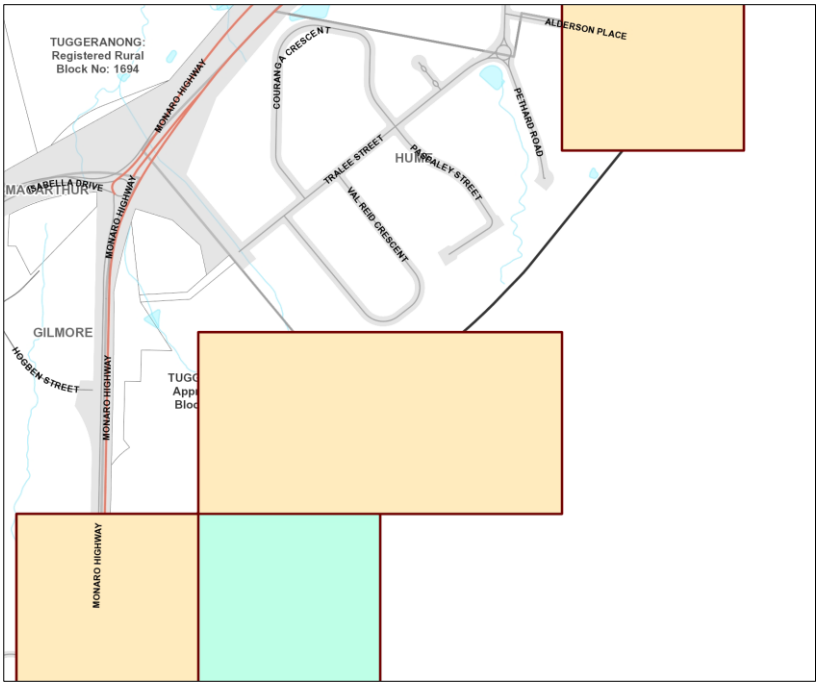


Figure 5. ACTmapi records of threatened flora in the local area (1/2/2024)
(Image legend: Orange (accent) = Small Purple-pea; Blue = Hoary Sunray)

3.3 Threatened ecological communities

The ACTmapi database shows a number of patches of "Potential Threatened Woodland" (PTW) occurring within the site (see Figure 6). This mapping layer does not automatically imply that the vegetation in these area supports a woodland that would constitute a threatened ecological community (TEC) under either the ACT NC Act or Commonwealth EPBC Act, but that there are some values within these areas that could indicate the presence of a woodland patch that is a TEC. Further detailed and on-site investigations are required to confirm this.

Based on the flora surveys conducted at the site for this assessment, it was determined that certain areas of the vegetation at the site would meet the criteria for mapping as part of the *Yellow Box Blakely's Red Gum Grassy Woodland* endangered ecological community (EEC) listed under the ACT NC Act. This community is referred to generally as Box Gum Grassy Woodland (BGGW). Specifically, the vegetation within the site that would form part of this EEC includes the band of woodland located along the minor waterway channel in northeastern portion of the site (see Figure 10). The reason for this conclusion is that although the groundcover vegetation of this area is comprised mainly of non-native species (as described previously and detailed in full flora plot results at Appendix C), there was observed to be (at least) 20 or more mature[7] native trees per hectare (on average), as well as evidence of natural regeneration of native trees in the understorey[8]. Consequently, it would meet the definition of the BGGW per the ACT NC Act Conservation Advice criteria.

However, given the groundcover vegetation in this area is dominated by (i.e., supports a greater than 50% of overall cover/biomass of) non-native species (refer to the results for flora survey plot 'G' with 18 exotic versus 10 native groundcover species), this woodland patch would not meet the criteria for mapping as part of the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* critically endangered ecological community (CEEC), listed under the Commonwealth EPBC Act.

It is noted that a smaller patch of mapped PTW occurs just to the south of this larger confirmed patch of (BGGW) PTW, and within the margins of the defined waterway corridor upstream of the mapped BGGW patch (see Figure 6). Although a flora survey plot was not established in this specific area, this area was traversed numerous times during the broader/general site assessment, and it was noted that the vegetation in this area was not notably dissimilar to other parts of the site (including Flora Survey Plot 'E', located <100m to the east of this waterway; see Figure 2) that were observed to support a predominantly non-native groundcover vegetation composition, including extensive Blackberry. It is therefore doubtful that this small, treeless area mapped as PTW would be part of the listed BGGW or Derived Native Grassland TEC.

Other parts of the site that have been mapped as supporting PTW in ACTmapi include the patch of trees in the central portion of the site, and a patch of PTW in the north of the site next to Tralee Street (occurring within Blocks 88 and 103, Section 22 Hume). A small patch

[7] Mature trees are considered to be those above 50 cm DBH. Refer to footnote 6 for further information on the definition of 'mature' tree;

[8] Per the description set out in the Conservation Advice for this EEC under Schedule 1 of the listing of this EEC under Nature Conservation Act 2014, s 90C; Notifiable Instrument NI2020-304.

of PTW also occurs to the southwest, but outside of, the site investigation area and is not considered further in this assessment (see Figure 6).

The patch of trees in the central parts of the site is not regarded as forming part of the BGGW TEC (under either the ACT NC Act or Commonwealth EPBC Act) because of the predominantly non-native groundcover vegetation (see the results for flora plot 'F'), as well as the fact that there are less than 20 mature trees (per hectare) in this patch, and the lack of any notable natural regeneration in this area (see Section 3.1.1 above for further description of this patch).

The mapped patch of PTW in the north of the site also does not form part of the BGGW TEC (under either the ACT NC Act or Commonwealth EPBC Act) as most of this vegetation has now been removed as part of recent industrial developments, leaving only two large Blakely's Red Gum in Block 88. This area also supports a predominantly non-native vegetation composition (based on visual estimate only, a detailed flora plot was not established in this area).

It is also noted that the treed areas along the western site boundary to Monaro Highway (located within the broader subject site investigation area, but outside of the specific area considered for future industrial uses; see Figure 1), do not meet the criteria for mapping as part of the BGGW threatened ecological community (TEC) under either the ACT or Commonwealth criteria. This is based on the modified composition of the canopy tree species, dominated mainly by Brittle Gum and Apple Box, with occasional/sub-dominant Red Box, Yellow Box, Blakely's Red Gum and Candlebark, as well as having a predominantly non-native understorey, and (likely[9]) lacking the required density of mature trees (i.e. <20 mature trees per hectare). These woodland patches are not mapped as PTW in ACTmapi. This is consistent with the ACT Vegetation Communities mapping layer (per Baines *et al*, 2013) which maps these patches as *APN: Amenity Planting Native* (see Figure 7).

For the remaining open cleared (treeless/grassland) areas of the site, based on the observed dominance of non-native flora species in the groundcover vegetation, none of these areas would meet the criteria for mapping as part of the *Natural Temperate Grasslands of the South Eastern Highlands* (NTG) endangered ecological community (under either the ACT or Commonwealth legislation). This is consistent with the ACT Vegetation Communities mapping layer which maps the open cleared grassland areas as *EXG: Exotic Grassland* (see Figure 7).

[9] Based on a visual estimate only – individual tree trunk diameters were not mapped in this area.



Figure 6. ACTmapi threatened ecological communities (Potential Threatened Woodland) in the local area



Figure 7. ACTmapi vegetation communities mapping for the local area



Figure 8. 2004 Aerial Imagery of central woodland patch

3.4 Weed species

The site supports a number of problematic weeds or potential pest plant species. It is noted that under the *Pest Plants and Animals Act 2005*, the current listed pest plants are included in the *Pest Plants and Animals (Pest Plants) Declaration 2015 (No 1)* (Disallowable Instrument) DI2015-59) and the *Pest Plants and Animals (Pest Plant) Declaration 2020* (Disallowable Instrument DI2020-291). However, both of these instruments have been recently repealed by *Biosecurity Act 2023*, the status of which is listed as "awaiting commencement" and also, does not have any current Regulations or Instruments. Accordingly, there does not appear to be a current, in force, list of pest plants.

Notwithstanding the above, given the presence of weed species such as Blackberry, African Lovegrass, Firethorn, St John's Wort, Scoth Thistle, and Cootamundra Wattle, it is anticipated that the does/will support listed pest plants (in due course, once the Biosecurity Act provides a regulation or instrument including a list of pest plants). Given this, there may be some additional requirements for the notification and subsequent containment or suppression of these weeds at the time the site is developed. This matter can therefore be dealt with in the future as part of a site Construction Environmental Management Plan (if development of the site is approved).

4 Fauna and habitats

4.1 General fauna values at the site

The fauna habitat values of the site include arboreal, terrestrial and aquatic habitats, described separately below.

4.1.1 Arboreal Fauna Habitats

The arboreal fauna habitat values of the site are provided by the existing treed areas, including some of the isolated 'paddock' trees. Collectively, these trees, are considered to be of moderate fauna habitat importance and provide foraging, shelter and movement opportunities as well as some breeding/nesting habitat values, particularly from the (19) identified hollow-bearing trees (HBT) present at the site (see Table 6 for details of hollows and Figure 10 for the location of these HBT).

The overall value of these trees is however considered to be only moderate given that they provide only limited ecological connectivity for movement, other than for birds. Specifically, these treed areas are somewhat fragmented with limited movement opportunities for arboreal mammals (such as possums and gliders) given the Monaro Highway road corridor to the west and existing industrial developments to the north, with only marginal contiguous canopy connectivity to the east.

The HBT's at the site however do provide some important breeding habitat resources, although this is likely to be restricted mainly to common bird species already observed at the site. Hollow-dependent species such as Galahs, Rosellas, Cockatoos, and Wood Ducks were observed at the site, however competition for these resources are likely to be high given the limited number of these HBT as well as the regularly observed (and dominant) number of territorial and competitor species; being the Common Starling[10] and Indian Myna[11]. Both of these species were observed on every single site visit and in very high numbers, being the dominant bird species present. Galahs are also likely to act in a competitive/exclusionary manner given their abundance and large flock sizes, reducing habitat suitability for other less competitive species. The presence of these species in moderate to large numbers is therefore likely to reduce the breeding habitat values of the site for other hollow-dependant species.

It is also noteworthy that no arboreal mammals (such as possums) were seen during either of the two spotlighting surveys at the site, although it possible that such animals could still occur at the site on a less frequent/irregular basis.

The potential for the site to support any listed threatened arboreal fauna species is described further below.

[10] For Starlings, nest sites are any type of hollow, such as tree hollows and house roof voids. The birds are aggressive when competing for nesting sites and readily drive out native species (Australian Museum, 2024: https://australian.museum/learn/animals/birds/common-starling/).

[11] They can be physically aggressive during breeding season and will take over nesting hollows from other birds, including native parrots (Birdlife Australia, 2024:- https://birdlife.org.au/bird-profiles/common-myna/)

In summary, the existing non-mature and non-HBT trees at the site are regarded as being of moderate importance and therefore may be considered to provide a moderate constraint level (based only on their fauna habitat values, and not in relation to their floristic value or ecological community status as described in the previous section). The mapped HBT are regarded as being of high importance or value and therefore provide a high constraint level (see Habitat Values and Constraints Map at Figure 10).

Table 6. Hollow-bearing trees and hollow types at the subject site

HBT No.	Species (Common Name)	Hollow Types	Notes/Comments
1	Blakely's Red Gum	1x Small Limb	Lots of Mistletoe
2	Blakely's Red Gum	1x Medium Limb 1x Small Limb	
3	Blakely's Red Gum	1x Small Trunk	
4	Dead (Stag)	1x Small Limb	
5	Blakely's Red Gum	1x Small Trunk	
6	Blakely's Red Gum	1x Small Limb	
7	Dead (Stag)	1x Small Limb	
8	Apple Box	1x Small Trunk	
9	Blakely's Red Gum	2x Medium Limb	
10	Blakely's Red Gum	1x Medium Trunk	
11	Narrow-leaved Peppermint	1x Medium Trunk	
12	Brittle Gum	1x Large Trunk 2x Medium Trunk	Starlings occupying hollow(s) Some Mistletoe
13	Dead (Stag)	1x Small Limb	
14	Blakely's Red Gum	1x Large Trunk	
15	Blakely's Red Gum	1x Small Limb	Multi-trunked tree
16	Dead (Stag)	1x Small Limb	
17	Dead (Stag)	1x Medium Limb 1x Small Limb	Fallen timber at base
18	Blakely's Red Gum	1x Medium Limb 1x Medium Trunk	
19	Apple Box	1x Small Limb	

4.1.2 Terrestrial Fauna Habitats

The terrestrial fauna habitat values of the site are considered to be of generally marginal value for native fauna and include mainly some foraging habitat as well as some limited shelter/nesting habitat features.

The open cleared grassland areas of the site provide some foraging habitat for grassland herbivores in addition to the horses that are currently agisted at the site. These include notably the Eastern Grey Kangaroos (*Macropus giganteus*) and the introduced European Rabbit (*Oryctolagus cuniculus*), both of which were observed to be present at the site. During the site inspections, the mob of kangaroos was estimated to contain somewhere in the order of 30-40 individuals (although this is likely to change on a regular basis, including the regularity of their occurrence at the site, being likely to range over much larger areas).

Other terrestrial fauna species known to occur at the site include the Common Wombat (*Vombatus ursinus*) evidenced by a burrow within the northeastern waterway channel and that appears to be relatively active with some fresh scats near to the entrance, as well as the European Red Fox (*Vulpes vulpes*), seen during the nocturnal spotlighting. Rats (*Rattus sp*.; likely to be the introduced Black Rat, *R. rattus*) are also present at the site evidenced by the observations of scats among some fallen timber.

Overall, given the lack of diversity of flora species and overall low complexity of the grassland/groundcover vegetation, there appears to be only marginal or limited terrestrial foraging habitat values for other less common or less-abundant native terrestrial fauna species.

The site also provides only marginal suitable shelter or nesting habitat values for terrestrial fauna. This includes mainly the occurrence of a number of small rocky habitats located in the central and eastern portions of the site (see Figures 9 and 10), as well as a number of fallen timber piles scattered about the site (not all of which have been individually mapped[12]).

The rocky habitats were observed to be moderate-heavily embedded with limited opportunity for smaller fauna to establish burrows beneath. However, they still provide some important habitat, particularly for a number of smaller (and relatively common) reptile species which rely on these habitat features for their shelter and basking requirements. Although no reptiles were observed within the rocky habitats, some common species are considered likely to occupy these habitats based on their observations during the (tile) surveys for the Striped Legless Lizard (see below), including the Grass Skinks (*Lampropholis guichenoti*) and Tussock Skinks (*Pseudemoia pagenstecheri*). Other species that could potentially utilise these rocky habitats and are relatively common in the region include the Striped Skink (*Ctenotus robustus*), and possibly some snakes including mainly the Eastern Brown Snake (*Pseudonaja textilis*), although other reptile species could also occur in these habitats.

For the fallen timber piles, it is possible/likely that these piles could be occupied by smaller terrestrial fauna species. The fauna types considered likely to occupy these habitats include some common reptiles (particularly snakes), as well as some smaller mammal species. Given the location and overall habitat values of the site however, the mammal species considered most likely to utilise these habitats would be introduced Rats (confirmed present by scat observations) and House Mice (*Mus musculus*) as well as rabbits which may establish warrens beneath some of these fallen timber piles.

The potential for the site to support any listed threatened terrestrial fauna species is described further below.

4.1.3 Aquatic Fauna Habitats

The aquatic habitat values of the site are limited to the occurrence of a small-medium sized farm dam in the western portion of the site with a short and small (1st Order) drainage line feeding into this dam, and a small, 1st order drainage channel running across the

[12] These features are not mapped at this point in time given they can easily be moved to new locations and therefore do not represent a moderate or high level of potential constraint, despite providing some habitat value

northern margins of the site. The farm dam provides some (semi) aquatic fauna habitat values, including mainly for some common and widespread frog species such as the Common Eastern Froglet (*Crinia signifera*), Spotted Marsh Frog (*Limnodynastes tasmaniensis*) and Whistling Tree Frog (*Litoria verreauxii*), all of which were heard calling at/near the dam, as well as likely the Eastern Long-necked Turtle (*Chelodina longicollis*) which is common in most farm dams in the region. Some waterbirds are also likely to utilise this dam on occasion, including the Australian Wood Duck (*Chenonetta jubata*), Pacific Black Duck (*Anas superciliosa*) and White-faced Heron (*Egretta novaehollandiae*) which were seen at the dam during the site inspection, although other waterbirds are likely to use this dam from time to time.

The minor waterway channel across the northern margins of the site provides only marginal aquatic habitat value. This is based mainly on the fact that, being a 1st order stream, it is only infrequently inundated and does not support any larger, more permanent pools. The extent of non-native groundcover vegetation within this area, including a lack of any notable aquatic (macrophyte) vegetation types in this area, also reduces its value as an area of aquatic habitat. Notwithstanding this, some frogs, including the Common Eastern Froglet, Eastern Sign-bearing Froglet (*Crinia parinsignifera*) and Whistling Tree Frog were heard calling from within/nearby to this feature during the nocturnal spotlighting survey.

None of the aquatic habitats within the site are considered likely to be suitable for native fish species.

4.2 Threatened fauna

No ACT listed threatened fauna species were recorded during any of the (various) fauna surveys conducted at the site. A single Diamond Firetail (*Stagonopleura guttata*; listed as Vulnerable under the Commonwealth EPBC Act as well as the NSW *Biodiversity Conservation Act 2016*) was seen at the site during the early site visit conducted on 2 August 2023. This single male was observed amongst some non-native Firethorn (*Pyracantha sp*.) bushes in the eastern parts of the site, near flora survey Plot 'F'.

The desktop assessment revealed only one other threatened fauna species as having been previously and directly recorded within the subject site, being the Gang-gang Cockatoo (this record was included in the NSW OEH BioNet Atlas; see Figure E2; Attachment E). The only other threatened fauna species that has been directly recorded or mapped as having habitat values present within the site is the Pink-tailed Worm-lizard (see Figure 9). This species is discussed in detail further below.

Based on the desktop assessment results as well as the Conservator's comments, the following threatened fauna species have been directly assessed through targeted surveys and/or detailed habitat analysis (in no particular order):

- Gang-gang Cockatoo
- Pink-tailed Worm-lizard
- Striped Legless Lizard
- Golden Sun Moth
- Other threatened woodland birds

These are discussed in turn below.

4.2.1 Gang-gang Cockatoo

The site is considered to provide some potentially suitable breeding habitat due to the presence of numerous HBT, as well as potential foraging habitat in the form of various eucalypts and some wattles. However, of the 19 identified HBT at the site, only eight (8) of these were observed to support hollows of a medium (10-20mm) or large (>20mm) entrance size which this species requires. The remaining 11 HBT were all observed to support small hollows only, unlikely to be suitable as breeding habitat for this species (see Table 6 for details of hollows and Figure 10 for the location of these trees). Despite the targeted surveys for this species at the site, including four diurnal (dawn) bird surveys as well as numerous additional site visits and random meanders for other fauna surveys as described elsewhere, the Gang-gang Cockatoo was not observed at the site. Given this, and the occurrence of many other competitive aggressive and territorial competitor species (such as Starlings, Mynas and Galahs), there is considered to be a low probability of the species occurring at the site on a regular basis or using the site as important (breeding) habitat.

4.2.2 Pink-tailed Worm-lizard

As noted above, four small patches of habitat for the Pink-tailed Worm-lizard (PTWL) have been mapped in the western margins of the site around (small) areas of exposed rocky outcrops (see Figure 9). All four patches have been mapped as "Moderate quality potential habitat" and in total, equate to almost 3,000m^2 in combined area.

It is noted from recent correspondence with the ACT Office of Nature Conservation that the ACTmapi mapping of these particular rocky habitats is based on the potential habitat quality only and that a direct record of the species has not been made. It is also noteworthy that direct or targeted surveys for this species involves turning over rocks to look for lizards, which is a highly invasive survey technique and typically requires a scientific licence and/or animal ethics permit to be undertaken. Obtaining the License/Permit is usually a time-consuming activity as well as requiring suitable justification to do so and is beyond the scope and time allowed for this assessment.

The PTWL is closely associated with areas of loosely scattered, lightly embedded surface rock where it spends the majority of its life living beneath. These usually include sloping, open woodland and grassland areas with a predominantly native grassy ground-layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with the rocks only partially-buried or lightly embedded (Wong, et. al., 2011).

As per the Conservator's request, this habitat was mapped according to the "Molonglo Standards"[13]). Under this approach, there are four classes of habitat quality that have been established, including; *High*, *Moderate*, and *Low* quality habitat as well as *Potential habitat under semi-open tree canopy*. A full description of each habitat category is provided at Appendix G. In general, *High* and *Moderate* quality habitats are dominated by, or otherwise have a large component of native grasses and forbs/graminoids, while *Low* quality habitat includes areas that have been subject to very high levels of disturbance (typically through pasture improvement and/or extensive grazing). Past

[13] based on the approach described in Osborne and Wong 2015 and 2019 (see Reference List and Appendix G for further details.

surveys in the ACT found PTWL generally do not occur within rocky areas within forest and woodland if the sites are beneath tree canopy (shaded), however, a few individuals have been found in clearings within forest and woodland (Wong *et al.,* 2011) and therefore can be categorised as "*Potential habitat under semi-open tree canopy*". Also noted in the assessment approach developed by Osborne and Wong, deeply embedded boulders and solid rock outcropping are not considered to provide potential habitat for the species.

In assessing the habitat quality of the rock patches at the site, it was noted that the majority of the rocks in these patches are either bedrock or are otherwise very heavily embedded large boulders. Within each patch, there were only very few smaller and lightly embedded or scattered surface rocks (see Site Photos at Appendix F). In addition to this, the vegetation characteristics across all four patches was observed to be in very poor condition having been heavily grazed by horses, as well as being dominated by non-native grasses and forbs such as Phalaris (*P. aquatica*), African Lovegrass (*Eragrostis curvula*), Paspalum (*P. dilatatum*), Ribwort Plantain (*Plantago lanceolata*), Flatweed (*Hypochaeris radicata*) and Dandelion (*Taraxacum officionale*), with only very low (<10% combined total) cover levels of native grasses including some Redgrass (*Bothriochloa macra*), and Tall Speargrass (*Austrostipa bigenculata)*.

In addition to the above, it is also noted that these rock patches maintain no effective connectivity to any other areas of potential habitat for the species in the local area (and from where the species is known to occur). Due to the high degree of embeddedness and predominantly non-native groundcover, these rock patches are generally considered to not form potential PTWL habitat, however, taking the precautionary principle, would at best, be regarded as **low-quality habitat** for the species[14].

This conclusion is not entirely inconsistent with the existing mapping of the PTWL habitat at the site. In particular, it is noted from recent correspondence with the ACT Office of Nature Conservation that these patches were assessed at a preliminary level in 2023, but that no rock-turning was undertaken, and no records of the species exist for these rock patches. The correspondence with the Office of Nature Conservation also noted that for these patches of rocks, the habitat quality is *low-moderate* but that further assessment of the vegetation was needed. Accordingly, this assessment, which included further consideration of the vegetation, concludes the habitat quality is low based on the grazing levels and extent of non-native groundcover composition.

4.2.3 Striped Legless Lizard

As noted previously, a request was made by the Conservator for a survey to be conducted for the Striped Legless Lizard (SLL), despite the lack of any records or mapped habitat for the species either within or nearby to the site. As also noted in Section 2, a targeted survey for this species was conducted in accordance with the applicable survey guidelines, involving the use of the artificial shelter (roof tiles) survey technique. This involved the deployment of 100 roof tiles at three separate locations within the northern

[14] It is noted that despite the low-quality habitat rating, until further confirmation is provided by the ACT Government, these rocky habitats should be regarded as potentially supporting the species and therefore would be regarded as a moderate to high constraint level.

margins of the site (only). The remaining parts of the site were discounted as requiring targeted surveys based on the high degree of grazing of these areas and the lack of any notable tussock structure which is a key component of the habitat requirements for this species.

The surveys failed to detect the species at the site. The site is also regarded as providing low habitat suitability for the species as well as other reptiles generally given the very low number of observations of other reptile species using the tiles for shelter (see Table 7 below for the results of the surveys, including observations of other reptile species). In particular, an assessment of the habitat at the site against the criteria for Critical Habitat for the species as set out in the *Threatened Species Scientific Committee Conservation Advice* - Delma impar *Striped Legless Lizard* (CoA TSSC, 2016.) was also completed. In summary, the site is not regarded as providing critical habitat for the species as it:

- *Does not currently support (any records of) the species, and the species has not previously been recorded from the site;*
- *Provides only limited/marginal potential foraging habitat;*
- *Provides a possible refuge from disturbance events, although there is limited suitable cover/shelter values;*
- *Does not provide for long term protection from development given that the specific areas of the site where some tussock occurs is zoned IZ1 General Industry and therefore has the potential to be developed in the future (and noting also that this assessment was conducted specifically to support the <u>possible</u> development of the site in future; and,*
- *Has no effective connectivity value, with no other suitable habitats occurring immediately adjacent or nearby to the site (and therefore, the site is not considered important in contributing to or ensuring the evolutionary potential of the species).*

Given the above findings, this species is considered very unlikely to occur at the site and the site also is not regarded as providing suitable habitat for the species.

Table 7. Results of the Striped Legless Lizard tile surveys

Survey no.	SLL recorded	SLL (Grid) location	Other reptiles seen (& location)
Tile Surveys			
1	No	N/A	No
2	No	N/A	No
3	No	N/A	1x *Lampropholis guitchenoti* (Site 1) 1x *Pseudemoia pagenstecheri* (Site 1)
4	No	N/A	No
5	No	N/A	1x *Lampropholis guitchenoti* (Site 1)
6	No	N/A	No
7	No	N/A	No
8	No	N/A	1x *Lampropholis guitchenoti* (Site 3)
9	No	N/A	No
10	No	N/A	No
11	No	N/A	1x *Lampropholis guitchenoti* (Site 3)
12	No	N/A	1x *Lampropholis guitchenoti* (Site 1) 1x *Pseudemoia pagenstecheri* (Site 1)

4.2.4 Golden Sun Moth

No Golden Sun Moths (GSM) were recorded during any of the four surveys completed at the site, despite the conditions being (generally[15]) suitable and moths recorded flying elsewhere in the ACT by other ecologists during this time. Specifically, GSM were observed flying by other researchers on the 6th, 11th and 12th December 2023 (with no reported surveys conducted anywhere in the region on the 10th December). It is also noted that moths had still been seen flying up to and including the 19th December 2023. This confirms that the seasonal timing for the activity period of the moth as well as the weather conditions of the surveys completed for this study were acceptable/suitable for detecting the species (if present).

In addition to the failure to detect the species, the subject site is also regarded as not providing any suitable habitat conditions for the GSM. In particular, the site was not found to support any Wallaby Grass (*Austrodanthonia/Rytidosperma sp.*) and limited amounts of Speargrass. Additionally, no Chilean Needlegrass (*Nassella neesiana*), a known food source for the GSM, was observed within the site.

Based on the survey results and failure to detect the species, as well as the generally low habitat values for the species within the site, it is believed that the GSM is unlikely to occur at the site, and the site would not provide any form of important habitat for the species.

[15] Although cloud cover was relatively high on the 10th, 11th and 12th, moths have been regularly recorded during such conditions if warm and calm enough.

Accordingly, the GSM is considered unlikely to affect future development opportunities at the site.

4.2.5 Threatened Birds

As noted previously, no ACT listed threatened bird species were directly recorded at the site during any of the four targeted (dawn) bird surveys, or during any of the other site visits (such as for the (12x) tile survey checks or (4x) GSM surveys). However, a single Diamond Firetail (*Stagonopleura guttata*), listed as Vulnerable under the Commonwealth EPBC Act (and NSW *Biodiversity conservation Act*) was seen at the site during the site visit, amongst some non-native Firethorn (*Pyracantha sp*.) bushes in the eastern parts of the site.

Although not seen, there may be some potential for other threatened native bird species to occur at the site from time-to-time, on an irregular basis, including (as notable examples) the Superb Parrot (*Polytelis swainsonii*) as well as some smaller threatened woodland birds such as the Varied Sitella (*Daphnoesitta chrysoptera*) and various Robins (*Petroica spp*.) that are known from the local area.

Specific habitat features present at the site for these species include notably the presence of numerous HBT for the Superb Parrot. However, as noted for the Gang-gang Cockatoo above, the presence of a number of aggressive and/or territorial species such as Starlings and Mynas, as well as other competitor species such as Galahs, all of which are present at the site on a regular basis would indicate that the Superb Parrot, which is likely to be only a seasonal visitor to the area, would find it very difficult to establish a nesting site within one of the eight (only) potentially suitable HBT (i.e., those with medium-large size hollow entrances; see Table 6 for details).

For the Varied Sittella, this species is associated with eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Based on this, the species if present, is therefore likely to be restricted to the woodland areas of the site, although no (potentially suitable/attributable) nests were seen in any trees at the site. This species is also likely to suffer from competition from Starlings and Mynas. Given this, there is considered to be a low probability of this species inhabiting the site, and limited mainly to foraging only, although the larger, more intact woodlands to the east of the site (in NSW) may likely support this species.

For the various Robins (being mainly the Flame and Scarlet Robins), these species have both been reported regularly from the woodland areas of Environa NSW (see OEH BioNet Atlas results at Appendix E). No nests that could be attributable to these species were seen at the site. Similar to the Varied Sittella, if present at the site, they are likely to be restricted to the woodland areas, however they are also likely to suffer from competition from Starlings and Mynas. Given this, there is considered to be a low probability of these species inhabiting the site, however this would be limited mainly to foraging only. The larger, more intact woodlands to the east of the site (in NSW) may likely support these species.

4.2.6 Other Threatened Fauna Species

In reviewing the ACTmapi database, the only other threatened species located within proximity (<2km) of the site is Key's Matchstick Grasshopper (*Keyacris scurra*) listed as Endangered under the ACT NC Act (and NSW legislation; it is not listed under Commonwealth legislation). The nearest mapped location for this species is approximately 1km to the northeast of the site, north of Dogtrap Gully and about 200m east of the railway line, within NSW. This species is typically found in native grasslands and grassy woodlands but it has also been recorded in other vegetation associations usually containing a native grass understory (especially Kangaroo Grass) and known food plants (particularly Asteraceae). Targeted surveys for this (or other grasshopper) species were not undertaken at the site. Some, but overall very little, Kangaroo Grass and native forbs in the Asteraceae family were observed at the site, and accordingly, there is considered to be some, but overall a low, probability of occurrence of the species within the site. Further surveys may be required to confirm the presence of this species, depending on the nature of any future proposed development.

Other threatened fauna species not directly recorded within proximity (<2km) to the site but included in the EPBC PMST results (Appendix A), are considered in the threatened species evaluations table at Appendix B.

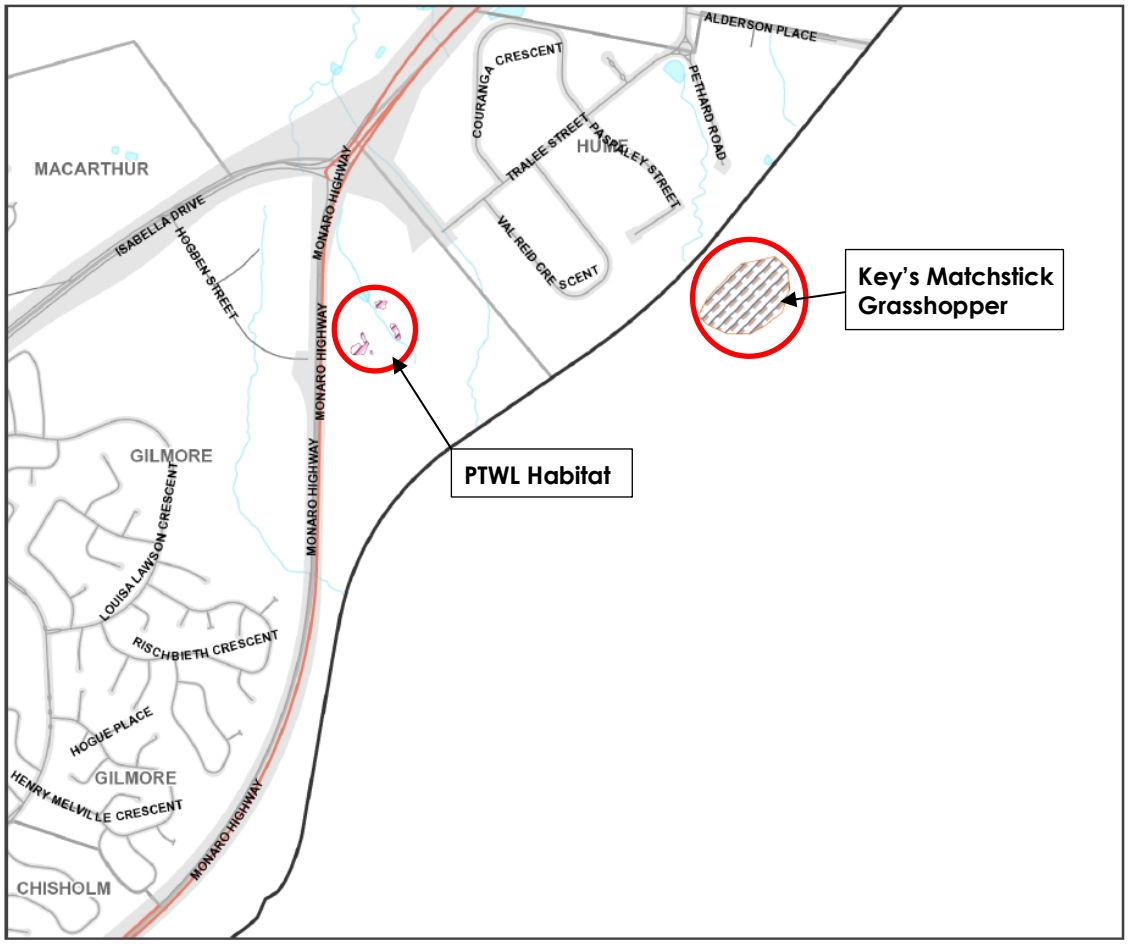


Figure 9 ACTmapi threatened fauna species in the local area

4.3 Ecological Connectivity

Ecological connectivity is an important factor in determining overall habitat quality for almost all (native) fauna. Fauna movement is of vital importance in establishing viable populations of animals as it assists in breeding between individuals of different local sub-populations and populations which maintains genetic diversity, and also allows animals to be able to move between habitats either in response to seasonal factors or to exploit habitat resources in other areas (such as migratory species). Ecological connectivity also enables some species to move to new areas if the habitat quality of their original environment becomes degraded or otherwise unsuitable for them to persist there.

Overall, the subject site is not considered likely to play an important role in maintaining ecological connectivity in the local area. Specifically, the site is bordered along its entire western boundary by the Monaro Highway, which is a busy 4 lane highway, restricting safe fauna movements in that direction. The site is also bordered along its entire northern boundary by existing/under-construction industrial developments, most of which incorporate high (>2m) chain-wire security fencing. Accordingly, fauna movements to the north are also restricted. Fauna movements internally within the site are also somewhat restricted by the lack of any contiguous intact remnant woodland, and groundcover conditions are also in poor condition due to persistent grazing providing minimal cover/shelter for smaller terrestrial fauna.

5 SUMMARY OF BIOIVERSITY VALUES: POTENTIAL DEVELOPMENT CONSTRAINTS

5.1 Overview of Biodiversity Values (Constraints) Assessment Approach

The biodiversity values and associated constraints analysis applied to the project area is based on three biodiversity value (and associated constraint) classes; *high*, *moderate* or *low* as identified in Table 8. These classes were informed by the key ecological values identified from the desktop assessment and detailed field surveys undertaken within the project area. These key biodiversity values primarily relate to the presence of potential habitats for the BGGW TEC, as well as certain habitat features that could support threatened fauna species listed under the ACT NC Act and/or EPBC Act as identified in Section 4 (for example, hollow-bearing trees that could provide habitat for the Gang-gang Cockatoo or other threatened woodland birds like the Superb Parrot).

This biodiversity values and constraints assessment is not intended to provide any assessment or statement of any potential impact that may occur but does identify where a biodiversity feature occurs that if impacted, could result in legislative triggers for additional assessment, such as the requirement to refer the matter to the commonwealth under the provisions of the EPBC Act, or the requirement to complete an EIS under the ACT Planning Act.

Table 8. Summary of Biodiversity Values (Constraints) Categories

Biodiversity Value (Constraint Level)	Description
High	Areas/features likely to have potential to support threatened species or ecological communities, including: ➢ BGGW TEC ➢ Individual HBT & trees with nests ➢ Mature Trees
Moderate	Areas/features that have a lower (but still some) potential to support listed threatened species, including: ➢ Rocky outcrops ➢ Fallen timber piles ➢ Stick Nest(s) ➢ Other (non-TEC) woodland areas
Low	Areas of low biodiversity value, including highly modified areas, unlikely to support any important biodiversity features or values

A biodiversity values (constraints) map is provided at Figure 10 below. While this figure may be of some value for assessing the future development opportunities of the site, it is not intended to provide a definitive guide for the future development layout of the site. Some mitigation measures may exist to support (a partial encroachment of) development within either Moderate or High Biodiversity Value Constraint areas.

5.2 Summary of High-Level Biodiversity Values (Constraints)

The features which comprise the identified High-Level Biodiversity Values and associated likely high-level constraint to future development at the site include the following (in no particular order):

- **Box Gum Grassy Woodland TEC**. Specifically, this includes the patch of woodland across the northeastern margins of the site (only) as shown in Figure 10. The other areas of woodland, such as in the central portions of the site do not support the BGGW TEC due to the composition of the groundcover vegetation and that there are less than 20 mature trees per hectare. Any proposal that could impact on this woodland would likely trigger the requirement for an EIS to be completed (or otherwise, an ESO to be obtained from the Conservator stating that the impact would not be a significant adverse environmental impact).

  It is also likely that any proposal to remove/clear (parts of) this woodland patch may require the provision of a biodiversity offset to mitigate the impact.

  In addition to the BGGW status of this patch of woodland, the presence of mature and hollow-bearing trees would also provide a high level of constraint for the reasons described below for each of those values.

- **Hollow-bearing Trees**. The hollow-bearing trees (HBT) present at the site, including both within the woodland patches as well as the isolated paddock trees could provide potential breeding/nesting habitat for a number of threatened bird species including the Gang-gang Cockatoo and possibly the Superb Parrot (although it is noted that based on the results of the targeted surveys for this assessment, there is considered to be a low probability of occurrence of either species).

  In addition to their potential habitat value for these threatened species (as well as other non-threatened species generally; which is also important for maintaining secure local populations), it is noted that the removal of hollow-bearing trees is identified as a Key Threatening Process (KTP) under the NC Act (as stated in Section 3.1; see Footnote 6). Under Section 105 of the recently established *Planning Act 2023*, (and as established under Schedule 1 of the new *Planning (General) Regulation 2023*; specifically item 25), a proposal that is likely to result in a KTP under the NC Act triggers the requirement for an EIS to be completed (unless an ESO is obtained from the Conservator indicating that the proposal is not likely to have a significant adverse environmental impact).

  Without foreshadowing the outcomes of an EIS/ESO application, it is believed that some (few) of the HBT at the site could be removed, however, to support this there would need to be a number of mitigation and management measures implemented to avoid impacts including (but not limited to):

  - Development of a Habitat Tree Felling Protocol including (but not limited to) a staged/soft-felling method as well as the presence of a fauna spotter during removal to capture/treat any fauna present/injured during the felling process.
  - Habitat replacement/supplementation including salvage and relocation of hollow-bearing sections of limbs/trunks (where possible) and/or installation of nest

boxes (at a ratio of at least 3:1 boxes for each hollow removed that wasn't able to be salvaged and relocated).

- **Mature Trees.** As noted above for HBT, the removal of Mature (and hollow-bearing) trees is listed as a KTP. As noted in Section 3, a Mature tree is identified as a tree with a trunk diameter of at least 50cm (dbh). As also noted previously, under the new Planning Act and Regulation, a proposal that is likely to result in a KTP triggers the requirement for an EIS to be completed unless an ESO is obtained from the Conservator. Accordingly, the existing Mature trees at the site (generally; these have not as yet been individually measured and mapped in Figure 10) are regarded as a High-Level Constraint. However, and likely different to the values associated with HBT, there is considered to be some opportunity to obtain approval to remove some of these Mature trees (if not also a HBT), provided that a sufficient number of other Mature trees are retained for future recruitment of hollows, as well as establishing that other values such as maintaining foraging habitat and movement opportunities are not substantially reduced or otherwise impacted by the removal. Further, if the Mature Tree is in poor health and likely to die (which would require assessment from a suitably qualified arborist), this may also support the application for its removal.

5.3 Summary of Moderate-Level Biodiversity Values (Constraints)

The areas of the site identified as having Moderate-Level Biodiversity Values and associated likely Moderate-Level Constraint to future development at the site include the following (in no particular order):

- **Rocky habitats.** This assessment concluded the mapped rocky habitats at the site are *Low-Quality Potential Pink-tailed Worm-lizard habitat* based on the vegetation composition and degree of embeddedness of the rocks. It is noted that the current ACTmapi mapping of these rocky habitats is *Moderate-Quality Potential Pink-tailed Worm-lizard habitat*. However, after recent (February 2024) consultation with the ACT Government Office of Nature Conservation, it was confirmed that there are no actual records of PTWL within these habitats and that these patches were assessed in 2023 (by ACT Government Senior Ecologist) as being of Low-Moderate quality PTWL habitat (but that further vegetation assessment was needed for confirmation). Given this, the mapping of these rocks as *Low-Quality Potential Pink-tailed Worm-lizard habitat* is considered accurate and appropriate.

  Notwithstanding the Low-Quality rating, the patches of rocky habitats within the site are still regarded as being a Moderate-Level Constraint as these rocks do provide some potential habitat value for other reptile species. Additionally, although no records of PTWL have been made from these habitats, it is acknowledged that no formal targeted surveys for the species have been completed (i.e. rock turning).

  Based on this assessment outcome, it is recommended that future development of the site seek to avoid these rocks if possible, or, that if development requires encroachment or other (indirect) impacts on these rocky habitats that in the first instance, a targeted survey be completed. This would provide a very high level of certainty of whether the species is present. If found present, the rocky areas would revert to being a High-Level Constraint and it would be very unlikely that approval

would be granted to impact on these features (even if an EIS were completed). If no PTWL are found from this survey approach, it is expected that development of these areas could then occur. Until such time as a targeted survey can be completed, any development of the site is recommended to avoid these areas. If avoided, there is no foreseeable mandatory requirement to complete the targeted survey program.

In addition to the above, should a targeted survey find no evidence of PTWL, but other reptile species are observed, a pre-clearance survey program should be completed shortly before construction takes place to capture and remove any animals (of any species) found present amongst the rocks. A fauna pre-clearance survey program, included as part of a broader Flora and Fauna (or Biodiversity) Management Plan and which prescribes this action, should be prepared as part of any future development application for the site (although it is noted that this plan could be prepared as part of a condition of approval to be implemented prior to construction commencement; see recommendations at Section 6).

- **Fallen timber piles.** The fallen timber piles at the site could provide potential habitat for a number of smaller terrestrial fauna species, however the fauna types considered likely to occupy these habitats include some common reptiles as well as some smaller mammal species (likely introduced Rats or Mice). No small, terrestrial threatened fauna species are known or considered likely to occupy these habitats. These habitat features could therefore be removed to allow some development, however, the removal should be undertaken in accordance with a removal plan, including a pre-clearance survey as well as the removal being completed in the presence of a fauna spotter. Additionally, these timber piles should be salvaged and relocated to elsewhere in the site outside of the development footprint (i.e. within retained woodland areas). Given these values and ability to relocate these features, they are considered to be a Moderate-Level Constraint only.
- **Stick Nests.** A single stick nest was observed at the site, within the BGGW TEC area. However, it is possible that other stick nests could be located in other areas but were not seen, including the potential for new nests to be built between the time of the site inspections for this assessment and any future development of the site (which could potentially be some years in the future). At present, the stick nest observed was of a type/size likely to be used by either magpies or ravens, which are common and abundant in the local area. It is very unlikely that a nest of this size would be use by a (larger) raptor species. Similar to the recommendations above for HBT, a tree with a stick nest could potentially be removed to allow for development, however, it also would need to be completed in accordance with a felling protocol, including having a fauna spotter present during removal, and relocation of the nest (if possible), where it could potentially be re-used by birds.
- **Other (non-TEC) Woodland Areas.** This includes the following woodland patches:
  - The small woodland patch within the central margins of site is collectively of some biodiversity importance or value. Specifically, this patch supports a number of HBT (as described above) and may also support Mature Trees (not yet individually surveyed for trunk diameters); both of which are (on their own as individuals) rated as being of High biodiversity value, while the remainder of the woodland patch is considered to be of Moderate value. However, this woodland patch collectively

may also provide a source for future recruitment of HBT Mature Trees that could potentially help to offset impacts from removal of other Mature or HBT (if required for site development). This woodland patch is also of some value as a 'stepping stone' for arboreal fauna movement in the area. Consequently, it is recommended that although being of Moderate-Level Constraint, this patch collectively should be avoided by future development to the greatest extent possible.

- The woodland patches along the western boundary mainly between Block 1563 and Monaro Highway (i.e. within Blocks 1469 and 1670, but also partly within Block 1563 itself) while not constituting part of the BGGW TEC and being mostly outside the likely future development footprint within Block 1563, still provide some important habitat values and therefore require some consideration. The biodiversity values of these woodland patches include the potential for them to support some Mature Trees (although none were seen/mapped), as well as providing a continuation of 'stepping stone' habitat patches to support arboreal fauna movements in the area. These woodland patches also provide a visual buffer from the highway to Block 1563 and therefore are likely to be of some additional (non-biodiversity) value to support future industrial development/land uses within the site (which will likely help to address requirements for Main Avenues and Approach Routes (MAAR) under the National Capital Plan).

5.4 Summary of Low-Level Biodiversity Values (Constraints)

The remaining areas of the site outside of/apart from the features described above for the High and Moderate Level Biodiversity Values, are regarded as being of low biodiversity value and therefore of a *Low-Level Constraint*.

This includes mainly the open grassland areas of the site subject to relatively high levels of grazing (both by horse agistment as well as kangaroos) and supports low sward height and biomass with no notable tussock structure, as well as areas of the planted tree rows within the central parts of the site that do not support any large, mature trees or HBT.

It is specifically noted that although the mapped polygon for the Small Purple-pea extends into the far northeastern margins of Block 1563, this is an artefact of the ACT Government's Office of Nature Conservation method of applying a 500m Area of Occupancy buffer around a record. Recent consultation with the Office of Nature Conservation confirmed that no records of the Small Purple-pea exist outside of the rail corridor in this local area. Consequently, no Medium or High-level constraint is assessed to occur within Block 1563 (or the areas of Block 88 Section 22 Hume within the site investigation area) on account of the mapping for this species.

In addition to the above, the existing farm dam and associated waterway (as well as the waterway within the BGGW TEC area), are considered to also provide a Low-Level Constraint. This is due to their modified and somewhat degraded nature, the lack of ecological connectivity they maintain with other (natural) waterbodies in the local area, and that the fauna species they support are all common, widespread and abundant both locally and regionally, as well as the fact that there are other farm dams and waterways available in nearby areas. Notwithstanding this, any proposal to develop these features,

including removal of the dam or modification of the waterways, will require some additional management measures, including mainly having a fauna spotter present during dewatering of the dam to capture/relocate any aquatic fauna occupying this habitat feature. In addition, development within the (natural) waterway channels would also require additional approval via a Waterway Works Licence.

These low constraint areas are not shown in Figure 10 below as they (generally) include all other areas not mapped as supporting either High or Medium level constraint features.

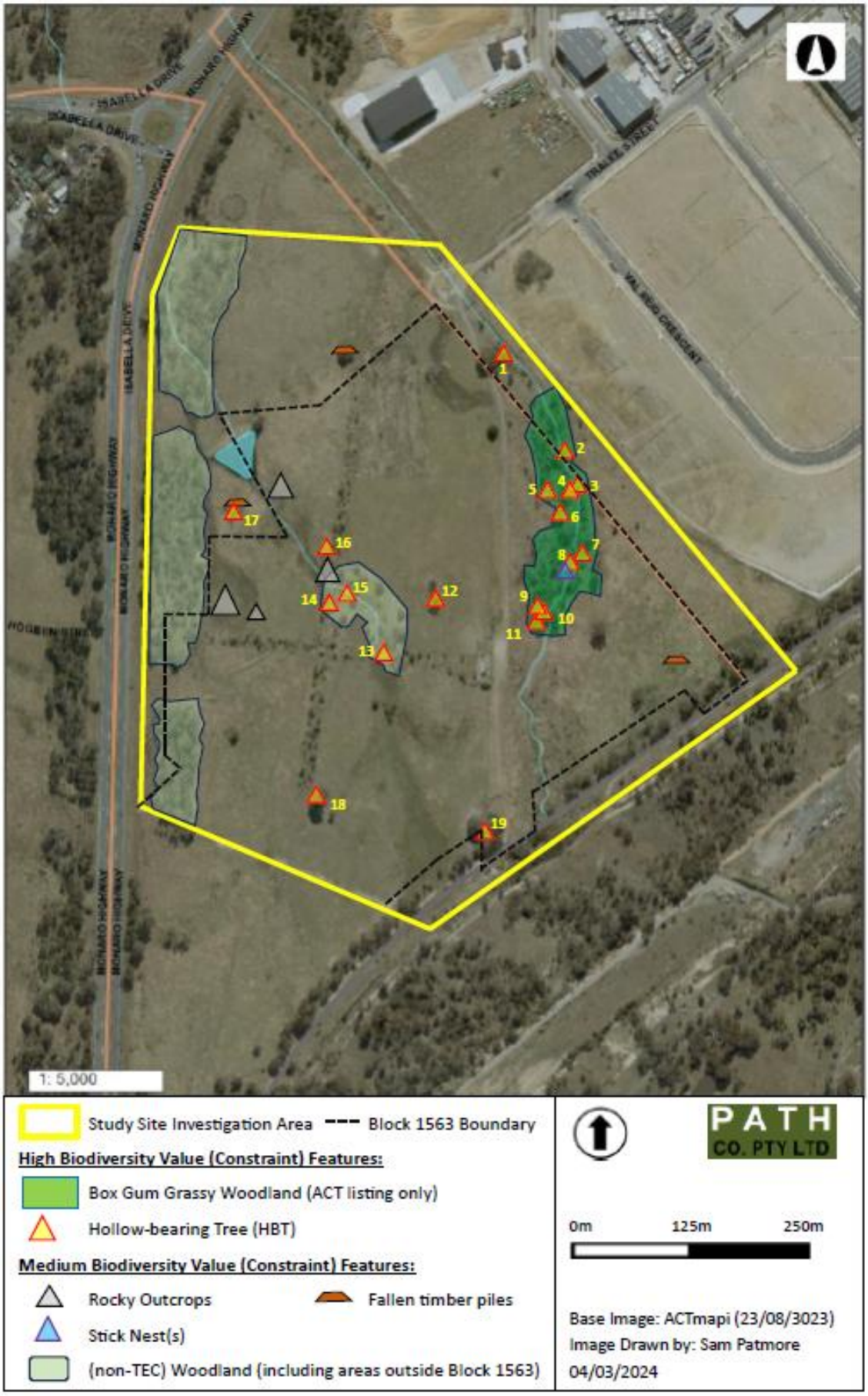


Figure 10. Biodiversity Values and Constraints Map

6 Conclusions and Recommendations

6.1 Conclusions

This assessment of the biodiversity values and associated constraints at the subject site (being mainly Block 1563 Tuggeranong but also including immediately surrounding land parcels/areas) noted that the site supports a number of important biodiversity features or values. These features are associated mainly with some of the existing trees at the site including identified hollow-bearing trees (HBT) which could provide potential habitat for certain threatened birds, as well as large, mature trees, the removal of which may/will trigger the requirement for an EIS to be completed or an ESO to be obtained from the Conservator. Additionally, some of the trees at the site, including mainly the large, mature trees along the northern margins of the site, collectively form part of the Box Gum Grassy Woodland threatened ecological community (BGGW TEC). Potential impacts to this community (if development were to occur in the area of the mapped woodland) would also trigger the requirement for an EIS to be completed or an ESO to be obtained from the Conservator.

However, it may be possible for some (few) of the HBT and/or large mature trees at the site to be removed, although this would require a number of management and mitigation measures to be implemented. This would include the preparation of a tree removal protocol (for a soft-fall approach and with a fauna spotter to be present), as well as potentially, the requirement to offset the loss of hollows by either salvage and re-use/translocation of hollow sections of trees, and/or the installation of nest boxes at a suitable ratio to the lost hollows. Removal of any of the BGGW TEC is also likely to require some form of biodiversity offset to be provided.

Other important biodiversity features observed at the site but assessed as being of Medium-level value (or constraint), include the rocky outcrops in the western site margins. These rocky habitats could potentially provide (Low-Moderate Quality) habitat for the Pink-tailed Worm-lizard (PTWL). Specifically, after further recent consultation with the ACT Government Office of Nature Conservation, it was confirmed that there are no actual records of the species from these rocky habitats (although targeted surveys were not completed) and that the rocks were assessed as Low-Moderate Quality habitat but required further vegetation assessment. This study found that the vegetation in these areas was dominated by non-native species and was heavily grazed and therefore, in combination with the high degree of embeddedness, are assessed as being of only Low-Quality habitat for the PTWL. Notwithstanding this, given that no direct targeted surveys have been completed, and that these rocky areas may provide habitat for other (common) reptiles, they are collectively assessed as being of overall Medium Quality or constraint level and that future development of the site should avoid these areas if possible. If these areas are to be impacted by development, additional mitigation and management measures have been recommended (see below).

Other (non-TEC) woodland areas are also considered to provide a medium-level constraint. It is considered unlikely that all of these areas would be approved to be cleared, however it is expected that some clearing could be approved if the individual trees to be removed are not mature trees or otherwise support important habitat values

(like hollows or nests). The retention of as much as possible of these (non-TEC) woodland areas is however recommended as they provide a source for future recruitment of mature trees and HBT and may also provide important values in relation to visual screening of future developments.

Other medium value biodiversity features identified at the site include fallen timber piles and (a single) stick nest. Neither of these features are considered likely to support habitat for listed threatened species but may still provide important habitat for other common native (and potentially non-native) fauna species. These features could likely be removed for development if needed but would require the implementation of some management and mitigation measures, including the salvage and relocation of the features to other suitable areas outside the development footprint, as well as the need for a fauna spotter to be present during this process.

Low constraint areas (not specifically/individually mapped) are regarded as being suitable for development from a biodiversity impact perspective (only); but subject to approval including confirmation of other (non-ecological) matters, such as heritage and contamination etc. Of particular note for the low constraint areas is the confirmation that no listed threatened species are considered likely to occur or utilise these areas. Specifically, it was confirmed through recent consultation with the ACT Government Office of Nature Conservation that despite the extension of existing mapped habitat polygon of the Small Purple-pea in the northeastern margins of the site, no actual records of this species actually occur within Block 1563 or Block 88 Section 22, and that the extension of the polygon into the site is an artefact of the (new) 500m Area of Occupancy buffer grid for mapping polygons. Given this, and the lack of observations during this assessment despite targeted surveys being conducted in these areas as well as the known ecology and habitat preferences for the species, it is considered unlikely that this species would occur within the existing open cleared areas of Block 1563 or the immediately adjacent parts of Block 88 Section 22. Consequently, no medium or high level of constraint is identified as being attributable to this species and the previous records of it within the adjacent rail corridor.

6.2 Recommendations

The recommendations for progressing toward a development proposal for the site are as follows:

- Obtain a detailed tree survey for all trees in/near to the future development footprint, particularly for trees that may require removal. This assessment should include a tree health assessment by a qualified arborist, as well as mapping the tree dimensions (including height, canopy spread and trunk diameter) for confirmation of whether they are 'mature' trees (i.e. have trunk diameters 50cm or greater dbh). This would be necessary to be completed at an early stage in order to apply for an ESO from the Conservator if a mature tree is required to be removed.
- If proposed development is to occur within or immediately adjacent to the rocky habitats, or otherwise has the potential to directly or indirectly impact on these habitats, a targeted survey for the Pink-tailed Worm-lizard should be undertaken. This involves turning over suitable rocks (i.e. lightly embedded and between 100-400mm

average diameter or particle size). This survey can be undertaken throughout the year, but preferably should be completed in Spring-early Summer. Note that a Scientific Licence/Animal Ethics Permit should be obtained for undertaking this survey.

In addition to the above, and although not specifically required for inclusion in the DA submission documentation, a Flora and Fauna Management Plan (FFMP) will need to be prepared for managing impacts during the construction phase. The requirement to prepare the plan would likely form part of the approval conditions (to be implemented prior to commencement of construction). The FFMP would likely include the following components (at a minimum):

- Pre-clearance surveys of any/all habitats to be cleared/impacted including hollow-bearing trees, nest trees, fallen timber, rocky outcrops and dewatering of dams (note that habitats to be retained may not require pre-clearance surveys),
- Presence of fauna spotter during clearing of any habitats, including nomination of fauna release sites
- Process for salvage and relocation of cleared habitats such as hollow sections of limbs/trunks, fallen timber and rocks including details of nominated sites for the relocation of these features as supplementary habitat.
- Details for how habitats to be retained will be protected during the construction phase (i.e. mainly tree protection measures, sediment and erosion controls and weed management)

The requirement to complete the above management plan documentation would be confirmed at a later stage once a proposal (either concept or detailed) is prepared.

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APPENDIX A. EPBC PMST Results

Note: Printed in part only for relevant threatened entities. Government land, heritage and migratory species not included.

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Feb-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	2
Wetlands of International Importance (Ramsar	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	54
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	222
Commonwealth Heritage Places:	32
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	19
Regional Forest Agreements:	1
Nationally Important Wetlands:	1
EPBC Act Referrals:	126
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Historic			
High Court - National Gallery Precinct	ACT	Listed place	In buffer area only
Old Parliament House and Curtilage	ACT	Listed place	In buffer area only

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	800 - 900km upstream from Ramsar site	In feature area
Hattah-kulkyne lakes	600 - 700km upstream from Ramsar site	In feature area
Riverland	700 - 800km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Alpine Sphagnum Bogs and Associated Fens	Endangered	Community may occur within area	In buffer area only
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area	In feature area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat may occur within area	In buffer area only
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
FISH			
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area	In feature area
FROG			
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area	In buffer area only
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Litoria raniformis Southern Bell Frog,, Growling Grass Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat may occur within area	In buffer area only
INSECT			
Keyacris scurra Key's Matchstick Grasshopper [89739]	Endangered	Species or species habitat may occur within area	In buffer area only
Synemon plana Golden Sun Moth [25234]	Vulnerable	Species or species habitat known to occur within area	In feature area
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat may occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
PLANT			
Amphibromus fluitans			
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Calotis glandulosa			
Mauve Burr-daisy [7842]	Vulnerable	Species or species habitat may occur within area	In feature area
Dodonaea procumbens			
Trailing Hop-bush [12149]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus aggregata			
Black Gum [20890]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Lepidium aschersonii			
Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area	In feature area
Lepidium ginninderrense			
Ginninderra Peppercress [78474]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Lepidium hyssopifolium			
Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat likely to occur within area	In feature area
Leucochrysum albicans subsp. tricolor			
Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat known to occur within area	In feature area
Muehlenbeckia tuggeranong			
Tuggeranong Lignum [64934]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pomaderris cotoneaster Cotoneaster Pomaderris [2043]	Endangered	Species or species habitat may occur within area	In buffer area only
Pomaderris pallida Pale Pomaderris [13684]	Vulnerable	Species or species habitat known to occur within area	In feature area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area	In feature area
Rutidosis leptorhynchoides Button Wrinklewort [67251]	Endangered	Species or species habitat known to occur within area	In feature area
Senecio macrocarpus Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat may occur within area	In feature area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat known to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area	In feature area
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat known to occur within area	In feature area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat known to occur within area	In feature area
Tympanocryptis lineata Canberra Grassland Earless Dragon, Lined Earless Dragon [25558]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa lapponica			
Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Pandion haliaetus			
Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Corporation [12324]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [12321]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12322]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [12320]	NSW	In buffer area only
Defence		
Defence - 10 WHYALLA ST - FYSHWICK [80001]	ACT	In buffer area only
Defence - 139 CANBERRA AVE - FYSHWICK [80004]	ACT	In buffer area only
Defence - 139 CANBERRA AVE - FYSHWICK [80002]	ACT	In buffer area only
Defence - 139 CANBERRA AVE - FYSHWICK [80003]	ACT	In buffer area only
Defence - 169 GLADSTONE ST - FYSHWICK [80005]	ACT	In buffer area only
Defence - CHURCHES CENTRE - TUGGERANONG [80041]	ACT	In buffer area only
Defence - DEAKIN OFFICES [80042]	ACT	In buffer area only
Defence - HMAS HARMAN - SYMONSTOWN [80106]	ACT	In buffer area only
Defence - HMAS HARMAN - SYMONSTOWN [80107]	ACT	In buffer area only
Defence - HMAS HARMAN - SYMONSTOWN [80105]	ACT	In buffer area only
Defence - MAJURA NAVIGATION BEACON [80033]	ACT	In buffer area only

APPENDIX B. Threatened Species Evaluations

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations included in the database search results using a 5 km buffer around project site, for those identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*[16], as well as records of species in the local area included in the ACT Government's ACTmapi online mapping database.

It was assumed that this search area and use of government databases would bring in all of the relevant species, although the list of species below omits many irrelevant ones found in aquatic habitats (i.e. fish species), or typically found within large waterbodies or coastal areas.

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant).

An assessment of potential impacts to these entities is not provided here given that no design and siting plans have yet been prepared upon which a detailed consideration of the likely impacts can be based.

The following classifications are used:

Presence of habitat

Present:	Potential or known habitat is present within the study area
Marginal:	Habitat present is not typical but may be suitable or habitat type is suitable but condition and microhabitat requirements of species are not present
Absent:	No potential or known habitat is present within the study area

Likelihood of occurrence

None:	Species known or predicted within the locality but no suitable habitat present within the study area
Unlikely: study area	Species known or predicted within the locality but unlikely to occur in the
Possible:	Species could occur in the study area
Present:	Species was recorded during the field investigations

[16] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment, Water, Heritage and the Arts.

B.1 Evaluation of the likelihood of EPBC threatened flora species and ecological communities

Species	Description of habitat	Presence of habitat	Likelihood of occurrence
Flora			
River Swamp Wallaby-grass *Amphibromus fluitans* V EPBC	River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels (NSW OEH 2013h).	Marginal – near dam and waterways only; but these are low quality habitats	Unlikely
Mauve Burr-daisy *Calotis glandulosa* V EPBC	The distribution of the Mauve Burr-daisy is centred on the Monaro and Kosciuszko regions. There are three known sites in the upper Shoalhaven catchment. It is found in montane and subalpine grasslands in the Australian Alps (dominated by Poa spp.), and montane or natural temperate grassland dominated by Kangaroo Grass (*Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area. It appears to be a coloniser of bare patches, which explains why it often occurs on roadsides and apparently common on roadsides in parts of the Monaro, though it does not persist for long in such sites. It does not appear to persist in heavily-grazed pastures of the Monaro or the Shoalhaven area.	Marginal – elevation and vegetation communities unsuitable	Unlikely
Trailing Hop-bush *Dodonaea procumbens* V EPBC	The Trailing Hop-bush is widely but patchily distributed across south-eastern Australia, where it occurs in New South Wales, Victoria and South Australia. This species grows in low-lying, often winter-wet areas in woodland, low open forests, heathland and grasslands, on sands and clays. Most populations in New South Wales occur either in in natural grassland or grassy woodland of Snow Gum (*Eucalyptus pauciflora*), usually on crests or slopes and on tilted sediments.	Absent	None – obvious plant and not seen

Species	Description of habitat	Presence of habitat	Likelihood of occurrence
Black Gum *Eucalyptus aggregata* V EPBC	The Black Gum is a rare species found from Capertee and Bathurst in central New South Wales, south through the central and southern tablelands. It typically grows in low lying areas with soils that are generally poorly drained, alluvial or swampy, and also in areas where there are natural frost hollows.	Absent	None – obvious tree and not seen
Spiny Peppercress *Lepidium aschersonii* V EPBC	This species is not widespread, occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). It is found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmanii*) and Grey Box (*Eucalyptus microcarpa*). In the south has been recorded growing in Bull Mallee (*Eucalyptus behriana*). It is typically recorded in grey loamy clays. Often the understorey is dominated by introduced plants, and vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter.	Marginal – overstorey species not present and geology generally not suitable	Very unlikely. Species has not been previously recorded from ACT.
Ginninderra Peppercress *Lepidium ginninderense* V EPBC	This short-lived forb species is known from only one site on Belconnen Naval Station, on the Ginninderra Creek floodplain, growing in grassland.	Marginal – no suitable floodplain or vegetation communities present	Very unlikely
Basalt Peppercress *Lepidium hyssopifolium* E EPBC	This short-lived forb species occurs in a variety of habitats including woodland with a grassy understorey and grassland. It appears to respond to disturbance, having appeared after soil disturbance at one site near Bungendore.	Marginal	Unlikely, due to rarity.
Hoary Sunray *Leucochrysum albicans subsp. albicans var. tricolor* E EPBC	This species may be locally common on the Southern Tablelands,. It grows in natural and secondary grasslands and grassy woodlands, often colonising disturbed sites such as road verges and other areas with thin soils, but does not persist well in grazed situations.	Marginal	Very unlikely – targeted surveys did not locate species

Species	Description of habitat	Presence of habitat	Likelihood of occurrence
Tuggeranong Lignum *Muehlenbeckia Tuggeranong* E EPBC	This species appears to be restricted to flood terraces at higher altitudes (680 – 1200 m a.s.l.). It is is known from only a few sites on flood terraces on the eastern bank of the Murrumbidgee River south of Canberra, in areas of rocky outcrops with pockets of silty sandy soil.	Absent. Site is not on a flood terrace	Very unlikely.
Cotoneaster Pomaderris *Pomaderris cotoneaster* E-EPBC	Shrub 1-3 m high with cream flowers. Occurs in south-eastern NSW (South Coast and Southern Tablelands regions) south from the Moss Vale district and in far eastern Vic. (East Gippsland region). Usually grows on shallow soils with outcropping rock, often associated with clifflines (above, on or below) or riverbanks. The species occurs in dry, shrubby open forest on north-west to south-west facing slopes	Absent. No rocks/cliff line present or rocky river banks	None. Obvious shrub and wasn't seen.
Pale Pomaderris *Pomaderris pallida* E-EPBC	The Pale Pomaderris is currently known from the ACT, southern NSW and eastern Victoria. In the ACT, this species is scattered along the Cotter, Paddys and Murrumbidgee Rivers and through the Molonglo Gorge. The Pale Pomaderris is found at numerous small sites along the plateau edge and very steep upper slopes and cliffs of river valleys at 480-600 m above sea level. The ACT sites are only on the eastern banks of the rivers, with an aspect ranging from north-westerly through westerly to southerly. The soils are shallow, pale brown sandy loams over granite rock and large, exposed granite boulders may be present.	Absent. No (rocky) river banks	None. Obvious shrub and wasn't seen.
Tarengo Leek Orchid *Prasophyllum petilum* E-EPBC	Known from three sites on the Southern Tablelands, at Boorowa, and Captain's Flat in NSW and Hall in the ACT, growing in grassland, Box-Gum Woodland or moist grassy flats, with kangaroo grass or wallaby grasses (*Austrodanthonia spp*). Flowers Oct-Nov (Bishop 1996).	Marginal – grassland composition not suitable	Unlikely – species was not observed at the site
Button Wrinklewort *Rutidosis leptorhynchoides* E EPBC	This perennial forb grows in scattered populations in natural temperate grassland or grassy woodland on the Southern Tablelands. It is known from the Red Hill Nature Reserve	Marginal – grassland composition not suitable	Unlikely – species was not observed at the site

Species	Description of habitat	Presence of habitat	Likelihood of occurrence
Large-fruit Fireweed, Large-fruit Groundsel *Senecio macrocarpus* V EPBC	The Large-fruit Groundsel is a small perennial plant endemic to south-eastern Australia, where it occurs primarily in South Australia and Victoria, and formerly occurred in Tasmania. It is also known from a small number of records in the NSW Southern Tablelands, north of the ACT and west of Lake George. It occurs in a variety of habitats, including grasslands, sedgelands, shrublands and woodlands, generally on sparsely vegetated sites on sandy loam to heavy clay soils, often in depressions that are waterlogged in winter.	Marginal. Soil type likely unsuitable – not waterlogged	Unlikely. Site is outside of known range. Small site area for survey and species wasn't seen.
Small purple-pea *Swainsona recta* E EPBC	Grows in grassland or grassy woodland on the Southern Tablelands and western slopes. Typically associated with open woodlands that have a predominantly native understorey of grasses including Kangaroo Grass, Speargrasses and Poa tussocks, but may also have some native shrubs present as well (ACT Gov. 1998).	Marginal – vegetation community within site boundaries generally not suitable	Very unlikely – targeted surveys did not locate species; likely present in adjacent rail corridor
Austral Toadflax *Thesium australe* V EPBC	This species is found in small populations across eastern NSW, on the coast and from the Northern to Southern Tablelands. It occurs in grassland or grassy woodland, sometimes in damp sites, and is almost invariably associated with kangaroo grass (*Themeda australis*).	Marginal – level of ongoing disturbance likely to be too high and very little Kangaroo Grass present	Unlikely - not found within the site

Species	Description of habitat	Presence of habitat	Likelihood of occurrence
EEC's			
Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory	Natural Temperate Grassland occurs on ridges, crests, hillsides, undulating plains, valleys and lower slopes, creeks, drainage lines and river flats. It is usually associated with heavy textured soils with low nutrient levels. Natural temperate grassland comprises of closed grassland, grassland and open grassland whose biomass is dominated by two or more of the perennial native tussock grasses *Themeda triandra* (Kangaroo Grass), *Austrodanthonia spp* (*wallaby grasses*), *Austrostipa spp* (speargrasses), *Bothriochloa macra* (Red Grass, Red-leg Grass) and/or *Poa* spp (snowgrasses). Mature tussock grasses range in height from moderately tall (25–50 cm) to tall (50–100 cm) (Commonwealth Endangered Species Scientific Subcommittee 2000). The spaces between the dominant grass tussocks are occupied by graminoids (grasses and grass-like plants) and a wide range of forbs (herbaceous, non-graminoid plants) which may comprise up to 70% of all plant species and form a distinct, lower layer of vegetation (Environment ACT 2005). Many forbs are from the daisy family (Asteraceae), or are lilies or native legumes. The perennial native grasses together with the native graminoids and forbs usually comprise more than 50% of the total plant cover (Environment ACT 2005).	Marginal - condition of vegetation not consistent with mapping criteria	Not present. Detailed flora surveys confirm vegetation composition not suitable
Box Gum Woodland CEC EPBC	White Box, Yellow Box, Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open grassy woodland community (sometimes occurring as a forest formation) , in which the dominant species are White Box *Eucalyptus albens*, Yellow Box *E. melliodora* or Blakely's Red Gum *E. blakelyi*.	Present	None for C'wealth listed TEC. ACT listed TEC is present

CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.* E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.* V EPBC = listed as Vulnerable under the Commonwealth *EPBC Act 1999*	CEEC EPBC = Critically Endangered Ecological Community listed under the Commonwealth *EPBC Act 1999* EEC EPBC = Endangered Ecological Community listed under the Commonwealth *EPBC Act 1999*

B.2 Evaluation of the likelihood and extent of impact on threatened fauna

The fauna species list is derived from a search of the EPBC Protected Matters Search Tool, both utilising a 10km buffer around the subject site. With regards to the evaluations provided below for each species included in the search results, fish species and marine waterbirds/shorebirds were collectively discounted from the evaluations given the complete lack of any identifiable suitable aquatic/marine habitat that could potentially support these species.

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
Aves			
Regent Honeyeater *Anthochaera phrygia* E EPBC	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia, particularly Box-Ironbark woodland, and riparian forests of River She-oak. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. The species is a generalist forager, mainly feeding on nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks or in mistletoe clumps.	Present/marginal. Some foraging habitat present with Mistletoe. The site does not provide breeding habitat (outside of breeding habitat areas).	Very unlikely – not recorded during targeted bird surveys
Aphelocephala leucopsis Southern Whiteface V - EPBC Act	Southern whiteface occur across most of mainland Australia south of the tropics, from the north- eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. It lives in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. It forages almost exclusively on the	Present/Marginal.	Unlikely - not recorded during targeted bird surveys

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
	ground, favouring habitat with low tree densities and an herbaceous understorey litter cover.		
Callocephalon fimbriatum Gang-gang Cockatoo E - EPBC Act	During summer, Gang-gang Cockatoos are found in tall mountain forests and woodlands, with dense shrubby understoreys. In winter, Gang-gangs will move to lower altitudes into drier, more open forests and woodlands. They feed mainly on seeds of native and introduced trees and shrubs, with a preference for eucalypts, wattles and introduced hawthorns. They will also eat berries, fruits, nuts and insects and their larvae. They nest in hollows of suitable trees.	Present	Possible – occasional visitor. Not recorded during targeted bird surveys
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo V – EPBC Act	South-eastern glossy black cockatoos are uncommon but widespread. They can be found from Mitchell, Queensland, through eastern New South Wales to East Gippsland, Victoria. They feed almost exclusively on the seeds of sheoaks (*Allocasuarina* spp. and *Casuarina* spp.), usually relying on one or two species within a region. They are hollow nesters, utilising large hollows in both living and dead eucalypt trees.	Marginal– no Casuarina sp. on site	Unlikely – no nearby records and low habitat suitability. Not recorded during targeted bird surveys
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) V – EPBC Act	Brown treecreepers (south-eastern) are endemic to south-eastern Australia from the Grampians in western Victoria, through central New South Wales to the Bunya Mountains in Queensland, and from the coast to the inland slopes of Great Dividing Range. In NSW the western boundary of the range of *Climacteris picumnus victoriae* runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell and along this line the subspecies intergrades with the arid zone subspecies of Brown Treecreeper *C. p. picumnus*. Brown treecreepers (south-eastern) occupy dry open eucalypt forests and woodlands. The subspecies mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. They also occur in mallee, forests and woodlands subject to periodic inundation, e.g., river red gum (*E. camaldulensis*) woodlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses in the upper Murray River.	Marginal. Vegetation of marginal/limited suitability	Possible but unlikely – occasional visitor only. Not recorded during targeted bird surveys

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
	Brown treecreepers (south-eastern) nest and roost in naturally occurring tree cavities in a variety of eucalypt species.		
Grey Falcon *Falco hypoleucos* V EPBC	The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia. The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread, although it is essentially confined to the arid and semi-arid zones at all times. The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses and has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter.	Marginal – no suitable breeding habitat observed	Unlikely. Not recorded during targeted bird surveys
Painted Honeyeater *Grantiella picta* V EPBC	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution The species inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Present/marginal. Some foraging habitat present with Mistletoe.	Unlikely – not recorded during targeted bird surveys
White-throated Needletail *Hirundapus caudacutus* V EPBC	The White-throated Needletail breeds in Asia, from central and south-eastern Siberia and Mongolia, east to the Maritime Territories of Russia, Sakhalin and the Kuril Islands and south to northern Japan and north-eastern China. Most White-throated Needletails spend the non-breeding season in Australasia, mainly in Australia and is widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences	Marginal – foraging habitat only.	Unlikely - mainly aerial species/rarely comes to ground. Breeds elsewhere. Not recorded during targeted bird surveys

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
	exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest.		
Swift Parrot *Lathamus discolor* E EPBC	Abundance of flowering eucalypts and banksias is required by this species, whose range includes southern Queensland to South Australia. This nectar feeder can gather in large groups when feed trees are in flower. It breeds in Tasmania and migrates to the south-east mainland between March and October.	Marginal. Some flowering trees in the surrounding area. No breeding habitat (breeds only in Tasmania)	Unlikely. Breeds elsewhere. Not recorded during targeted bird surveys
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) E – EPBC Act	Hooded robins (south-eastern) occur in south-eastern Australia from far south-east Queensland to Yorke Peninsula, South Australia, intergrading with *M. c. picata* in the southern Murray-Darling basin. They prefer dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer. They avoid woodlands with tall trees or dense tree cover but sometimes occur in tall, dense heaths with scattered open areas. Nests comprise small, neat cups of bark and grasses bound with webs.	Present/Marginal. Understorey lacks complexity of native grasses	Possible/unlikey – Not recorded during targeted bird surveys
Neophema chrysostoma Blue-winged Parrot V – EPBC Act	Breeds on mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and sometimes in the far south-east of South Australia, and the north-western, central and eastern parts of Tasmania. During the non-breeding period, from autumn to early spring, birds are recorded from northern Victoria, eastern South Australia, south-western Queensland and western New South Wales with some birds reaching south-eastern New South Wales and eastern Victoria, particularly on the southern migration. While on the mainland, mobile flocks feed in saltmarsh and rough pasture in coastal Victoria. They are known to move more than 100 km inland during winter to feed in semi-arid chenopod shrubland and sparse grassland. Nests are made in hollows, preferably with a vertical opening, in live or dead trees or stumps.	Marginal – lack of suitable foraging habitat	Unlikely. Not recorded during targeted bird surveys

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
Superb Parrot *Polytelis swainsonii* V EPBC	The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west, although the species has been moving south into the ACT in recent years (OEH, 2018). Inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. Nests in large tree hollows. Species known to be used for nesting are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Feed in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants.	Present.	Unlikely. Not recorded during targeted bird surveys and competition from other birds likely too high for this species
Australian Painted Snipe *Rostratula australis* E EPBC	Little is known of the ecology, habitat requirements and reproductive biology of Australian Painted Snipe. They feed in shallow water or at the waters' edge and on mudflats. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater.	Marginal – at dam only	Unlikely. Not recorded during targeted bird surveys
Stagonopleura guttata Diamond Firetail V – EPBC Act	Diamond firetails occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea. Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover. Nests are bottle-shaped and are made of green grass blades and stems lined with fine grasses.	Present. Possible foraging habitat. No breeding habitat (nests) present/seen at site.	Present. Species seen at site
Mammals			
Large-eared Pied Bat, Large Pied Bat *Chalinolobus dwyeri* V EPBC	Roosting habitat typically consists of sandstone cliffs and fertile woodland valley habitat within close proximity of each other.	Absent.	None

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
Spotted-tailed Quoll *Dasyurus maculatus* E EPBC	This species is found in a variety of habitat types including rainforest, open forest, woodland, coastal heath and inland riparian forest from the subalpine zone to the coastline. Species requires hollow bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	Marginal. Lack of suitable denning sites and low foraging habitat suitability (prey availability)	Very unlikely
Yellow-bellied Glider (south-eastern) *Petaurus australis australis* V - EPBC	The yellow-bellied glider (south-eastern) occurs in eucalypt-dominated woodlands and forests, including both wet and dry sclerophyll forests. Abundance is highly dependent on habitat suitability, which is in turn determined by forest age and floristics and shows a preference for large patches of mature old growth forest that provide suitable trees for foraging and shelter. The species uses hollow-bearing trees for breeding and shows a preference for smooth-barked eucalypts. The species feeds mainly on sap which it extracts by chewing off sections of bark from trees, with usually only a few trees selected for repeat feeding, and often leaving a number distinctive incision marks/scars on the trunks of feed trees.	Marginal. Small area of woodland with limited connectivity/contiguous arboreal habitat corridors to other suitable areas	Unlikely – no evidence of feeding, no nearby records and not seen during spotlighting surveys
Koala *Phascolarctos cinereus* V EPBC	This species inhabits eucalypt woodlands and forests over a broad but fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts; they are also known from several sites on the southern tablelands.	Marginal. Very low abundance of suitable food trees	None – not previously recorded and not seen during extensive surveys at site
Grey-headed Flying-fox *Pteropus poliocephalus* V EPBC	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. Occur in rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source, commonly found in gullies, close to water, or in vegetation with a dense canopy. The closest is likely to be the large colony at Batemans Bay. Forage on the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and	Marginal – Few suitable feed trees and no camp trees present in area	Unlikely – potential occasional visitor. Not seen during spotlighting surveys

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
	Banksia, and fruits of rainforest trees and vines. Travel up to 50 km to forage.		
Amphibians			
Green and Golden Bell Frog *Litoria aurea* V - EPBC	The Green and Golden Bell Frog occurs mainly along coastal lowland areas of eastern NSW and Victoria. The furthest inland record of the species is at a recently discovered population near Hoskinstown in the Southern Tablelands (referred to as the Molonglo population) (Osborne et al. 2008). The species was previously known from elsewhere in the Southern Tablelands, but is now considered to have disappeared from the ACT and central slopes around Bathurst. Green and Golden Bell Frogs have been found in differing habitat in NSW and Victoria. In NSW, the species commonly occupies disturbed habitats, and breeds largely in ephemeral ponds , but also need various other habitats for different aspects of their life cycle including foraging, breeding, over-wintering and dispersal.	Marginal/absent. Dam supports limited suitable aquatic vegetation.	Very unlikely. Not recorded at site during surveys
Booroolong Frog *Litoria booroolongensis* E EPBC	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.	Absent. No rocky stream habitat	None
Yellow-spotted Tree Frog *Litoria castanea* E EPBC	Requires large permanent ponds or slow flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation. Adults are active during spring and summer and bask on sunny days, and moves and forages at night on grassy banks.	Absent. Lack of suitable aquatic habitats	None

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
Growling Grass Frog Litoria raniformis V EPBC	This species is found mostly amongst emergent vegetation, including *Typha sp.* (bullrush), *Phragmites sp.* (reeds) and *Eleocharis sp.*(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams.	Marginal/absent. Dam supports limited suitable aquatic vegetation.	Very unlikely. Not recorded at site during surveys
Reptiles			
Pink-tailed Worm-lizard *Aprasia parapulchella* V EPBC	The Pink-tailed Legless Lizard is only known from the Central and Southern Tablelands, and the South West Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. The species inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites.	Present/marginal. Rocky outcrops are present within the site, but heavily embedded and low vegetation quality.	Possible/unlikely. Further targeted survey recommended if development proposed in rocky areas
Striped Legless Lizard *Delma impar* V EPBC	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. Also in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component and in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, *Austrostipa* spp,. *Poa* spp., and occasionally wallaby grasses *Rytidosperma* spp. Goes below ground or under rocks or logs over winter.	Present/Marginal. Low suitability of groundcover vegetation and very little native tussocky grassland structure.	Very Unlikely. Targeted surveys undertaken and did not record species
Grassland Earless Dragon	The grassland earless dragon is a native grassland specialist inhabiting natural temperate grasslands (as described above in Appendix A), where it occupies burrows of the wolf spider (*Lycosa*	Present/marginal. Rocky outcrops are present within the site, but heavily	Very unlikely

Species and Status	Description of habitat[17]	Presence of habitat	Likelihood of occurrence
Tympanocryptis pinguicolla E EPBC	spp.) and wood cricket (*Coorabooorama canberrae*), embedded surface rocks and tussocks.	embedded and low vegetation quality.	
Insects			
Key's Matchstick Grasshopper *Keyacris scurra* E EPBC	Key's Matchstick Grasshopper is a slender, wingless grasshopper. The species is endemic to NSW, the ACT and Victoria (although possibly now extinct in Victoria). This species is typically recorded in native grasslands in the following land-uses: cemeteries, along railway easements, travelling stock routes and more recently conservation reserves in the ACT. r is usually found in native grasslands but it has also been recorded in other vegetation associations containing a native grass understory (especially kangaroo grass Themeda triandra) and known food plants (particularly Asteraceae). Although it does not feed on Themeda, it may be important for providing protection from predators. Disturbance appears to be an important determinant of site occupancy and it appears to be absent from sites where inappropriate disturbance occurs (such as overgrazing at inappropriate times of year which can interrupt the life cycle of the species).	Marginal – Lack of suitable open grassland areas and suitable species compositions.	Unlikely.
Golden Sun Moth *Synemon plana* CE EPBC	The golden sun moth has been recorded in native grasslands and grassy woodlands containing wallaby grass (*Austrodanthonia* spp.), speargrass (*Austrostipa* spp.), and Bothriochloa, as well as in degraded grasslands dominated by the exotic Chilean needlegrass (*Nassella nessiana*), a weed of national significance.	Marginal	Unlikely – species not recorded during targeted surveys

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E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

CAMBA = Chinese-Australia Migratory Bird Agreement

JAMBA = Japan-Australia Migratory Bird Agreement

APPENDIX C: Flora records.

Relative abundance is given by a cover abundance scale/score (modified Braun-Blanquet, and as per the C/A score used in Rehwinkle, 2015) and assessed visually as an average score within each of the four survey areas established for this assessment as follows:

1. < 5% cover and solitary (<4 individuals)
2. < 5% cover and few (4–15 individuals)
3. < 5% cover and numerous/scattered (>15 individuals)
4. 5% – <25% cover
5. 25% – <50% cover
6. 50% – <75% cover
7. 75% cover and greater.

For trees (only), the following cover/abundance codes have been applied: d = Dominant; o = Occasional; r = Rare

GF = Growth Form; codes are as follows: T = tree; S = shrub; G = grass; H/F/S = herb/forb/sedge (but includes also bryophytes/mosses and other graminoids); EP = epiphytic parasite

Numbers inside brackets are for groundcover species only; numbers outside brackets are for all species.

"*" refers to plants seen nearby to but outside of the 20m x 20m rapid flora survey plots.

Species	Common name	GF	A	B	C	D	E	F	G
Exotic Species									
Acetosella vulgaris	Sorrel	H/F/S	3	3	3		3	3	2
Arctotheca calendula	Capeweed	H/F/S			3*			3*	3*
Avena sp.	Oats	G			3	3			3*
Briza maxima	Quaking Grass	G							3
Bromus sp. (hordaceus?)	a Brome grass	G							3
Conyza bonariensis	Fleabane	H/F/S	3	3		4	2	3	3
Cyperus eragrostis	Umbrella Sedge	H/F/S	2		3				
Digitaria sp.	a Finger Grass	G	3						
Dittrichia sp.	a Stinkwort	H/F/S			3	3			
Echium plantagineum	Paterson's Curse	H/F/S			3		2	2	
Eleusine tristachya	Goose Grass	G				3	3	3	3
Eragrostis curvula	African Lovegrass	G	5	3	4	4	5	4	3
Euphorbia sp. (helioscopia?)	a (Sun?) Spurge	H/F/S				3			
Gamochaeta pupurea	Purple Cudweed	H/F/S						2	
Hirschfeldia incana	Buchan Weed	H/F/S				3	3	3	2
Hypericum perforatum	St John's Wort	H/F/S	3	3	4	3	4	3	3
Hypochaeris sp.	Flatweed	H/F/S					3	3	3
Lepidium sp. (africanus?)	a (Common) Peppercress	H/F/S			2				
Malva (neglecta?)	Dwarf Mallow	H/F/S					2	2	
Modiola caroliniana	Red-flowered Mallow	H/F/S							3
Nassella trichotoma	Serrated Tussock	G					2		
Onopordum acanthium	Scotch Thistle	H/F/S							2
Panicum capillare	Witchgrass	G	3						
Paspalum dilatatum	Paspalum	G	4						
Phalaris aquatica	Phalaris	G	4	3		4	4	4	4
Plantago lanceolata	Ribwort Plantain	H/F/S	3		3	3	3	3	3
Poa annua	Winter Grass	G							3
Pyracantha sp.	Firethorn	S						2*	2*

Rosa rubiginosa	Briar Rose	S			2				
Rubus sp.	Blackberry	S	3	3					3
Spergularia rubra	Sandspurry	H/F/S			3*	3*	3*	3*	
Sporobolus africanus	Parramatta Grass	G	4						
Taraxacum officionale	Dandelion	H/F/S	3						
Tragopogon dubius	Goatsbeard	H/F/S							2
Trifolium dubium	Yellow Suckling Clover	H/F/S				3			
Trifolium sp.	a Clover	H/F/S			3	3			
Verbascum thapsus	Great Mullein	H/F/S					2	2	
Verbena bonariensis	Purpletop	H/F/S					3	3	3
Vulpia myuros	Rat's Tail Fescue	G			3				3
Total Exotic Species (39)			***13***	***6***	***12(+2*)***	***12(+1*)***	***14(+1*)***	***14(+3*)***	***18(+3*)***
Native Species									
Acacia baileyana	Cootamundra Wattle	S		3					
Acacia dealbata	Silver Wattle	S							2
Acacia decurrens	Green Wattle	S				2			2
Acacia implexa	Hickory Wattle	S							2
Amyema sp.	Mistletoe	EP		o					o
Austrostipa begeniculata	Tall Speargrass	G	3	4	3			3	
Bothriochloa macra	Redgrass	G	3						
Brachychiton populneus	Kurrajong	T							r
a Bryophyte	a Moss	H/F/S			2				
Bursaria spinosa	Native Blackthorn	S		2					
Carex appressa	Tall Sedge	H/F/S			3				
Cassinia quinquefaria	Cough-bush	S		2					3
Crassula (sieberiana?)	Australian Stonecrop	H/F/S			2				
*Cynodon dactylon^*	Couch	G				4			
Cyperus difformis	Rice Sedge	H/F/S			3				
Dianella sp.	a Flax-lily	H/F/S							3
Eucalyptus blakelyi	Blakely's Red Gum	T		o					d

Eucalyptus bridgesiana	Apple Box	T		c					r
Eucalyptus mannifera	Brittle Gum	T		d					
Eucalyptus melliodora	Yellow Box	T		o					r
Eucalyptus polyanthemos	Red Box	T		c					
Eucalyptus radiata ssp. *robertsonii*	Narrow-leaved Peppermint	T							r
Eucalyptus rubida	Candlebark	T		r					
Exocarpos cuppressformis	Cherry Ballart	T		o					
Geranium solanderi	Native Geranium	H/F/S							3
Hypericum gramineum	Small St John's Wort	H/F/S							2*
Juncus sp. (filicaulis?)	a Pinrush	H/F/S	2		3		3		
Olearia glandulosa	Swamp Daisy-bush	H/F/S							2
Oxalis perennanse	Grassland Wood Sorrel	H/F/S		2			2		3
Poa sp.	Poa Tussock	G						3	
Pseudognaphalium luteoalbum	Jersey Cudweed	H/F/S						1	3
Senecio sp(?)	a Groundsel	H/F/S							2
Themeda australis	Kangaroo Grass	G		2					
Vittadinia sp.	New-holland Daisy	H/F/S		2					
Total Native Species (34)			***3***	***15 (7)***	***6***	***2***	***2***	***3***	***17 (10+1*)***

APPENDIX D: Fauna records.

Table D.1. Avifauna records at the site

Scientific Name	Common Name	Survey A 2/8/23	Survey B 30/8/23	Survey C 12/10/23	Survey D 12/12/23	Other/Opportunistic sightings & Comments
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		X		X	
**Acridotheres tristis*	Common/Indian Myna	X	X	X	X	Dominant species in woodland areas (along with Starlings)
Anas superciliosa	Pacific Black Duck			X		Observed at dam
Anthochaera carunculata	Red Wattlebird	X			X	Regularly seen in N & W woodland areas
Anthus novaeseelandiae	Australasian Pipit		X	X		
Aquila audax	Wedge-tailed Eagle	X		X		Observed on powerlines in E woodland area and perching on tree in central woodland area
Cacatua galerita	Sulphur-crested Cockatoo	X		X		
Cacatua sanguinea	Little Corella			X	X	
Calyptorhynchus funereus	Yellow-tailed Black Cockatoo				X	Observed flying over site - briefly alighted in trees in central parts of site
Chenonetta jubata	Australian Wood Duck		X	X		Observed at dam
Coracina novaehollandiae	Black-faced Cuckoo-shrike	X	X		X	
Corcorax melanorhamphos	White-winged Chough					Observed in E woodland area near railway
Corvus coronoides	Australian Raven		X	X	X	
Dacelo novaeguineae	Laughing Kookaburra		X		X	
Egretta novaehollandiae	White-faced Heron					Observed (once) at dam after (Nov) rainfall
Elanus axillaris	Black-shouldered Kite				X	
Eolophus roseicapillus	Galah	X		X	X	
Falco cenchroides	Nankeen Kestrel					Regularly observed in open paddock areas - mostly in middle parts of day
Gymnorhina tibicen	Australian Magpie	X	X	X	X	
Grallina cyanoleuca	Magpie-lark		X	X	X	
Hirundo neoxena	Welcome Swallow	X	X	X	X	

Lichenostomus penicillatus	White-plumed Honeyeater		X			
Malurus cyaneus	Superb Fairy Wren	X	X		X	Regularly seen in N & W woodland areas
Manorina melanocephala	Noisy Miner				X	Regularly seen in N & W woodland areas
Neochmia temporalis	Red-browed Finch	X			X	Regularly seen in E & W woodland areas
Ocyphaps lophotes	Crested Pigeon		X	X		
Pardalotus striatus	Striated Pardalote					Observed in E woodland area near railway
Phaps chalcoptera	Common Bronzewing					Observed in E woodland area near railway
Philemon corniculatus	Noisy Friarbird				X	
Platycercus elegans	Crimson Rosella	X		X	X	
Platycercus eximus	Eastern Rosella	X	X			
Porphyrio porphyrio	Purple Swamphen					Observed in N margins of site after rain
Psephotus haematonotus	Red-rumped Parrot		X	X		Regularly seen in N & W woodland areas
Rhipidura albiscapa	Grey Fantail	X			X	
Rhipidura leucophrys	Willy Wagtail	X	X			
Stagonopleura guttata	Diamond Firetail					Single male seen in Firethorn bush in Area C (1/8/23)
Strepera graculina	Pied Currawong		X		X	
**Sturnus vulgaris*	Common Starling	X	X	X	X	Dominant species at site - regularly seen in N woodland in/around HBT
Threskiornis moluccus	Australian White Ibis			X		Occasionally seen in N margins of site
Turdus merula	Common/Eurasian Blackbird					Observed in E woodland area near railway
Vanellus miles	Masked Lapwing				X	Observed in N margins of site after rain
Zosterops lateralis	Silvereye					Observed in E woodland area near railway
Total Species	**42**	**15**	**18**	**17**	**22**	

*denotes non-native species

Table D.2. Mammals recorded at the site

Scientific Name	Common Name	Area/Notes
Equus caballus	Horse	Agisted across majority of site to S of main access track
Macropus giganteus	Eastern Grey Kangaroo	Regularly seen across entire site area
Oryctolagus cunniculus	European Rabbit	Seen occasionally in/around woodland areas - lots of scats
Rattus sp.	Rat	Rat scats (likely Black Rat; *R. rattus*) observed in fallen timber pile
Vombatus ursinus	Common Wombat	Burrow and (mod fresh) scats observed in N woodland
Vulpes vulpes	Euorpean Red Fox	Observed in far S of site during 2nd spotlight

Table D.3. Reptiles recorded at the site

Scientific Name	Common Name	Tiles	Other
Lampropholis guitchenoti	Grass Skink	X	
Pseudemoia pagenstecheri	Tussock Skink	X	

Table D.4. Frogs recorded at the site

Scientific Name	Common Name	Dam	Waterway
Crinia parinsignifera	Eastern Sign-bearing Froglet		X*
Crinia signifera	Common Eastern Froglet	X	X*
Limnodynastes tasmaniensis	Spotted Marsh Frog	X	
Litoria verreauxii	Whistling Tree Frog	X	X*

*recorded after recent rain in early-mid November 2023

APPENDIX E. Additional Database Maps of Threatened Species

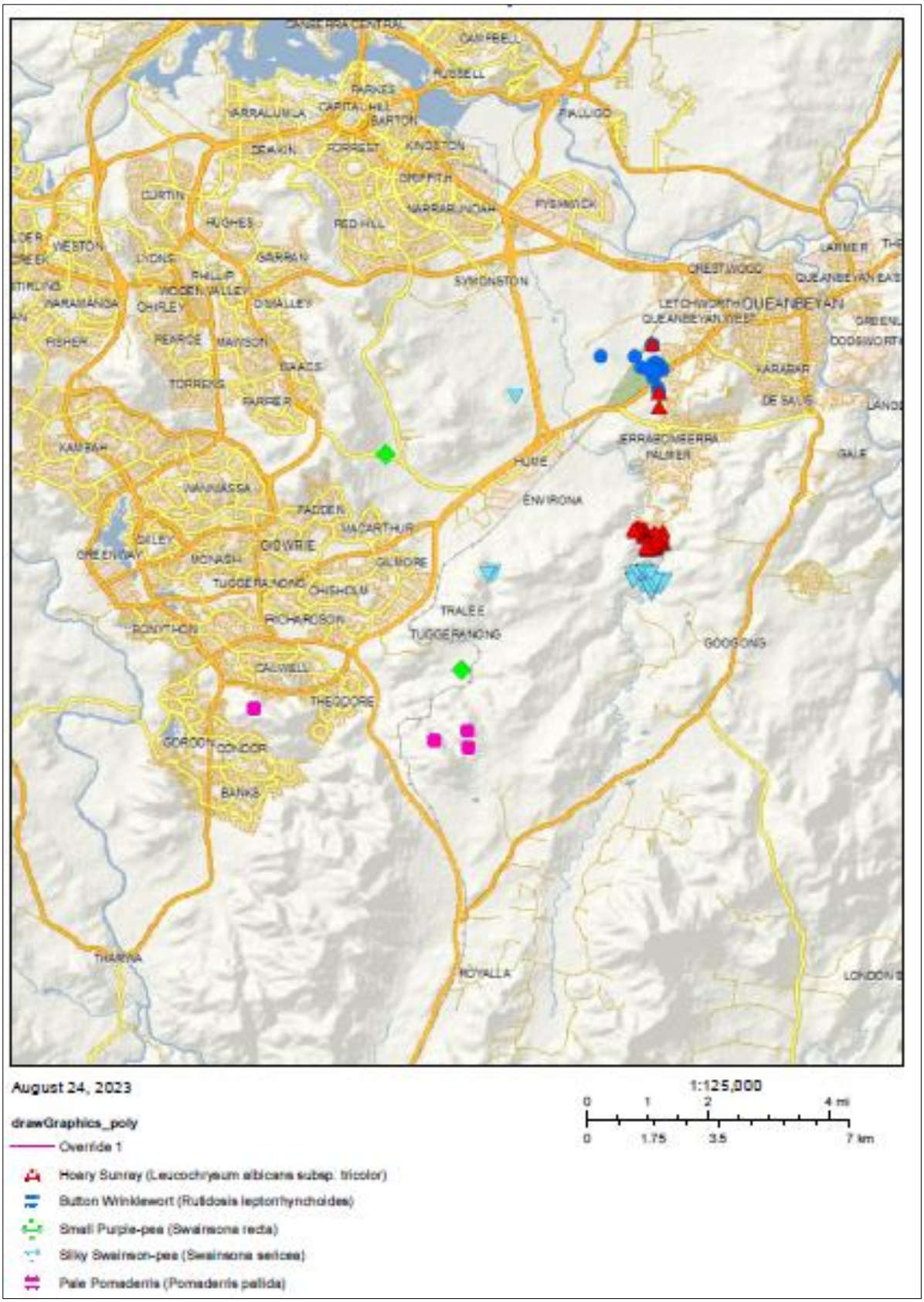


Figure E.1. NSW BioNet Atlas records of threatened flora in the local area

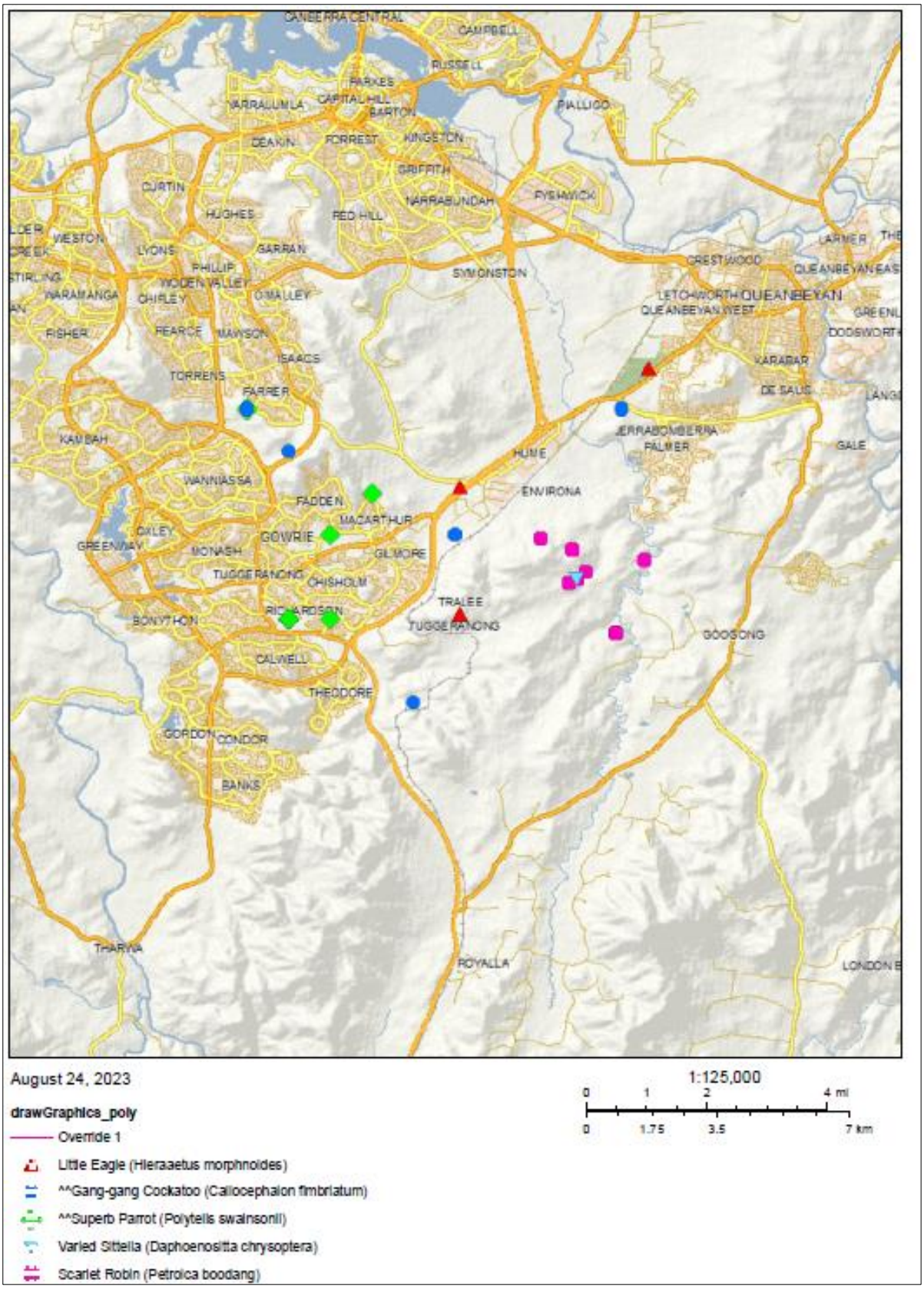


Figure E.2. NSW BioNet Atlas records of threatened fauna in the local area – birds (ACT-listed)

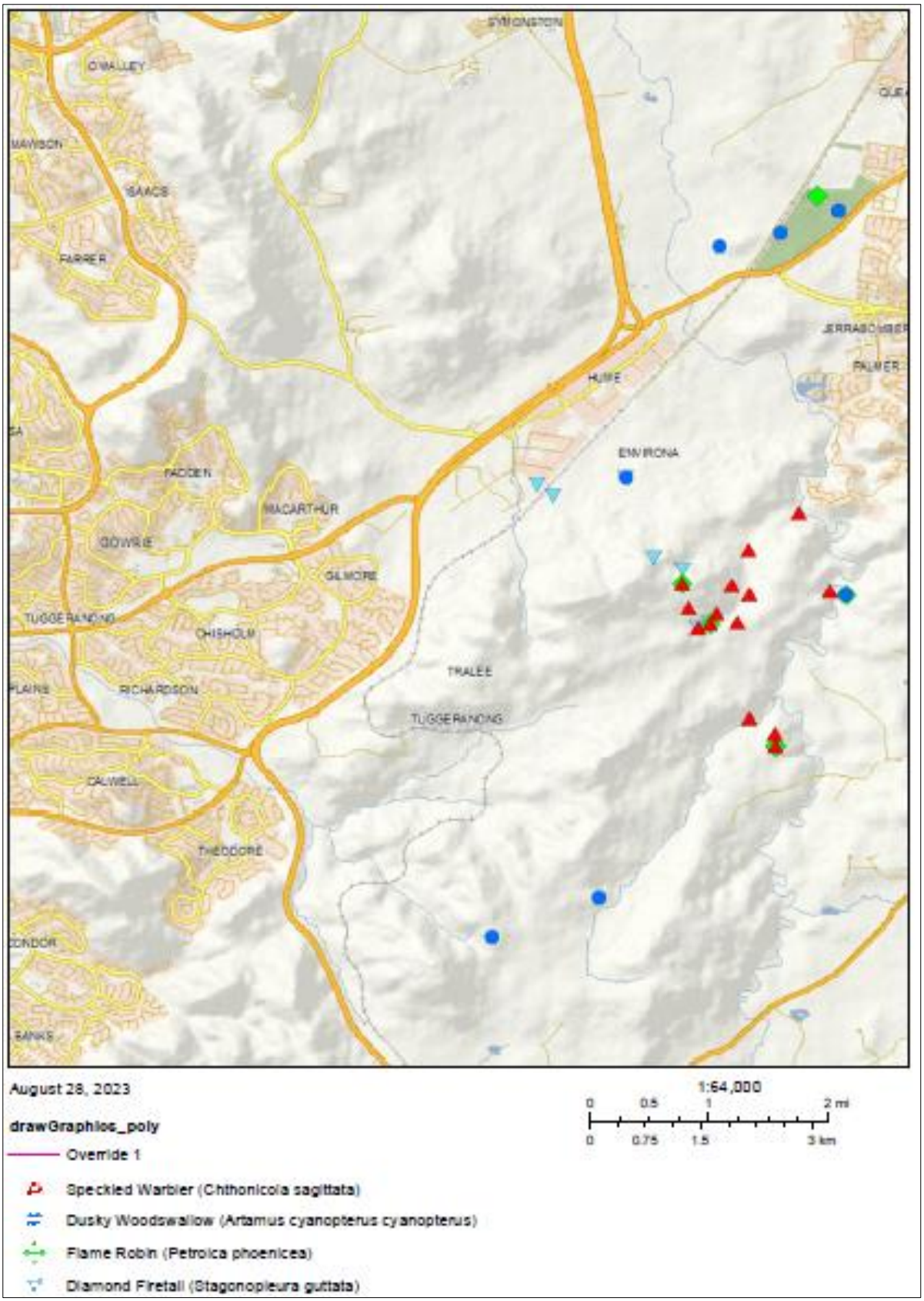


Figure E.3. NSW BioNet Atlas records of threatened fauna in the local area – birds (some are not ACT-listed)

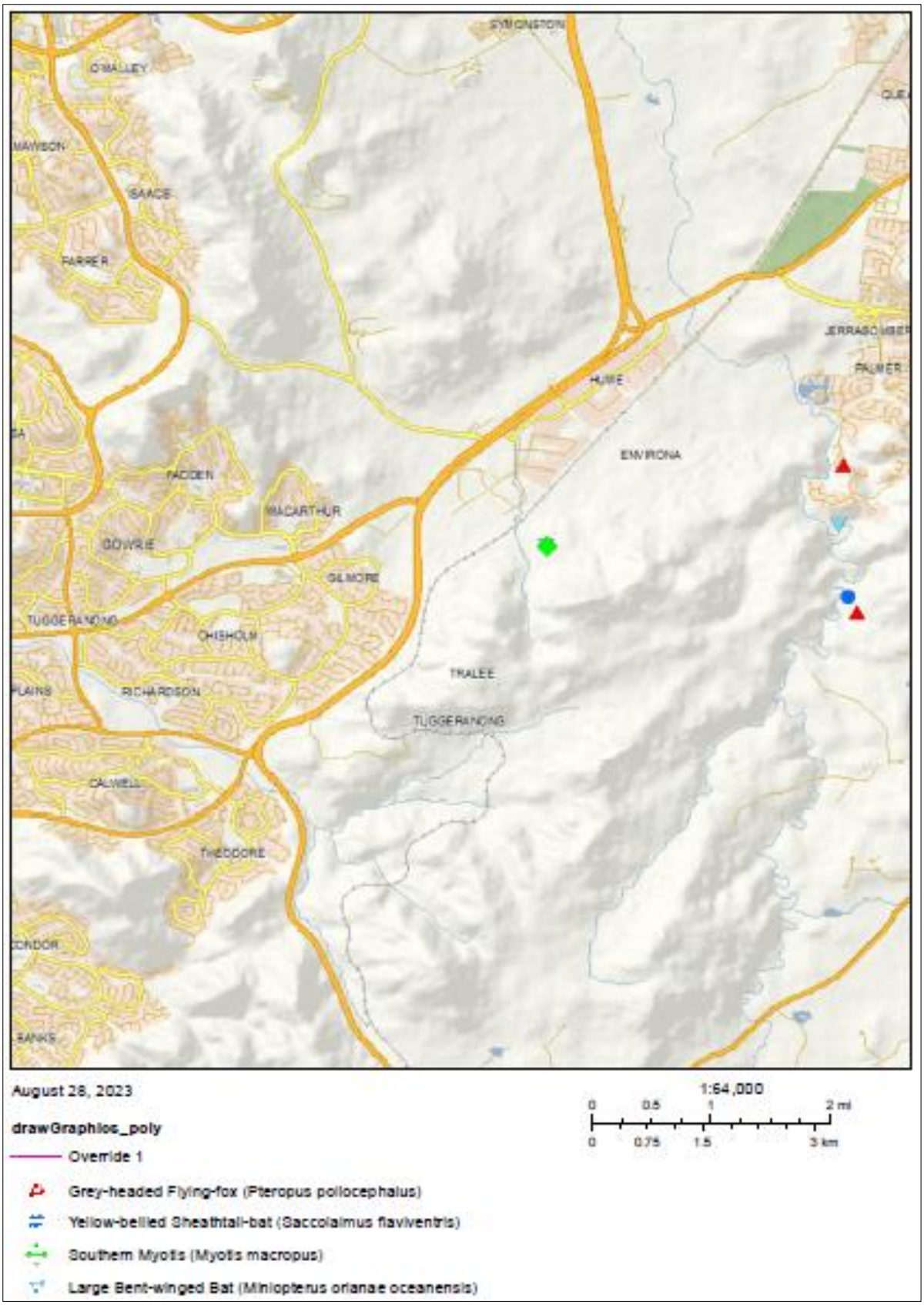


Figure E.4. NSW BioNet Atlas records of threatened fauna in the local area – mammals

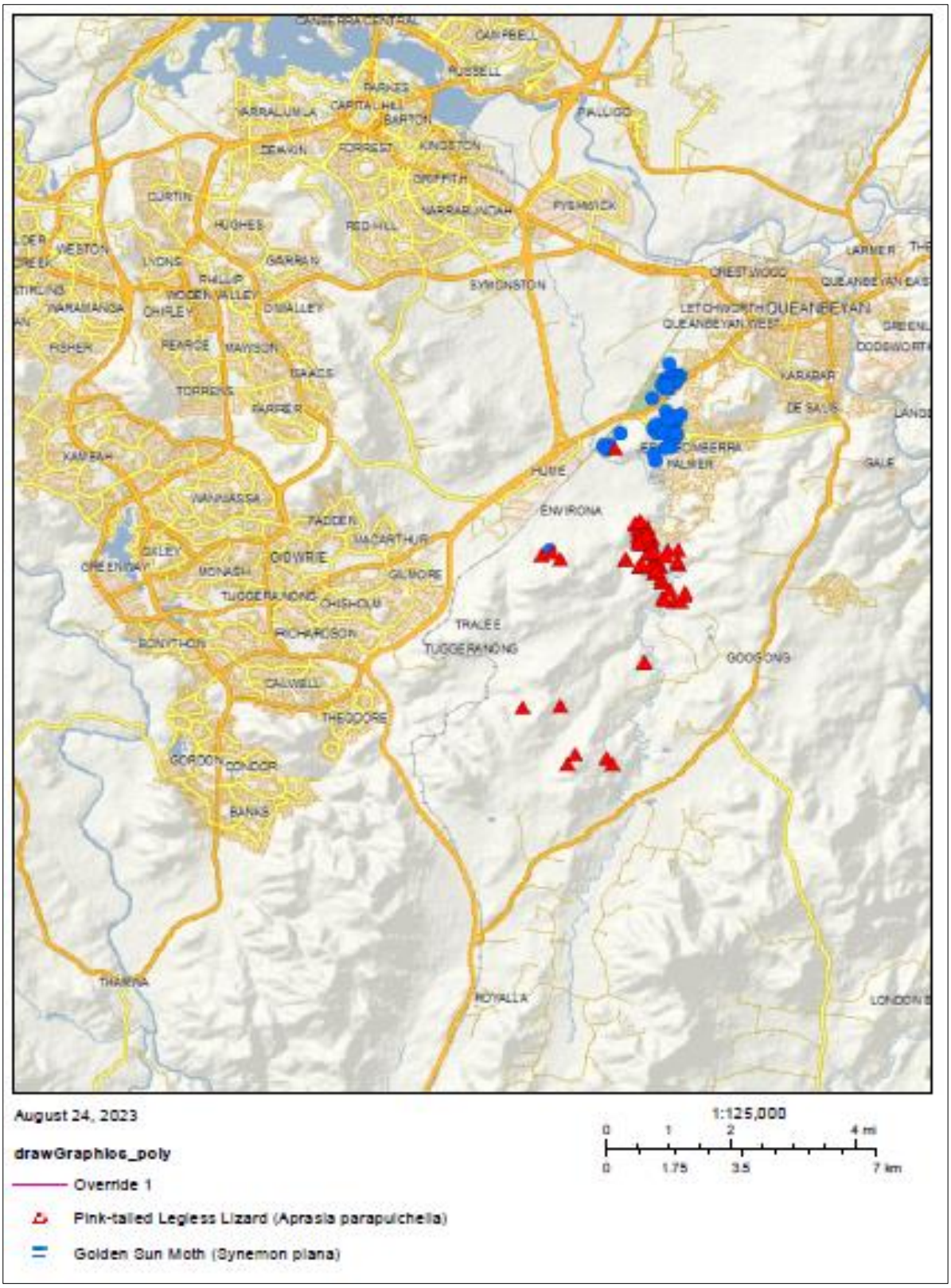


Figure E.5. NSW BioNet Atlas records of threatened fauna in the local area – reptiles and insects

APPENDIX F. Site Photos



Site Photo 1. Northern woodland patch (BGGW TEC) near flora plot G



Site Photo 2. HBT15



Site Photo 3. HBT 16 (dead stag) and rocky outcrops with very high embeddedness



Site Photo 4. HBT 12. Note: Diamond Firetail seen in Firethorn bush at base of tree



Site Photo 5. Rocky outcrop in southwestern margins of site showing high degree of embeddedness and very low vegetation cover, dominated by exotic species.



Site Photo 6. HBT 13 (dead stag)



Site Photo 7. Woodland patch (not BGGW TEC) along western site boundary



Site Photo 8. Fallen timber pile in north of site



Site Photo 9. SLL Tile Survey Site 1: 30/8/2023 (deployment day)



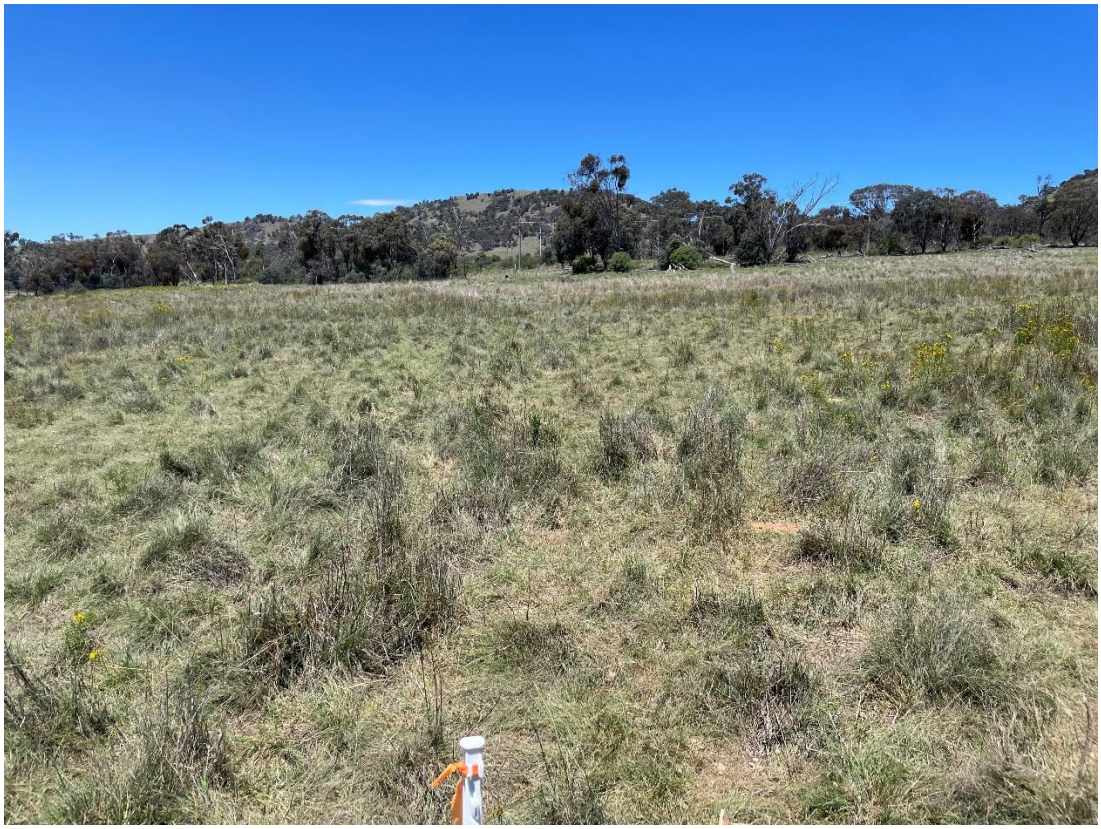
Site Photo 10. SLL Tile Survey Site 2: 30/8/2023 (deployment day)



Site Photo 11. SLL Tile Survey Site 3: 30/8/2023 (deployment day)



Site photo 12. View of general horse agistment paddock area showing very low groundcover biomass and no tussock structure (hence decision not to undertake SLL tile surveys in these areas)



Site Photo 13. SLL Tile Survey Site 1: 6/12/2023 (Check # 11/12)



Site Photo 14. SLL Tile Survey Site 2: 12/12/2023 (Final Check # 12/12)



Site Photo 15. SLL Tile Survey Site 3: 6/12/2023 (Check # 11/12). Note: Small Purple-pea record is in this general location.

APPENDIX G. Pink-tailed Worm-lizard Habitat Mapping Criteria

Summary extract of "Molonglo Standards" developed by Osborne and Wong.

Four classes of habitat quality have been established in the methods and include:

High quality habitat

High quality habitat consists of suitable rocky areas generally dominated by, or with a large component of, kangaroo grass (*Themeda triandra*) or dominated by other graminoides from the large tussock functional such as *Aristida ramosa*, *Cymbopogon refractus*, *Poa sieberiana* and/or *Austrodanthonia* spp. and a range of native forbs species and graminoids such as *Lomandra* spp. and *Dianella*. Areas dominated by other smaller tussock forming species such as *Austrostipa scabra*), but also supported at least three disturbance-sensitive forb or graminoid species. A requirement of the inclusion of sites with these species is that they should have an occurrence of at least a few individuals (e.g. 4-15 individuals observed across the site polygon; following Rehwinkel 2007; see Appendix C). Such sites also may support a diverse open cover of low or prostrate shrubs. Exotic annual species such as hares foot clover (*Trifolium arevense*) and *Vulpia* spp. may also be present.

Moderate quality habitat

Suitable rocky areas that have a less diverse ground cover usually dominated by spear grasses (*Austrostipa* spp.) and wallaby grasses (*Austrodanthonia* spp.) or other disturbance tolerant native grasses. Native forb species may be present, but in reduced abundance when compared to higher quality habitat. Exotic annual species such as haresfoot clover (*Trifolium arvense*), wild oats (*Avena* sp.), and saffron thistle (*Carthamus lanatus*) may also be present. Typically, less than three disturbance sensitive species will be present.

Low quality habitat

Suitable rocky areas that have been subject to very high levels of disturbance (typically through pasture improvement) are considered to no longer provide potential habitat. However, because it is still possible that the species may occur in very low densities at sites like this, the habitat is considered to be of a low quality. The sites are likely to have high levels of disturbance to the soil layer (erosion, compaction and particularly nitrification) and any vegetation present will be dominated by sown pasture grasses, other agronomic species and weeds; includes former sheep camps that no longer support native ground cover. The low ranking is also given to sites that are highly invaded with weeds (e.g. smothered with blackberry or completely over grown with exotic grasses).

Potential habitat under semi-open tree canopy

Past surveys in the ACT found PTWL do not occur within rocky areas within forest and woodland if the sites are beneath tree canopy (shaded), however, a few individuals have been found in clearings within forest and woodland (Wong *et al.* 2011). This indicates that lizards may be capable of moving through forest and woodland cover to occupy these more open patches.