

PLACE LABORATORY

SOUTHERN MEMORIAL PARK

PRELIMINARY ECOLOGICAL ASSESSMENT

DECEMBER 2020

CONFIDENTIAL



Question today Imagine tomorrow Create for the future

Southern Memorial Park Preliminary Ecological Assessment

Place Laboratory

WSP

Level 1, 121 Marcus Clarke Street

Canberra ACT 2601

PO Box 1551




Canberra ACT 2600

Tel: +61 2 6201 9600

Fax: +61 2 6201 9666

wsp.com

REV	DATE	DETAILS
A	12/06/2020	Draft Report
B	09/12/2020	Final Report

	NAME	DATE	SIGNATURE
Prepared by:	Lauren Smith Alex Garrett	09/12/2020	
Reviewed by:	Selga Harrington	09/12/2020	
Approved by:	Selga Harrington	09/12/2020	

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.



TABLE OF CONTENTS

	ABBREVIATIONS	III
1	INTRODUCTION	1
1.1	PROJECT BACKGROUND	1
1.2	STUDY AREA	1
2	METHODS	1
2.1	DESKTOP ASSESSMENT	1
2.2	SITE INSPECTION.....	2
2.2.1	FLORA.....	2
2.2.2	FAUNA	2
2.3	LIKELIHOOD OF OCCURRENCE ASSESSMENT	3
2.4	CONSERVATION SIGNIFICANCE ASSESSMENT.....	3
3	RESULTS.....	5
3.1	CURRENT MASTERPLAN	5
3.2	VEGETATION COMMUNITIES.....	1
3.2.1	BLAKELY'S RED GUM – YELLOW BOX ± WHITE BOX TALL GRASSY WOODLAND OF THE UPPER SOUTH WESTERN SLOPES AND WESTERN SOUTH EASTERN HIGHLANDS BIOREGIONS (U19)	2
3.2.2	RED BOX TALL GRASS-SHRUB WOODLANDS PRIMARILY ON HILLSLOPES AND FOOTSLOPES IN THE AUSTRALIAN CAPITAL TERRITORY_Q6	2
3.2.3	DERIVED NATIVE GRASSLAND.....	3
3.2.4	EXOTIC GRASSLAND	4
3.2.5	AMENITY PLANTING – NATIVE	5
3.3	FAUNA HABITAT AND CONNECTIVITY	6
3.3.1	OPEN WOODLAND	6
3.3.2	GRASSLAND	6
3.3.3	FARM DAMS AND CREEKS.....	7
3.3.4	CONNECTIVITY	7
4	THREATENED BIODIVERSITY.....	8
4.1	THREATENED ECOLOGICAL COMMUNITIES	8
4.1.1	BOX GUM WOODLAND AND DERIVED GRASSLAND	8
4.1.2	NATURAL TEMPERATE GRASSLAND.....	11
4.1.3	ALPINE SPHAGNUM BOGS AND ASSOCIATED FENS.....	11
4.2	THREATENED SPECIES	11
4.2.1	FLORA.....	11
4.2.2	FAUNA	11



5	OPPORTUNITIES AND CONSTRAINTS	15
6	CONCLUSIONS AND RECOMMENDATIONS.....	19
7	LIMITATIONS	20
7.1	PERMITTED PURPOSE	20
7.2	QUALIFICATIONS AND ASSUMPTIONS.....	20
7.3	USE AND RELIANCE	20
7.4	DISCLAIMER	21
	BIBLIOGRAPHY.....	22

ABBREVIATIONS

ACT	Australian Capital Territory
EPBC Act	<i>Environment Protection Biodiversity Conservation Act 1999</i> (Commonwealth)
NC Act	<i>Nature Conservation Act 2014</i> (ACT)
SMP	Southern Memorial Park (the Project)

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Southern Memorial Park (SMP) Masterplan (dated June 2012) was commissioned by the ACT and Canberra Cemeteries to provide ongoing land allocation, design, operational and financial framework for implementation over 20 years. Detailed analysis of the site and its attributes is provided in the Masterplan along with proposed works and proposed enhancement.

The ACT Government requires an updated Masterplan for a staged approach, with a focus on Stage 1. With the revision of the Masterplan, a considered approach to minimise impacts to ecological values will be undertaken. This Preliminary Ecological Assessment involved a review of previous ecological assessments and a brief site visit to understand the biodiversity constraints of the Project and inform the update of the Masterplan.

1.2 STUDY AREA

The study area for the Project is comprised of portions of Tuggeranong Blocks, 1520, 1521, 1676 and 1695 off Mugga Lane in the ACT. The study area is depicted in Figure 1.1.

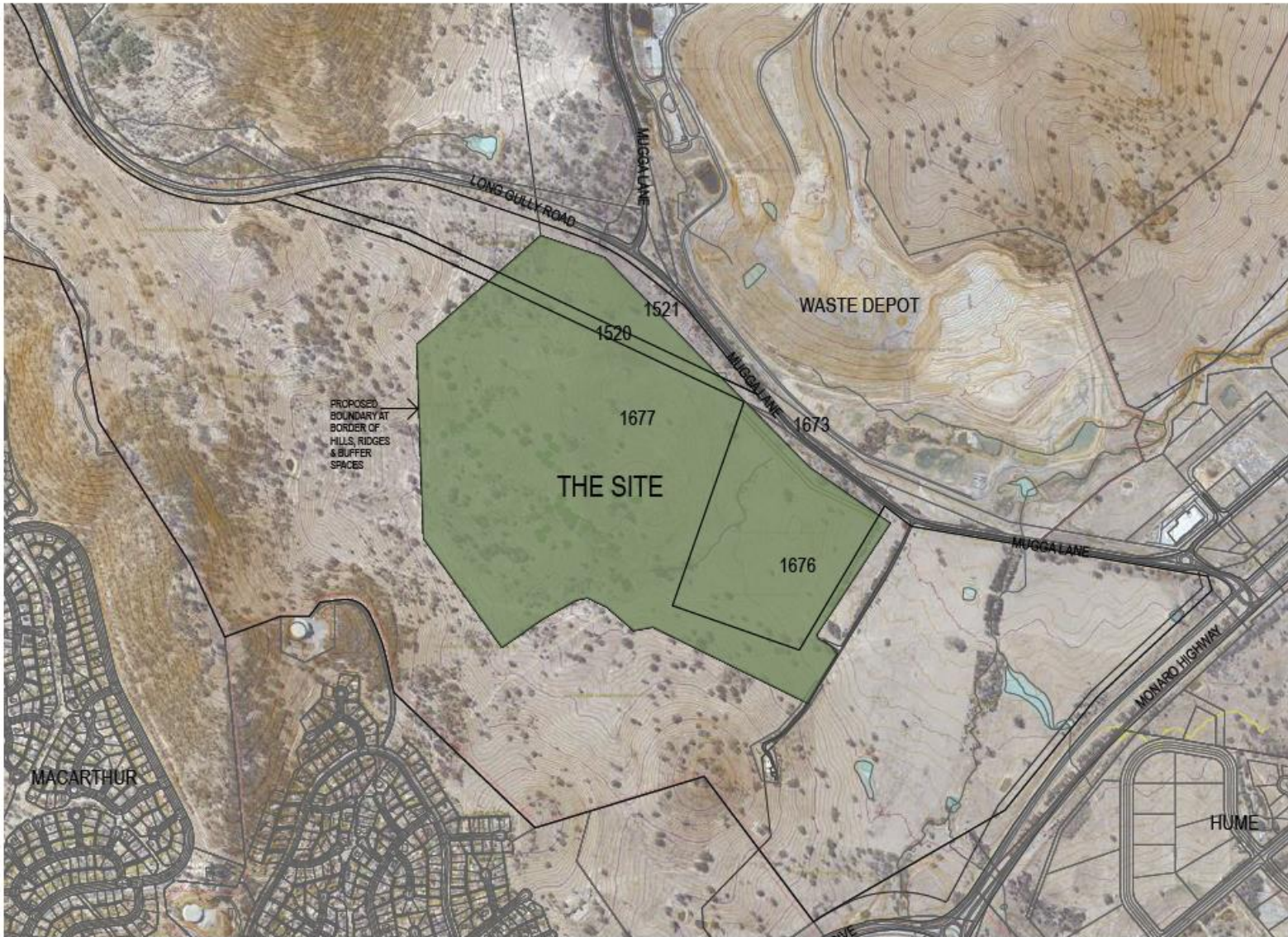


Figure 1.1 Project study area

2 METHODS

This section details the methods used for the preliminary ecological assessment of the study area.

2.1 DESKTOP ASSESSMENT

The aim of the desktop assessment was to identify Threatened flora and fauna species, populations and ecological communities; Commonwealth listed Migratory species; or critical habitat recorded previously or predicted to occur in the vicinity of the study area. The information gathered was used to determine the likely vegetation and habitats on site to identify ecological conservation values within the study area.

The desktop assessment provides a broad understanding of the biodiversity values and included a review of:

- existing vegetation mapping including
 - ACTmapi –Vegetation Communities (ACT Government, 2020)
 - Plant communities of the upper Murrumbidgee catchment in New South Wales and the Australian Capital Territory (Armstrong et al., 2013b)The vegetation of the Kowen, Majura and Jerrabomberra districts of the Australian Capital Territory (Baines et al., 2013)
- Existing ecological reports for the site
 - Canberra Southern Cemetery Blocks 1676, 1677, 1520 and 1521 Tuggeranong Ecological Assessment (Nash and Hogg, 2009)
 - Southern Memorial Park Masterplan (Tonkin Zuliakha Greer Architects, 2012)
 - Southern Memorial Park Ecological Surveys (Moore et al., 2012)¹
 - Draft Southern Memorial Park Masterplan Review of Potential Ecological Impacts (Hogg and Moore, 2012)
 - Southern Memorial Park Masterplan Review of Potential Ecological Impacts (Hogg and Moore, 2013)
 - Determination of the Extent and Quality of EPBC Act Box Gum Woodland at the Proposed Mugga Lane Cemetery Site (Umwelt (Australia) Pty Limited, 2015)
- Canberra Nature Map (Canberra Nature Map, 2020)
- ACT threatened species list (ACT Government, 2019)
- topographic maps and aerial photographs.

In addition to the sources listed above, database searches of threatened species, populations and communities in the locality were conducted and are summarised below in Table 2.1.

Table 2.1 Database searches for threatened species, populations and communities

DATABASE	SEARCH DATE	AREA SEARCHES	REFERENCE
ACTmapi – Significant Species, Vegetation Communities & Registered Trees	11/05/2020	10 km buffer around the study area	(ACT Government, 2020)

¹ A copy of this report was only obtained in Microsoft Word version and figures referenced within the report were absent from this version.

EPBC Protected Matters Search Tool (PMST)	11/05/2020	10 km buffer around the study area	(Department of Agriculture Water and the Environment, 2020)
NSW Flora Online Spatial Search ²	14/05/2020	10 km buffer centred on Macarthur, ACT (149.11666, -35.4)	(Royal Botanic Gardens and Domain Trust, 2020)

2.2 SITE INSPECTION

A site inspection was undertaken on 15 May 2020 to confirm the findings of the desktop assessment. The site inspection included confirmation of vegetation communities mapping within the study area, recording of the location of significant habitat features such as hollow bearing trees where observed, assessing the significance of habitat for threatened flora and fauna and incidental observations of fauna utilising the site.

2.2.1 FLORA

Random meander surveys are a standard survey technique whereby the recorder walks in a random meander throughout the study area recording dominant and key plant species (e.g. threatened species, noxious weeds), between various vegetation communities and condition of vegetation (Cropper, 1993). The time spent in each vegetation community was generally proportional to the size of the community and its species richness.

2.2.2 FAUNA

2.2.2.1 FAUNA HABITAT ASSESSMENT

Fauna habitat assessments were undertaken to assess the habitat values present in the study area. Fauna habitat characteristics assessed included:

- structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, birds and reptiles
- presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- presence of waterways (ephemeral or permanent) and water bodies.

2.2.2.2 OPPORTUNISTIC RECORDING OF FAUNA

Opportunistic sightings of animals were recorded including diurnal birds, mammals and reptiles. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc, was also noted. This provided indirect information on animal presence and activity.

² The NSW Flora Online Spatial Search is an advanced area and botanical search tool based on specimens lodged at the National Herbarium of New South Wales. While the herbarium is not located within the ACT, specimen from the region have been lodged at this location.

2.3 LIKELIHOOD OF OCCURRENCE ASSESSMENT

Targeted surveys have not been undertaken as a part of this assessment and subsequently desktop review and habitat assessments undertaken during site inspection were the primary assessment tool in assessing whether threatened species were likely to occur within the study area.

The likelihood of listed threatened and Migratory species occurring within the study area was assessed against the criteria outlined in Table 2.2.

Species subject to likelihood of occurrence assessments were those identified in literature and database searches during the desktop review as known or predicted to occur and any additional species considered having the potential to occur in the professional opinion of contributors to this assessment.

Table 2.2 Likelihood of occurrence assessment

LIKELIHOOD OF OCCURRENCE	CRITERIA
Known	The species was observed in the study area either during the current survey or during another recent survey.
High	Are dependent on habitat types or resources that are present in the study area that are abundant and/or in good condition within the study area. Are known or likely to maintain resident populations surrounding the study area. Are known or likely to visit the study area or surrounds during regular seasonal movements or migration.
Moderate	Have been recorded previously in the study area and surrounds infrequently (i.e. vagrant individuals). Use habitat types or resources that are present in the study area, although generally in a poor or modified condition. Are unlikely to maintain sedentary populations, however may seasonally utilise resources within the study area opportunistically during variable seasons or migration.
Low	Have not been recorded previously in the study area and surrounds and/or the study area is beyond the current known geographic range of the species. Are dependent on specific habitat types or resources that are not present in the study area. Are considered extinct in the locality.

2.4 CONSERVATION SIGNIFICANCE ASSESSMENT

In order to avoid and minimise impacts of future development on biodiversity values of the study area a conservation significance assessment was undertaken. This assessment involved assigning each identified biodiversity value a conservation ranking based on conservation significance categories and principles. Information on biodiversity values in the study area was obtained from a desktop-based study, and only a brief site visit was undertaken to confirm this information. Categories and principles used to rank biodiversity constraints within the study area included:

- presence of threatened ecological communities
- presence of threatened species and native vegetation that provides habitat (or potential) for threatened species
- native remnant vegetation patches (considering size, connectivity and condition)
- riparian corridors and buffers

— local and regional significance of remnant native vegetation.

The conservation significance assessment identified three conservation significance categories; high, moderate and low. The purpose of these categories was to identify areas to avoid as far as possible as part of the design process.

All highly disturbed areas with no or limited native vegetation, have been assigned to a low ecological constraint class. These areas pose little to no biodiversity restrictions and are most suitable for future development/ disturbance.

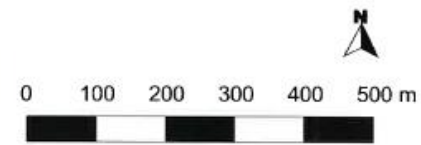
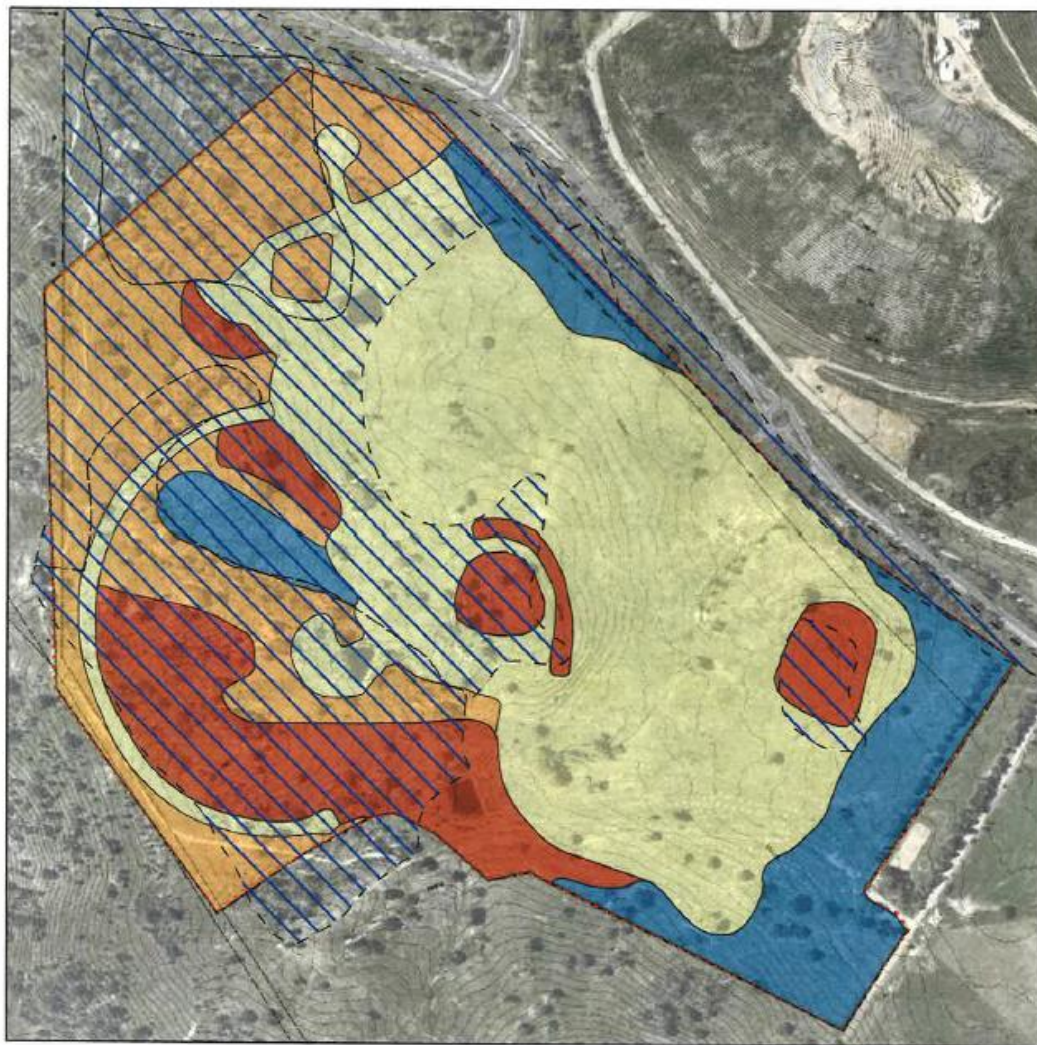
3 RESULTS

3.1 CURRENT MASTERPLAN

Previous assessment of ecological values within the site was undertaken in association with the 2012 Masterplan (Tonkin Zuliakha Greer Architects, 2012, Nash and Hogg, 2009, Moore et al., 2012). Hogg and Moore (2013) categorised the ecological impacts of the proposed activities and developments in the current Masterplan into the following four levels:

- Level 1 (high impact) – impacts relate particularly to areas used for lawn burials or monuments, as well as sites used for building, roads, carparks and lawns.
- Level 2 (moderate impact) – impacts relate primarily to natural burial areas, as well as any areas away from Level 1 impact areas which may experience limited disturbance for the provision of services. They would also include the ash interment areas.
- Level 3 (no significant adverse impact) – impacts are neutral or beneficial and relate mainly to woodland buffer areas on the perimeter of the site
- Level 4 (beneficial impact) – impacts are beneficial and include the woodland plantings along Mugga Land and a proposed ‘meadow’. The proposed ‘meadow’ is located on a ridge to the west of the central facilities complex. The concept for this area is to create ‘an opening flowering swarth of native grasses’, a place for reflection with no burials (see Section 9.2 of 2012 Masterplan). This could be interpreted as restoring the area to a secondary native grassland with a diverse native forb component. This has the potential to enhance the level of diversity within the woodland community.

Hogg and Moore (2013) overlaid their native vegetation mapping with the proposed impacts based on the site layout presented in the Masterplan (Figure 3.1). This shows that there are areas of moderate and high ecological impacts proposed to areas of native vegetation, some of which is consistent with the threatened ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, which is listed as Critically Endangered under both the *Environment Protection Biodiversity Conservation Act* (EPBC Act) and the *Nature Conservation Act 2014* (NC Act).



Southern Memorial Park boundary

....

Polygon boundaries

--

Native vegetation

∞

Impact areas

High impact (1)

Moderate impact (2)

No significant adverse impact (3)

Beneficial impact (4)

Some boundaries are indicative only

See Section 4.2 for further explanation of impacts

Figure 4.4 Impacts on native vegetation

Figure 3.1 Impacts to native vegetation with current Masterplan

Source: (Hogg and Moore, 2013)

3.2 VEGETATION COMMUNITIES

The study area has been highly modified as a result of agriculture activities including tree removal, tree planting, pasture improvement, and heavy grazing, and ongoing use for horse agistment (Nash and Hogg, 2009). Despite this past and ongoing disturbance, areas of remnant native vegetation remain.

The brief site visit identified that the vegetation within the study area is largely consistent with previous mapping (Baines et al., 2013, Armstrong et al., 2013a, Nash and Hogg, 2009, Hogg and Moore, 2013). Within the study area, the groundcover vegetation varies in condition. Generally, the eastern part of the study area is dominated by exotic species, and the western part dominated by native species. Within areas containing a predominately native understorey, condition varies; with some patches containing a very low diversity of only disturbance tolerant native species, and others with a higher diversity of native grasses and herbs. Generally, native species diversity and abundance was low.

Native vegetation communities as described in *The Vegetation of the Kowen, Majura and Jerrabomberra Districts of the Australian Capital Territory* (Baines et al., 2013) present within the study area include:

- Blakely’s Red Gum – Yellow Box tall grassy woodland (map unit u19)
- Red Box tall grass-shrub woodlands primarily on hillslopes and footslopes in the Australian Capital Territory (map unit q6)
- (Derived) Native grassland (map unit NG).

Vegetation communities recorded within the study area are summarised below in Table 3.1. Brief descriptions of the vegetation and photos (Photo 3.1 to Photo 3.6) are provided below.

Table 3.1 Vegetation communities recorded

PLANT COMMUNITY ¹	TOTAL AREA (HA)
NATIVE VEGETATION	
Blakely's Red Gum – Yellow Box ± White Box tall grassy woodland of the Upper South Western Slopes and western South Eastern highlands bioregions (map unit u19)	23.6
Red Box tall grass-shrub woodlands primarily on hillslopes and footslopes in the Australian Capital Territory (map unit q6)	21.8
(Derived) Native grassland (map unit NG)	9.9
TOTAL native vegetation	
EXOTIC VEGETATION	
Exotic grassland (map unit EXG)	28.1
Native plantings with an exotic understorey	4.1
Grand Total	87.5

- (1) Plant communities corresponding to plant communities of the upper Murrumbidgee catchment in New South Wales and the Australian Capital Territory (Armstrong et al., 2013b) and the vegetation of the Kowen, Majura and Jerrabomberra districts of the Australian Capital Territory (Baines et al., 2013).

3.2.1 BLAKELY'S RED GUM – YELLOW BOX ± WHITE BOX TALL GRASSY WOODLAND OF THE UPPER SOUTH WESTERN SLOPES AND WESTERN SOUTH EASTERN HIGHLANDS BIOREGIONS (U19)

Blakely's Red Gum – Yellow Box ± White Box tall grassy woodland is a tall grassy woodland dominated by a canopy of *Eucalyptus blakelyi* (Blakely's Red Gum) and/ or *E. melliodora* (Yellow Box). *Eucalyptus albens* (White Box) is not part of the community in the ACT is outside of the range of *E. albens*. This community often occurs in sites of impeded drainage. The community may grade into Community u178 (Yellow Box ± Apple Box tall grassy woodland of the South Eastern Highlands) in the ACT (Baines et al., 2013, Armstrong et al., 2013a).

Within the study area, this community occurred with a canopy dominated by *Eucalyptus blakelyi* and *E. melliodora*, an open understorey with regenerating Eucalypts.

The ground layer was dominated by grazing tolerant grasses including *Austrostipa scabra*, *Chloris truncate*, *Microlaena stipoides*, *Elymus scaber*, *Rytidosperma spp.*, *Bothriochloa macra*, *Panicum simile*. Herbs and forbs recorded included, *Wahlenbergia gracilis*, *Vittadinia cuneata*, *Cheilanthes sieberi*, *Chrysocephalum apiculatum*, *Oxalis perennans*, *Lomandra filiformis* subsp. *coriacea*,

Ground cover diversity was relatively low with low variety of forbs. Disturbance sensitive species such as orchids and lillies typical of this community were not recorded (e.g. *Microtis unifolia*, *Arthropodium minus*, *Dichopogon fimbriatus* and *Wurmbea dioica*).

An area of higher diversity was recorded in the south west of the site.

Weeds recorded included *Hypericum perforatum*, *Vulpia myurus*, *Bromus spp.* *Plantago lanceolata*, *Taraxacum officinale*, *Conyza sp.* and *Lycium ferocissimum*.



Photo 3.1 Blakely's Red Gum – Yellow Box ± White Box tall grassy woodland



Photo 3.2 Blakely's Red Gum – Yellow Box ± White Box tall grassy woodland

3.2.2 RED BOX TALL GRASS-SHRUB WOODLANDS PRIMARILY ON HILLSLOPES AND FOOTSLOPES IN THE AUSTRALIAN CAPITAL TERRITORY_Q6

Red Box Tall Grass-Shrub Woodland is an open grassy woodland dominated by *Eucalyptus polyanthemos* (Red Box). The Queanbeyan, Pialligo (aeolian) and Winnunga Soil Landscapes have a high probability of containing woodlands dominated by *Eucalyptus polyanthemos* than other soil landscapes. Additionally, areas with a north to north-easterly aspects, and lower to midslope topographic positions are more likely to support this community. This community is often identified by the rapid change in dominant tree species, and occasionally monospecific stands of *Eucalyptus polyanthemos*. This community often grades into u19 (Blakely's Red Gum – Yellow Box ± White Box tall grassy woodland of the Upper South Western Slopes and western South Eastern highlands bioregions), present on site. The majority of this community has been heavily altered by grazing and changed fire regimes, resulting in a simplified

midstorey and groundlayer and distinguishing characteristics of these layers from other woodlands cannot be identified. Based on mapping of some small remnants of a less disturbed nature, shrubs may have once been a major component of this woodland (Baines et al., 2013).

This community occurred primarily on hillslopes and upslope of Blakely's Red Gum – Yellow Box tall grassy woodland (described above). The understorey typically consisted of disturbance tolerant grasses such as *Austrostipa* sp., *Bothriochloa macra*, and *Chloris truncata*.



Photo 3.3 Red Box tall grass-shrub woodland

3.2.3 DERIVED NATIVE GRASSLAND

Derived Native Grassland was recorded within the study area, generally within the western area of the study area (Nash and Hogg, 2009). Scattered or small clusters of eucalypts were present above a degraded native grassland. This vegetation type generally had low species diversity and was dominated by disturbance tolerant species such as *Bothriochloa macra* and *Austrostipa* spp. Small isolated areas exhibited higher diversity and included *Wahlenbergia* sp., *Chrysocephalum apiculatum*, *Rytidosperma* sp. and *Lomandra multiflora*.

This native grassland community is considered to be a derived grassland rather than natural temperate grassland because the study area is outside the mapped extent of the estimated pre-1750 grassland (Environment ACT, 2005a) in areas disturbed by previous land clearing and grazing with evidence of past clearing of trees as well as regeneration of eucalypts.



Photo 3.4 Derived native grassland

3.2.4 EXOTIC GRASSLAND

Exotic grassland was recorded within the study area, generally within the lowest lying areas in the east (Nash and Hogg, 2009). This area is predominately treeless with scattered or small clusters of eucalypts. These areas contain a groundcover dominated by exotic pasture species including *Phalaris aquatica*, *Holcus lanatus*, *Hypericum perforatum*, *Plantago lanceolate*, *Hypochaeris* spp., *Vulpia* sp., *Bromus* spp., *Aira* sp., *Briza minor*, *Echium plantagineum*, *Conyza* sp. and *Carthamus lanatus*.

Native species were scattered throughout or occurred in small patches. Native species included grazing tolerant species such as *Austrostipa bigeniculata* and *Bothriochloa macra*, and less commonly *Microlaena stipoides*, *Rytidosperma* spp, *Vittadinia cuneate* and *Wahlenbergia communis*. Additional species recorded in drainage line and low lying wetter areas included *Carex appressa* and *Juncus* spp.,.



Photo 3.5 Exotic grassland

3.2.5 AMENITY PLANTING – NATIVE

Several areas contained planted native trees and shrubs including species which occur within the locality but not necessarily within the study area, for example *Eucalyptus rossii* (Scribbly Gum) and *E. mannifera* (Brittle Gum) (Nash and Hogg, 2009). Some plantings are present in areas mapped as native woodland or grassland communities. Additional areas have been planted with eucalypt saplings since the preparation of the previous assessment in 2009. These planted species were not identified during the site visit.



Photo 3.6 Amenity planting

3.3 FAUNA HABITAT AND CONNECTIVITY

The suitability, size and configuration of fauna habitats broadly corresponds to the structure, floristics and quality of vegetation communities. The majority of the study area has been heavily modified and disturbed as a result of historic and current land use practices including clearing, grazing and horse agistment. Habitats were generally in poor to moderate condition, with habitat features including those associated with grassland, woodland, and riparian habitats. Such areas provide habitat for a range of invertebrates, reptiles, amphibians, fish, birds and mammals.

3.3.1 OPEN WOODLAND

Open woodlands occurred as patches of remnant vegetation. This habitat had limited abundance of important woodland habitat features such as mature trees, tree hollows, large woody debris, leaf litter and in some areas a midstorey shrub layer. However, an abundance of mistletoe, an important foraging resource for some bird species, was recorded. Understorey cover varied between exotic dominated areas with little bare ground and patches dominated by a native grassy understorey. The study area has suffered from heavy grazing in the past, and current grass structure is low, and there is limited abundance of tussock forming native grasses.

Common bird species such as Australian Magpie, Australian Raven, Sulphur Crested Cockatoo, Galah, Crested Pigeon, Rosella's, and Noisy Miner were recorded. No small bird species were recorded during the site visit which is likely a result of the limited cover available for smaller birds. This open woodland habitat could also provide potential foraging resources for a number of microbat species.

3.3.2 GRASSLAND

Grassland habitat varied between areas of:

- exotic pasture
- derived native grasslands dominated by disturbance tolerant grass species

- small patches of derived native grassland dominated by native grasses and herbs.

Grassland areas had suffered from heavy and prolonged grazing and biomass was low. Important grassland habitat features such as invertebrate burrows and soil cracks were limited and generally lacking across most of these areas. Rocky outcropping was recorded in a number of locations with previous surveys recording Spotted Marsh Frog, Cunningham's Skink and three unidentified skinks. A number of invertebrates such as ants, wolf spiders, centipedes and scorpions were also recorded under rocks in these areas (Moore et al., 2012).

These open grassland areas are suited to native grassland species tolerant of disturbance such as common reptiles, Eastern Grey Kangaroo, and invertebrates, as well as introduced species such as Fox and House Mouse.

3.3.3 FARM DAMS AND CREEKS

Three dams were recorded within the study area, as well as a series of creek lines. The majority of the creek lines were dry, with a few small ripples observed in the creek within the southern section of the site. These areas provide habitat for a diverse range of fauna including amphibians, mammals, reptiles, invertebrates, and birds. Common species such as Wood Australian Duck and Australasian Grebe were recorded using the farm dams.

Due to the lack of extensive wetlands, large rivers, wet forests or damp gullies, the study area is not likely to support significant habitat for Migratory birds (Nash and Hogg, 2009). While the study area is unlikely to support significant habitat for any Migratory listed species, the occasional occurrence of Migratory species during seasonal movements cannot be discounted.



Photo 3.7 Farm dam



Photo 3.8 Water filled channel

3.3.4 CONNECTIVITY

The study area is part of a habitat connectivity corridor which links to the Majura Valley in the north of Canberra and down south to Rob Roy Nature Reserve. In an east west direction it is a part of the corridor linking forested areas of New South Wales in the east with the Lower Molonglo in the west (Moore et al., 2012). Areas surrounding the study area are of particular value, as they include minimally fragmented woodland patches and forest habitat which retains considerable structural diversity, and is located at the intersection of movement corridors from the south-east, north and west (Moore et al., 2012). Recent planting across the site, if allowed to mature, will increase the connectivity value of the study area. Additionally, potential ecological benefit could be gained by improving the condition of woodland and restoring cleared areas within the study area to provide better quality and additional habitat for native fauna.

4 THREATENED BIODIVERSITY

4.1 THREATENED ECOLOGICAL COMMUNITIES

Based on desktop review, one threatened ecological community is mapped as occurring within the study area, being White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and derived native grassland (Box Gum Woodland), listed as Critically Endangered under the EPBC Act and the NC Act.

An additional two threatened ecological communities have been identified as having potential to occur (Department of Agriculture Water and the Environment, 2020) within the study area. They are:

- Natural Temperate Grassland of South Eastern Highlands listed as Critically Endangered under the EPBC Act
- Alpine Sphagnum Bogs and Associated Fens.

These three communities and their occurrence within the study area are discussed below.

4.1.1 BOX GUM WOODLAND AND DERIVED GRASSLAND

White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and derived native grassland can occur as either open woodland and derived native grassland which has been created through the removal of all tree species.

Blakely's Red Gum – Yellow Box ± White Box tall grassy woodland and connected areas of Native Grassland recorded within the study area are consistent with White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and derived native grassland listed as Critically Endangered listing under the NC Act and the EPBC Act (Maguire and Mulvaney, 2011).

Previous assessments of the study area have identified the presence of the Box Gum Woodland community consistent with EPBC Act condition criteria based on species diversity within vegetation quadrats. Hogg and Moore (2012) estimated an area of 27 ha consistent with this threatened ecological community, and Umwelt (2015) later identified 33.1 hectares in an assessment of extent and floristic quality of the threatened ecological community. A review of existing vegetation mapping (Baines et al., 2013) and verification during a brief site walkover identified approximately 23.6 ha of this community occurring within the study area.

NC ACT LISTED CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY

Table 4.1 below outlines the characteristics of the ecological community for consistency with listing under the NC Act and comparison with the study area.

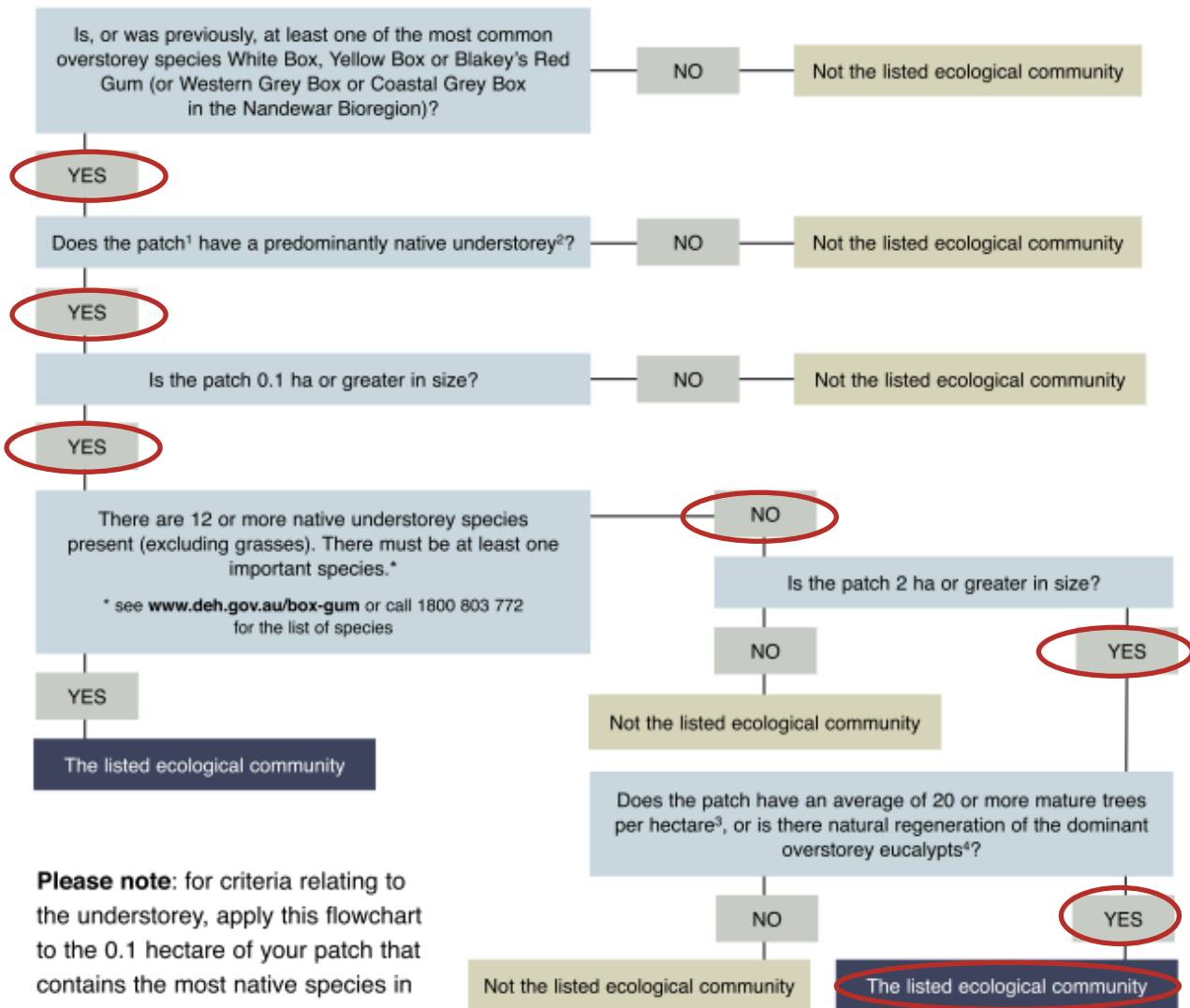
Table 4.1 Characteristics of Yellow Box–Red Gum Grassy Woodland listing under the NC Act

CHARACTERISTICS OF YELLOW BOX–RED GUM GRASSY WOODLAND CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY	CHARACTERISTICS OF VEGETATION WITHIN THE STUDY AREA
<i>E. melliodora</i> and/or <i>E. blakelyi</i> contribute 40% or more of the crown cover	The crown cover of one vegetation communities consisted of <i>E. blakelyi</i> and/or <i>E. melliodora</i> : <ul style="list-style-type: none"> – Blakely's Red Gum – Yellow Box tall grassy woodland (u19) Within this community more than 40% of the crown cover consisted of <i>E. blakelyi</i> and/or <i>E. melliodora</i> .
There is a species-rich understorey of native tussock grasses, herbs and scattered shrubs. The understorey is not exotic pasture or degraded beyond recovery	Areas consistent with this have been recorded.

CHARACTERISTICS OF YELLOW BOX-RED GUM GRASSY WOODLAND CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY	CHARACTERISTICS OF VEGETATION WITHIN THE STUDY AREA
Remnants of Yellow Box- Red Gum Grassy Woodland that contain a species-rich native understorey of native tussock grasses, herbaceous species and scattered shrubs but the trees have been removed or reduced.	Areas consistent with this condition have been recorded as derived native grassland.
CONCLUSION	Areas consistent with the NC listed community occur within the study area.

EPBC ACT LISTED THREATENED COMMUNITY

While detailed vegetation assessment and mapping including quadrats have not been undertaken within the study area as part of this assessment. The threatened ecological community consisted within the EPBC Act listed is considered to be present based on the findings of previous assessments and preliminary analysis using the flowchart presented below (Figure 4.1).



- 1 Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
 - an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
 - the area over which the understorey is predominantly native.
 Patches must be assessed at a scale of 0.1 ha (1000m²) or greater.
- 2 A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not if it is difficult to pull out of the soil. Annual species pull out very easily.)
- 3 Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.
- 4 Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

Source: (Department of the Environment and Heritage, 2006)

Figure 4.1 Commonwealth criteria for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland

4.1.2 NATURAL TEMPERATE GRASSLAND

Natural Temperate Grassland of the South Eastern Highlands is listed as Critically Endangered under the EPBC Act and the NC Act.

The ecological community is defined by the vegetation structure thought to have been present at the time of European settlement (Environment ACT, 2005a). The community is dominated by native species of perennial tussock grasses and a diversity of native forbs. Dominant grasses typically include *Themeda triandra*, *Rytidosperma* species, *Bothriochloa macra* and *Poa* species. The community is naturally treeless or contains less than 10% projective foliage cover of trees/shrubs in its tallest stratum (Environment ACT, 2005a).

A review of pre-1750 mapping of estimated grassland extent (Environment ACT, 2005a) did not identify the study area as once supporting native grassland. As the study area is outside the estimated distribution of grassland prior to European occupation, there is evidence of past clearing and regeneration of Eucalypt spp., it is unlikely that this threatened ecological community is present.

4.1.3 ALPINE SPHAGNUM BOGS AND ASSOCIATED FENS

Alpine Sphagnum Bogs and Associated Fens are listed as Endangered under the EPBC Act. A single ecological community described in the ACT is consistent with this threatened community, being, the *Sphagnum cristatum* Montane and Subalpine Bogs which lies entirely within Namadgi National Park and are considered adequately conserved in the ACT (Department of the Environment, 2015b).

This community was not recorded within study area and given the study area is outside of Namadgi National Park and the mapped areas of this community, it is considered unlikely to occur.

4.2 THREATENED SPECIES

4.2.1 FLORA

No threatened flora species are considered likely to occur within the study area based on condition of remnant vegetation, level of past and ongoing disturbance, and previous survey effort. Three threatened flora species listed under the EPBC Act and/ or NC Act were identified as having been recorded in some proximity to the site, being:

- *Leucochrysum albicans* var. *tricolor* (Hoary Sunray)
- *Rutidosis leptorhynchoides* (Button Wrinklewort)
- *Swainsona recta* (Small Purple Pea)

While habitat potential was considered to be low, these species were targeted in the previous vegetation assessment. Meandering transverses for threatened plants were undertaken on 19 November 2011, 10 December 2011 and 25 October 2012 (Moore et al., 2012). No threatened, rare or uncommon flora species were recorded.

Full likelihood of occurrence assessments for threatened species is located in Appendix B.

4.2.2 FAUNA

This section address threatened fauna which have been previously surveyed for within the study area or are considered to have potential habitat based on the results of this assessment. Full likelihood of occurrence assessments for threatened species is located in Appendix B.

4.2.2.1 PINK-TAILED WORM-LIZARD

Potential habitat for Pink-tailed Worm-lizard (*Aprasia parapulchella*) was previously identified within the proposed site for the Project and targeted surveys have since been undertaken. Surveys for the Pink-tailed Worm-lizard were undertaken in November 2012 in accordance with Commonwealth guidelines and guidelines provided by the ACT

Government’s Conservation Planning and Research in 2010 (Moore et al., 2012). No Pink-tailed Worm-lizards were recorded during surveys and the study area was deemed unlikely to support the species due to the limited and fragmented nature of the site and the lack of records during survey. Full details of survey methodology and results is available in *Southern Memorial Park Ecological Surveys* (Moore et al., 2012).

Based on the targeted survey results and habitat condition, this species is considered unlikely to occur.

4.2.2.2 GOLDEN SUN MOTH

The initial assessment for the Project did not identify any suitable habitat for the Golden Sun Moth (*Synemon plana*) (Nash and Hogg, 2009). However, this assessment preceded the 2009 discovery of Golden Sun Moth in many areas of secondary native grassland in Gungahlin (Moore et al., 2012). Surveys targeting Golden Sun Moth were undertaken on 19 November and 10 December 2011, during the flying season for the species in that year (Table 4.2) in accordance with guidelines established by Conservation Planning and Research (2010). These guidelines are not currently publicly available, however the surveys conducted are inconsistent with the survey guidelines for detecting the species published by the Australian Government which require surveys to be conducted on at least four suitable days in appropriate flying conditions for the species (Department of Environment Water Heritage and the Arts, 2009).

Table 4.2 Survey weather conditions

SURVEY DATE	TIME	SURVEY EFFORT	SURVEY CONDITIONS ¹ AND COMMENTS
19/11/11	Between 11:45 and 13:30	2 person hours	29°C to 31°C, light winds 7-9 km/hr with occasional gusts, sunny conditions. No rain recorded in the three days prior to survey. Species was observed in low numbers in Symonston earlier in the day.
10/12/11	Between 11:30 and 15:30	1.5 person hours	21°C to 25°C light winds 9-13 km/hr, sunny conditions. No rain recorded in the three days prior to survey. No reference site for the species

(1) Observations were drawn from Tuggeranong (Isabella Plains) AWS (station 070339).

Areas dominated by native grass species typically preferred by Golden Sun Moth are restricted to small patches located on the tops of undulating hills and isolated cleared rises between stand of eucalypts. The latter areas would be subject to shading and therefore inconsistent with habitat preferences (Moore et al., 2012). It has been suggested that the occurrence of the species in secondary grasslands and open woodlands is the result of the species spreading outside its preferred habitat (Natural Temperate Grassland). Observations support this idea as observations in secondary grassland and open woodland habitat generally support fewer moths than Natural Temperate Grassland (ACT Government, 2017b).

No flying male moths were observed during the surveys and potential habitat is very limited within the highly modified site. The previous assessment concluded that the species was unlikely to occur based on available habitat, known occurrences of the species and results of targeted surveys (Moore et al., 2012). While habitat is limited, and the study area is not near areas of preferred habitat nor did it once support preferred habitat of Natural Temperate Grassland, previous surveys were inconsistent with the Australian Government’s survey guidelines. Further targeted surveys are recommended to be undertaken in conjunction with other surveys for the site during the right seasonal timing to confirm the findings of previous surveys.

4.2.2.3 WOODLAND BIRDS

Several threatened woodland birds listed under the NC Act and/or EPBC Act occur within the ACT and are tolerant of some disturbance and will occur on edges of woodland patches.

Bird surveys were undertaken in November and December 2011 within the study area (two areas) and adjacent woodland areas (two areas). A 30-minute survey of all four areas was conducted on four occasions, alternating between morning

and evening surveys (Moore et al., 2012). A total of 50 bird species were observed including one threatened species, Australian Painted Snipe, listed as Endangered under the EPBC Act and NC Act. The individual Australian Painted Snipe was observed on the edge of a dam. The dam was identified as containing poor quality habitat, and unlikely to be a significant location for the species. The observation was considered reflective of the role of the area as a movement corridor through the ACT, rather than the presence of habitat for this species (Moore et al., 2012).

While the study area was not considered to contain significant habitat for threatened woodland birds, the adjacent Wanniasa Hills Nature Reserve contains better quality habitat, with a greater diversity of small woodland birds observed, and the study area may provide a buffer for this habitat. Potential habitat for woodland birds is marginal within the study area, lacking many important habitat features. Given the mobile nature of bird species and availability of better-quality habitat in proximity to the study area, is likely to provide only supplementary foraging habitat. However, woodland habitat across the study area is likely to contribute to the bird movement corridors across the Jerrabomberra Valley (Moore et al., 2012).

Previous assessment (Nash and Hogg, 2009, Moore et al., 2012) identified species with potential, albeit low quality, habitat available within the study area including:

- Australian Painted Snipe (*Rostratula australis*)
- Brown Treecreeper (*Climacteris picumnus*)
- Hooded Robin (*Melanodryas cucullata*)
- Little Eagle (*Hieraaetus morphnoides*)
- White-winged Triller (*Lalage sueurii*)
- Painted Honeyeater (*Grantiella picta*)
- Regent Honeyeater (*Anthochaera phrygia*)
- Superb Parrot (*Polytelis swainsonii*)
- Swift Parrot (*Lathamus discolor*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Superb Parrot (*Polytelis swainsonii*)

Of these species, seven are considered to have a moderate or higher likelihood of occurrence within the study area, being: Australian Painted Snipe, Little Eagle, Painted Honeyeater, Regent Honeyeater, Swift Parrot, Varied Sittella and White-winged Triller. Desktop review of available information also identified the potential for Flame Robin (*Petroica phoenicea*) to utilise woodland habitats within the site.

4.2.2.4 GREY-HEADED FLYING-FOX

This assessment has identified potential foraging habitat for Grey-headed Flying-fox (*Pteropus poliocephalus*). A known camp site is located within site in Commonwealth Park approximately 12 km away from the study area. While no camp sites were identified within the study area, this species may utilise areas of Box Gum Woodland when flowering resources are available.

4.2.2.5 PERUNGA GRASSHOPPER

The Perunga Grasshopper (*Perunga ochracea*) has been recorded primarily in Natural Temperate Grassland communities dominated by *Rytidosperma* spp. (Wallaby grasses), *Austrostipa* spp. (Stipa grasses), or *Themeda triandra* (Kangaroo Grass), and other native grasslands (ACT Government, 2017a). The species sometimes occurs in open woodland areas with a grassy understorey (ACT Government, 2017a). Observations suggest that the species utilises grass tussocks as shelter spaces and occupies habitat consisting of a mosaic with tall tussock grass, shorts grass and forbs, and bare ground (ACT Government, 2017a). The species has also been recorded in heavily grazed landscapes with limited availability of

dense grass tussocks. In these landscapes, animals were recorded in or near grass tussocks, suggesting tussocks are a critical component of their habitat (ACT Government, 2017a).

The Perunga Grasshopper is a cryptic species, which is difficult to observe unless disturbed. Once disturbed, they seek shelter quickly. The species has a lifecycle of one year; nymphs hatch in late summer and autumn and develop over winter and spring. Adults have been collected between October to mid-February (ACT Government, 2017a). Records of the species (casual observations, targeted surveys, and animals caught in pitfalls) are usually single animals or low numbers, suggesting the species mostly sparsely distributed throughout its habitat. However, population densities vary between years and sites. Little is known about the diet of this species. It has been suggested that there is a dietary relationship between *Chrysocephalum* spp., largely due to the collection of the species at sites containing this native forb species, particularly *Chrysocephalum apiculatum* (ACT Government, 2017a).

The species has been recorded in several locations nearby; approximately 3.5 km to the southwest in the suburb of Wanniasa, approximately 3 km to the northeast in the Jerrabomberra Valley, and 4.5 km to the northwest in the suburbs of O'Malley and Red Hill. Previous assessments did not identify potential for this species to occur, however, given the availability of potential habitat and records in relative proximity to the site further assessment including targeted seasonal surveys for the species is recommended in areas dominated by a native understorey.

5 OPPORTUNITIES AND CONSTRAINTS

This ecological assessment was conducted to identify ecological constraints within the study area. Specifically, this desktop assessment determined the potential for threatened species, populations and ecological communities likely to occur and conservation values located within the study area.

Although much of the site consisted of highly modified vegetation as a result of past agricultural activities, this assessment identified the presence of remnant patches of native vegetation including patches consistent with White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and derived native grassland, a Critically Endangered ecological community listed under the EPBC Act and NC Act, and the potential for threatened species including Perunga Grasshopper listed as Vulnerable under the NC Act, Grey-headed Flying-fox listed as Vulnerable under the EPBC and NC Act, and a number of threatened woodland birds.

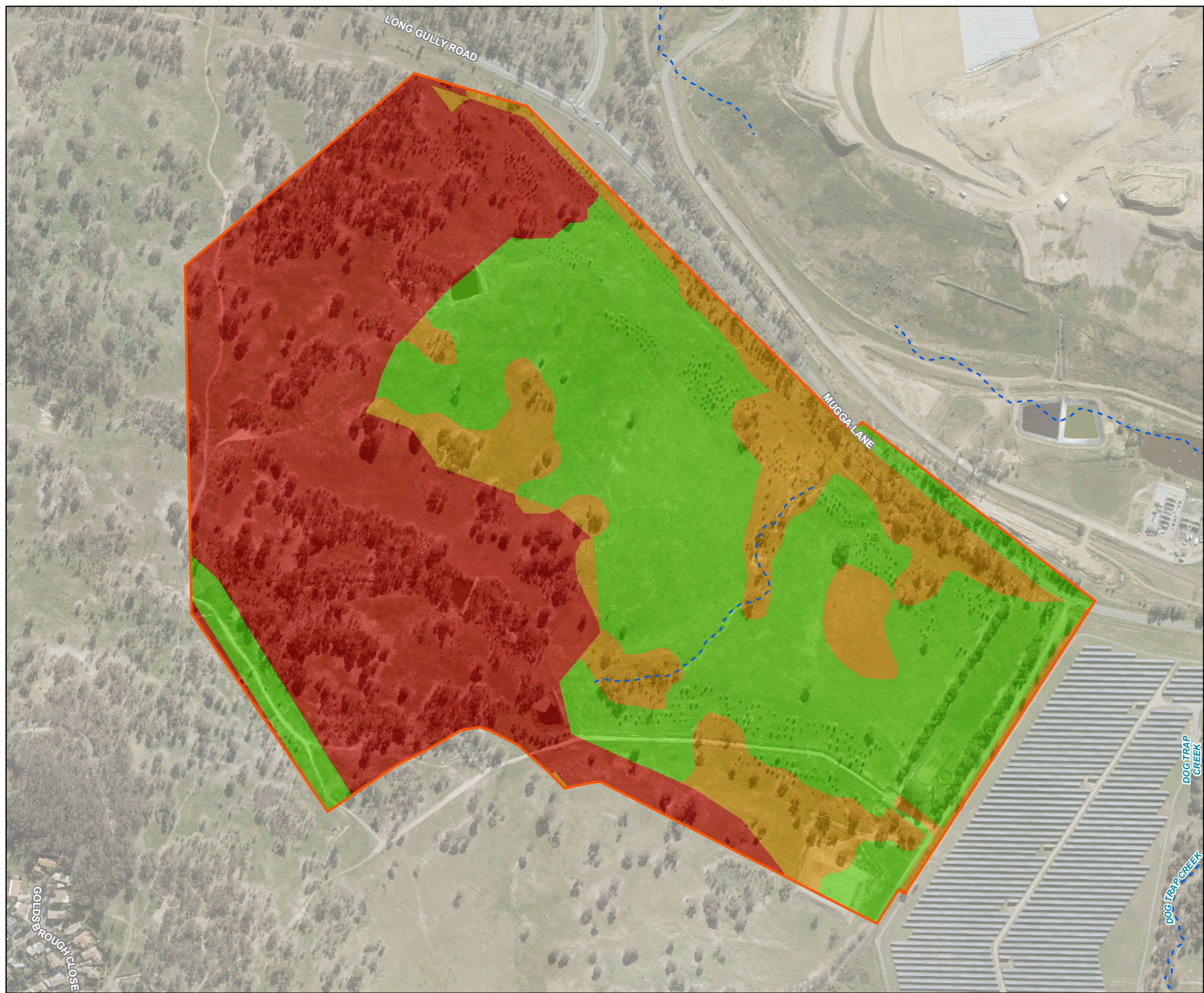
Ecological values are identified below in Table 5.1 and Figure 5.1 and Figure 5.2. Design options should aim to avoid or minimise impacts and disturbance to areas of ecological value.

Table 5.1 Ecological constraints ranking and subsequent conservational significance within the study area

ECOLOGICAL CONSTRAINT RANK AND CONSERVATION SIGNIFICANCE	ECOLOGICAL VALUES	LOCATIONS WITHIN THE STUDY AREA (FIGURE 5.1)	OPPORTUNITIES AND CONSTRAINT
High	<ul style="list-style-type: none"> — Threatened ecological communities. — Potential habitat for sedentary threatened species. — Riparian corridor and buffer. — Core areas of native vegetation and habitats; likely to have high value for fauna movement. 	<ul style="list-style-type: none"> — Areas mapped as a threatened ecological community (map units u19 with native understorey and associated NG) — Native woodland with a predominately native understorey (map unit q6). — Native grassland — Creeks within the study area. 	As far as practicable, these areas should be protected from future development and opportunities for ecological enhancement should be considered including planting of canopy species consistent with the Box Gum Woodland community, weed control and monitoring of grazing pressure.
Moderate	<ul style="list-style-type: none"> — Areas of native vegetation not consistent with a Threatened ecological community. — Areas of marginal and supplementary habitat for highly mobile native fauna species. 	<ul style="list-style-type: none"> — Native woodland with a predominantly exotic understorey (map units u19 and q6). — Mature native amenity plantings in the east of the study area 	Where possible, impacts to native vegetation should be avoided and retention of connectivity of trees and shrubs which act as linkages for mobile fauna across the site and the broader landscape should be retained.

ECOLOGICAL CONSTRAINT RANK AND CONSERVATION SIGNIFICANCE	ECOLOGICAL VALUES	LOCATIONS WITHIN THE STUDY AREA (FIGURE 5.1)	OPPORTUNITIES AND CONSTRAINT
Low	<ul style="list-style-type: none"> — Areas that have been substantially modified and are no longer consistent with a native vegetation community. — Areas of native plantings. 	<ul style="list-style-type: none"> — Areas of exotic grassland — Areas of young native amenity plantings. 	<p>These areas are most suitable for development. Retention of trees, particularly mature trees should be undertaken where practicable.</p>

Figure 5.2
Biodiversity Constraints



Legend

- Study area
- Waterways

Constraints

- High constraint
- Moderate constraint
- Low constraint



Coordinate system: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A3
1:5,000 Date: 9/12/2020

Data sources: - ACT Govt GeoHub, 2020, Geoscience Australia, Metromap 2019
© WSP Australia Pty Ltd ("WSP") Copyright in the drawings, information and data recorded ("the information") is the property of WSP. This document and the information are solely for the use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that which it was supplied by WSP. WSP makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information. NCSI Certified Quality System to ISO 9001. © APPROVED FOR AND ON BEHALF OF WSP Australia Pty Ltd.

6 CONCLUSIONS AND RECOMMENDATIONS

Based on the desktop analysis and the site visit, areas have been identified that pose differing constraints to future development and activities within the study area. These constraints have been ranked based on specific ecological attributes forming, high, moderate and low constraints classes.

The presence of an ecological constraint does not necessarily entirely preclude development/ disturbance in these locations. However, areas of higher conservation value are the least suitable for high level impacts and should be preserved wherever possible. Additionally, some level of impact may be acceptable in high conservation value areas. Development controls and the implementation of environmental management measures associated with future use of the study area may also provide opportunities to enhance the long-term viability of vegetation and associated habitat, thereby leading to longer term positive ecological outcomes within the locality.

Further surveys are recommended for the study area to further assess and refine the ecological values and constraints within the study area. These include:

- detailed vegetation mapping and assessment of condition preferably during suitable conditions (e.g. following rainfall and in spring or autumn. This should aim to identify the boundaries of extent of the ecological community and determine condition to assess patches against criteria for listings under both the NC Act and EPBC Act.
- Transect surveys for Perunga Grasshopper during spring/ summer.
- Transect surveys for Golden Sun Moth should be undertaken in conjunction with surveys for Perunga Grasshopper to confirm the findings of previous survey effort, as previous surveys did not meet Australian Government survey guidelines to detect presence/ absence of the species. These surveys should consider the survey guidelines for detecting the species published by the Australian Government (Department of Environment Water Heritage and the Arts, 2009)., namely surveys should be undertaken:
 - during the local flying seasons for the species (generally late October to early January) in suitable flying conditions for the species.
 - a reference site should be checked to confirm the flying season for the species is underway and suitable conditions for the species to be detected on the day of survey. This opportunity for survey in conjunction with those recommended for Perunga Grasshopper presents the opportunity.

Opportunities to improve condition of the Box Gum Woodland community should be considered during the revision of the Masterplan and may include additional planting of canopy species to improve connectivity of woodland habitats across the site, weed control, and restoration of a native groundcover including seeding of locally indigenous grass and herb species. The western section of the site provides the best opportunity for the creation of the ‘meadow’ as described in the 2012 Masterplan as a predominately native understorey is present in this area.

The outcomes of recommended surveys and assessment of the revised Masterplan in accordance with identified ecological values within the study area will help to determine the appropriate approvals pathways for the Project under both Territory and Commonwealth legislation, should a referral under the EPBC Act be considered necessary.

7 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (WSP) for Place Lab (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 5 March 2020 and agreement with the Client dated 1 October 2020 (Agreement).

7.1 PERMITTED PURPOSE

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (Permitted Purpose).

7.2 QUALIFICATIONS AND ASSUMPTIONS

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (Conclusions) are based in whole or in part on information provided by the Client and other parties identified in the report (Information), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

7.3 USE AND RELIANCE

Other than for use by Client or Permitted Third Party (ACT Government, as agreed):

- a) This Report should be read in its entirety and must not be copied, distributed or referred to in part only
- b) The Report must not be reproduced without the written approval of WSP
- c) This Report (or sections of the Report) should not be used as part of a specification for a project or incorporation into any other document without the prior agreement of WSP.

WSP is not (and will not be) obliged to provide an update of this Report to include any event, circumstance, revised Information or any matter coming to WSP's attention after the date of this Report. Data reported and Conclusions drawn are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) any Conclusions contained within the Report and implement them in an appropriate, suitable and timely manner.

In the absence of express written consent of WSP, no responsibility is accepted by WSP for the use of the Report in whole or in part by any party other than the Client or Permitted Third Party (ACT Government, as agreed) for any purpose whatsoever. Without the express written consent of WSP, any use which a third party makes of this Report or any reliance on (or decisions to be made) based on this Report is at the sole risk of those third parties without recourse to

WSP. Third parties should make their own enquiries and obtain independent advice in relation to any matter dealt with or Conclusions expressed in the Report.

7.4 DISCLAIMER

No warranty, undertaking or guarantee whether expressed or implied, is made with respect to the data reported or the Conclusions drawn. To the fullest extent permitted at law, WSP, its related bodies corporate and its officers, employees and agents assumes no responsibility and will not be liable to any third party for, or in relation to any losses, damages or expenses (including any indirect, consequential or punitive losses or damages or any amounts for loss of profit, loss of revenue, loss of opportunity to earn profit, loss of production, loss of contract, increased operational costs, loss of business opportunity, site depredation costs, business interruption or economic loss) of any kind whatsoever, suffered on incurred by a third party.

BIBLIOGRAPHY

- ACT GOVERNMENT 1999. Trout Cod (*Maccullochella macquariensis*): An endangered species. Action Plan No12. In: ACT, E. (ed.). Canberra: ACT Government.
- ACT GOVERNMENT 2017a. ACT Native Grassland Conservation Strategy and Action Plans (Environment, Planning and Sustainable Development Directorate, Canberra). Australian Capital Territory
- ACT GOVERNMENT 2017b. ACT Native Grassland Conservation Strategy and Action Plans (Environment, Planning and Sustainable Development, Canberra). Canberra.
- ACT GOVERNMENT. 2019. *Threatened Species List* [Online]. Available: https://www.environment.act.gov.au/cpr/conservation_and_ecological_communities/threatenedspecieslist [Accessed].
- ACT GOVERNMENT. 2020. *ACTmapi - Significant Species, Vegetation Communities & Registered Trees* [Online]. Available: <http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcr> [Accessed].
- ACT SCIENTIFIC COMMITTEE 2019. Nature Conservation (White-winged Triller) Conservation Advice 2019.
- ANSTIS, M. 2002. *Tadpoles of South-eastern Australia: a Guide with Keys*, Sydney, New Holland Publishers.
- ARMSTRONG, R. C., TURNER, K. D., MCDOUGALL, K. L., REHWINKEL, R. & CROOKS, J. I. 2013a. Plant communities of the upper Murrumbidgee catchment in New South Wales and the Australian Capital Territory *Cunninghamia*, 13, 125-265.
- ARMSTRONG, R. C., TURNER, K. D., MCDOUGALL, K. L., REHWINKEL, R. & CROOKS, J. I. 2013b. Plant communities of the upper Murrumbidgee catchment in New South Wales and the Australian Capital Territory *Cunninghamia*, 13, 125-265.
- BAINES, G., WEBSTER, M., COOK, E., JOHNSTON, L. & SEDDON, J. 2013. The vegetation of the Kowen, Majura and Jerrabomberra districts of the Australian Capital Territory. ACT Government.
- BARRER, P. 1992. A survey of *Aprasia parapulchella* along parts of the lower Molonglo River corridor. Canberra: ACT Parks & Con. Wildlife Research Unit.
- CANBERRA NATURE MAP. 2020. *Canberra Nature Map* [Online]. Available: <https://canberra.naturemapr.org/Content/Privacy> [Accessed].
- COGGER, H., FORD, H., JOHNSON, C., HOLMAN, J. & BUTLER, D. 2003. Impacts of Land Clearing on Australian Wildlife in Queensland. Brisbane: WWF Australia.
- COGGER, H. G. 2000. *Reptiles and Amphibians of Australia*, Sydney, Reed Books.
- CROPPER, S. C. 1993. *Management of Endangered Plants*, Melbourne, CSIRO Australia.
- DEPARTMENT OF AGRICULTURE WATER AND THE ENVIRONMENT. 2020. *Protected Matters Search Tool* [Online]. Canberra. Available: <http://environment.gov.au/epbc/protected-matters-search-tool> [Accessed].
- DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE. 2007. *Threatened species, populations and ecological communities* [Online]. Hurstville: NSW Department of Environment and Conservation. Available: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx> [Accessed 2006].
- DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE. 2008. *Threatened species, populations and ecological communities* [Online]. Hurstville: NSW Department of Environment and Conservation. Available: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx> [Accessed 2008].
- DEPARTMENT OF ENVIRONMENT AND CONSERVATION. 2007. *Threatened species, populations and ecological communities* [Online]. Hurstville: NSW Department of Environment and Conservation. Available: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx> [Accessed 2006].
- DEPARTMENT OF ENVIRONMENT WATER HERITAGE AND THE ARTS 2009. Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (*Synemon plana*) *Background paper to the EPBC Act policy statement 3.12 - Nationally threatened species and ecological communities*. Canberra: Department of Environment Water Heritage and the Arts,.
- DEPARTMENT OF PRIMARY INDUSTRIES. 2018. *Murray Crayfish* [Online]. Available: <https://www.dpi.nsw.gov.au/fishing/fish-species/species-list/murray-crayfish> [Accessed 17 October 2018].
- DEPARTMENT OF THE ENVIRONMENT 2015a. Consultation Document on Listing Eligibility and Conservation Actions: *Limosa lapponica menzbieri* (bar-tailed godwit (northern Siberian)).
- DEPARTMENT OF THE ENVIRONMENT 2015b. National Recovery Plan for the Alpine *Sphagnum* Bogs and Associated Fens.
- DEPARTMENT OF THE ENVIRONMENT. 2016a. *Anthochaera phrygia — Regent Honeyeater SPRAT Profile* [Online]. Department of the Environment. Available: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82338 [Accessed].
- DEPARTMENT OF THE ENVIRONMENT. 2016b. *Delma impar* in *Species Profile and Threats Database* [Online]. Canberra: Department of the Environment. Available: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1649 [Accessed].

- DEPARTMENT OF THE ENVIRONMENT. 2016c. *Golden Sun Moth (Synemon plana)* in *Species Profile and Threats Database* [Online]. Department of the Environment. Available: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=25234 [Accessed].
- DEPARTMENT OF THE ENVIRONMENT. 2016d. *Murray Cod (Maccullochella peelii)* in *Species Profile and Threats Database* [Online]. Canberra: Department of the Environment. Available: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66633 [Accessed].
- DEPARTMENT OF THE ENVIRONMENT AND ENERGY. 2019. *Species Profile and Threats Database* [Online]. Canberra: Department of the Environment and Energy,. Available: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl> [Accessed].
- DEPARTMENT OF THE ENVIRONMENT AND HERITAGE 2003. Australian Painted Snipe- Nationally threatened species and ecological communities information sheet. Canberra: Department of the Environment and Heritage.
- DEPARTMENT OF THE ENVIRONMENT AND HERITAGE 2006. EPBC Act Policy Statement 3.5 - White Box - Yellow Box - Blakely's Red Gum grassy woodlands and derived native grasslands Canberra: Department of the Environment and Heritage.
- ENVIRONMENT ACT 2005a. Action plan no. 28: A vision splendid of the grassy plains extended. ACT lowland native grassland conservation strategy. Canberra: Arts, Heritage and the Environment.
- ENVIRONMENT ACT. 2005b. *White-Winged Triller (Lalage sueurii): A vulnerable species* [Online]. Available: https://www.environment.act.gov.au/_data/assets/pdf_file/0004/576481/white-winged_triller.pdf [Accessed].
- ENVIRONMENT ACT. 2006. *Perunga Grasshopper (Perunga ochracea)* [Online]. Arts, Heritage and Environment. Available: https://www.environment.act.gov.au/_data/assets/pdf_file/0005/576464/Perunga_Grasshopper.pdf [Accessed 26 September 2018].
- GARNETT, S. T. & CROWLEY, G. M. 2000. *The Action Plan for Australian Birds*, Canberra, Environment Australia.
- HARDEN, G. 1992. *Flora of New South Wales Volume 3*, Kensington, University of New South Wales Press Ltd.
- HIGGINS, P. J. & PETER, J. M. (eds.) 2002. *Handbook of Australian, New Zealand and Antarctic Birds*, Melbourne: Oxford University Press.
- HOGG, D. & MOORE, D. 2012. Draft Southern Memorial Park Masterplan Review of Potential Ecological Impacts
- HOGG, D. & MOORE, D. 2013. Southern Memorial Park Masterplan Review of Potential Ecological Impacts
- MAGUIRE, O. & MULVANEY, M. 2011. Box-Gum Woodland in the ACT. ACT Government
- MOORE, D., NASH, K., JESSOP, R. & HOGG, D. 2012. Southern Memorial Park Ecological Surveys.
- NASH, K. & HOGG, D. M. 2009. Canberra Southern Cemetery Blocks 1676, 1677, 1520 and 1521 Tuggeranong Ecological Assessment,.
- NSW NATIONAL PARKS AND WILDLIFE SERVICE 1999a. Koala threatened species information. Hurstville: NSW National Parks and Wildlife Service.
- NSW NATIONAL PARKS AND WILDLIFE SERVICE 1999b. Spotted-tailed Quoll threatened species information. Hurstville: NSW National Parks and Wildlife Service.
- NSW NATIONAL PARKS AND WILDLIFE SERVICE 1999c. Terms of licence under the Threatened Species Conservation Act 1995. Appendix B of the Integrated Forestry Operations Approval for the Upper North East Region.
- NSW NATIONAL PARKS AND WILDLIFE SERVICE 2003. Draft Recovery Plan for the Koala. Hurstville: NSW National Parks and Wildlife Service.
- NSW SCIENTIFIC COMMITTEE. 2001. *Hooded robin (south-eastern form) - vulnerable species listing* [Online]. Available: <https://www.environment.nsw.gov.au/determinations/HoodedRobinSoutheasternFormVulSpListing.htm> [Accessed 26 September 2018].
- OFFICE OF ENVIRONMENT & HERITAGE 2017a. Brown Treecreeper - profile.
- OFFICE OF ENVIRONMENT & HERITAGE. 2017b. *Flame Robin - profile* [Online]. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20129> [Accessed].
- OFFICE OF ENVIRONMENT & HERITAGE. 2017c. *Golden Sun Moth - profile* [Online]. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10791> [Accessed].
- OFFICE OF ENVIRONMENT & HERITAGE. 2017d. *Green and Golden Bell Frog - profile* [Online]. NSW Government. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10483> [Accessed 18 September 2018].
- OFFICE OF ENVIRONMENT & HERITAGE. 2017e. *Grey-headed Flying-fox - profile* [Online]. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10697> [Accessed].
- OFFICE OF ENVIRONMENT & HERITAGE. 2018. *Mauve Burr-daisy - profile* [Online]. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10135> [Accessed 26 November 2018].
- OFFICE OF ENVIRONMENT & HERITAGE. 2019a. *Black Gum - profile* [Online]. NSW Government. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20128> [Accessed].

- OFFICE OF ENVIRONMENT & HERITAGE. 2019b. *Koala - profile* [Online]. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10616> [Accessed].
- OFFICE OF ENVIRONMENT AND HERITAGE. 2014. *Striped Legless Lizard - profile* [Online]. Office of Environment and Heritage. Available: <http://www.environment.nsw.gov.au/ThreatenedSpeciesApp/profile.aspx?id=10211> [Accessed].
- OFFICE OF ENVIRONMENT AND HERITAGE. 2017. *Glossy Black-Cockatoo - profile* [Online]. Available: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10140> [Accessed 6 December 2018].
- OSBOURNE, W. S. & JONES, S. R. 1995. Recovery Plan for the Pink-tailed Worm Lizard (*Aprasia parapulchella*). Technical Report No. 10. Canberra: Department of Environment, Land and Planning.
- PARSONS BRINCKERHOFF 2004. Targeted surveys for the Australasian Bittern (*Botaurus poiciloptilus*) at Wingecarribee Swamp. Sydney: Report prepared for Sydney Catchment Authority.
- ROYAL BOTANIC GARDENS. 2007. *PlantNet - The Plant Information Network System of Botanic Gardens Trust (version 2.0)* [Online]. Sydney: Royal Botanic Gardens. Available: <http://plantnet.rbgsyd.nsw.gov.au/> [Accessed].
- ROYAL BOTANIC GARDENS. 2009. *PlantNet - The Plant Information Network System of Botanic Gardens Trust (version 2.0)* [Online]. Sydney: Royal Botanic Gardens. Available: <http://plantnet.rbgsyd.nsw.gov.au/> [Accessed].
- ROYAL BOTANIC GARDENS AND DOMAIN TRUST. 2020. *PlantNet (The Plant Information Network System of Botanic Gardens Trust)* [Online]. Sydney: Royal Botanic Gardens. Available: <http://plantnet.rbgsyd.nsw.gov.au/> [Accessed].
- SWAN, G., SHEA, G. & SADLER, R. 2004. *A Field Guide to Reptiles of New South Wales*, Sydney, Reed New Holland.
- SWIFT PARROT RECOVERY TEAM 2001. Swift Parrot Recovery Plan. In: DEPARTMENT OF PRIMARY INDUSTRIES, W. A. E. T. (ed.). Hobart: Department of Primary Industries, Water and Environment.
- THREATENED SPECIES SCIENTIFIC COMMITTEE 2016. Conservation Advice: *Limosa lapponica baueri*.
- TONKIN ZULIAKHA GREER ARCHITECTS 2012. Southern Memorial Park Masterplan.
- UMWELT (AUSTRALIA) PTY LIMITED 2015. Determination of the Extent and Quality of EPBC Act Box Gum Woodland at the Proposed Mugga Lane Cemetery Site.

APPENDIX A

SURVEY RESULTS



A1 RECORDED FAUNA

Table A.1 Recorded fauna

SCIENTIFIC NAME	COMMON NAME
<i>Cacatua galerita</i>	Sulphur Crested Cockatoo
<i>Callocephalon fimbriatum</i> [^]	Gang-gang Cockatoo
<i>Chenonetta jubata</i>	Australian Wood Duck
<i>Corcorax melanorhamphos</i>	White-winged Chough
<i>Corvus coronoides</i>	Australian Raven
<i>Crinia signifera</i>	Common Eastern Froglet
<i>Eolophus roseicapilla</i>	Galah
<i>Equus ferus caballus</i> [*]	Horse
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Gymnorhina tibicen</i>	Australia Magpie
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>Manorina melanocephala</i>	Noisy Miner
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Oryctolagus cuniculus</i> [*]	European Rabbit
<i>Platycercus elegans</i>	Crimson Rosella
<i>Platycercus eximius</i>	Eastern Rosella
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe
<i>Treskiornis molucca</i>	Australian White Ibis

Notes *denotes an exotic species, ^ indicates the species was recorded outside of the study area but nearby

APPENDIX B

LIKELIHOOD OF OCCURRENCE ASSESSMENTS



B1 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA

Table B.1 Likelihood of occurrence of threatened flora assessment

SCIENTIFIC NAME	COMMON NAME	NC ACT ¹	EPBC ACT ²	HABITAT DESCRIPTION	SOURCE ³	LIKELIHOOD OF OCCURRENCE
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	-	V	The species occurs in southern NSW, Victoria, South Australia, and Tasmania. In NSW historic collections come from the Albury area, Along the Murray River, and along the Murrumbidgee River. It grows in moderately fertile soil, with some bare ground, and conditions that are caused by seasonally fluctuating water levels. The specie mostly grows in permanent swamps, but also occurs in billabongs, lagoons, dams, and in roadside ditches (Department of the Environment and Energy, 2018).	PMST	Low – no suitable habitat available within the study area.
<i>Bossiaea grayi</i>	Murrumbidgee bossiaea	E	-	A wiry shrub growing to around 1.5 meters high. The species flowers from September to October and seeds in December. The species is found only with the ACT and is known from ten locations along the Murrumbidgee, Paddy's and Cotter Rivers. The species grows in sandy soil amongst boulders on river banks and adjacent slopes close to rivers, usually at the top of the riparian zone (Environment and Planning Directorate - Environment, 2015).	ACTmapi	Low – no suitable habitat available within the study area.
<i>Calotis glandulosa</i>	Mauve Burr-daisy	-	V	The species grows in montane and subalpine grasslands in the Australia Alps. Usually in subalpine grassland dominated by <i>Poa</i> spp., montane or natural temperate grassland dominated by <i>Themeda australis</i> , and Snow Gum Woodlands on the Monaro and Shoalhaven area. It is a coloniser of bare patches, often occurring on roadsides. The species flowers in spring and summer (Office of Environment & Heritage, 2018).	PMST	Low – no suitable habitat available within the study area.

SCIENTIFIC NAME	COMMON NAME	NC ACT ¹	EPBC ACT ²	HABITAT DESCRIPTION	SOURCE ³	LIKELIHOOD OF OCCURRENCE
<i>Dodonaea procumbens</i>	Trailing Hop-bush	-	V	Found in the dry areas of the Monaro, between Michelago and Dalgety. There is one population at Lake Bathurst (the northern-most occurrence of the species). Occurs mostly in Natural Temperate Grassland or Snow Gum <i>Eucalyptus pauciflora</i> Woodland. Grows in open bare patches where there is little competition from other species. Found on sandy-clay soils, usually on or near vertically-tilted shale outcrops. Produces roots along the stems that enable the plants to recover from minor disturbances. It often occurs on roadside batters but does not persist in heavily grazed pastures of the Monaro (Department of Environment and Climate Change, 2007).	PMST	Low – no suitable habitat available within the study area.
<i>Eucalyptus aggregata</i>	Black Gum	V	V	The species has a relatively moderate distribution, and occurs mainly in the wetter, cooler and higher areas of the tablelands including Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts. It grows on alluvial soils, in the lowest parts of the landscape. The species also occurs isolated within paddocks in modified native or exotic pastures (Office of Environment & Heritage, 2019a).	PMST, PlantNet	Low – no suitable habitat available within the study area.
<i>Lepidium ginninderrense</i>	Ginninderra Peppergrass	E	V	The Ginninderra Peppergrass is a perennial herb that flowers in late Spring. The Ginninderra Peppergrass grows in a natural temperate grassland on the flood plain of Ginninderra Creek, especially in locations where grass tussocks and other plant growth are short and open, thus there is little competition for space and light. The soil type over most of the site is a shallow red earth, with patches of colluvium on the footslopes and the population occurs at an altitude of c.580 metres (Department of the Environment and Energy, 2019b).	PMST, ACTmapi	Low – no suitable habitat available within the study area.

SCIENTIFIC NAME	COMMON NAME	NC ACT ¹	EPBC ACT ²	HABITAT DESCRIPTION	SOURCE ³	LIKELIHOOD OF OCCURRENCE
<i>Lepidium hyssopifolium</i>	Basalt Pepper-cress	-	E	Currently known from about 35 populations. Most occur in Tasmania, three in NSW, and seven in Victoria. In NSW, populations occur in Bathurst and Bungendore (Tumino, 2010). Original habitat for the species was likely to be eucalypt and/or <i>Allocasuarina</i> woodland with a grassy understorey, and native temperate grasslands. Most remaining populations occur in heavily modified environments (Tumino, 2010).	PMST	Low – no suitable habitat available within the study area.
<i>Leucochrysum albicans</i> <i>var. tricolor</i>	Hoary Sunray	-	E	The species occurs in a wide range of communities and habitats occurring within grasslands, grassy areas in woodlands and dry open forests and modified landscapes on a variety of soils types. This subspecies is restricted to the central and southern tablelands and the central western slopes (Royal Botanic Gardens, 2007).	PMST, ACTmapi	Low – no suitable habitat available within the study area, and previous targeted surveys failed to identify the species.
<i>Muehlenbeckia tuggeranong</i>	Tuggeranong Lignum	E	E	Known from a few sites on flood terraces along the eastern bank of the Murrumbidgee River South of Canberra. Grows on terraces prone to occasional flooding and on adjacent gentle slopes at an altitude of 550 m growing on coarse-textured alluvium, mainly quartzitic sand and gravel (Department of the Environment, 2015).	PMST, ACTmapi, PlantNet	Low – no suitable habitat available within the study area.
<i>Pomaderris pallida</i>	Pale Pomaderris	V	V	The main distribution of this species is along the Murrumbidgee in the ACT. This species usually grows in shrub communities surrounded by Brittle Gum (<i>Eucalyptus mannifera</i>) and Red Stringybark (<i>E. macrorhynca</i>) or Callitris spp. Woodland (Royal Botanic Gardens, 2009).	PMST, ACTmapi	Low – no suitable habitat available within the study area.

SCIENTIFIC NAME	COMMON NAME	NC ACT ¹	EPBC ACT ²	HABITAT DESCRIPTION	SOURCE ³	LIKELIHOOD OF OCCURRENCE
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	E	E	Grows in open sites within Natural Temperate Grassland at the Boorowa site. Also grows in grassy woodland in association with <i>Poa labillardieri</i> (River Tussock), <i>Eucalyptus aggregata</i> (Black Gum) and <i>Leptospermum spp.</i> (tea-trees) at Captains Flat and within the grassy groundlayer of Box-Gum Woodland at Hall. Apparently highly susceptible to grazing, being retained only at a little-grazed travelling stock reserve (Boorowa) and in cemeteries (Captains Flat and Hall) (Department of Environment and Climate Change, 2008).	PMST	Low – no suitable habitat available within the study area.
<i>Rutidosia leptorrhynchoides</i>	Button Wrinklewort	E	E	Occurs in Box-Gum Woodland, secondary grassland derived from Box-Gum Woodland or in Natural Temperate Grassland; and often in the ecotone between the two communities. Grows on soils that are usually shallow, stony red-brown clay loams; tends to occupy areas where there is relatively less competition from herbaceous species (either due to the shallow nature of the soils, or at some sites due to the competitive effect of woodland trees). Exhibits an ability to colonise disturbed areas (e.g. vehicle tracks, bulldozer scrapings and areas of soil erosion). Normally flowers between December to March; plants do not usually flower until their second year. Has regenerative buds at the surface of the soil but not below, so plants do not have the ability to resprout from underground structures; the stems usually die back in late summer or autumn and new basal leaves are evident by early winter. Thought to be insect pollinated, although the specific vectors are not known. Observed flourishing at a site a few years after the area was burnt by a wildfire. Apparently susceptible to grazing, being retained in only a small number of populations on roadsides, rail reserves and other un-grazed or very lightly grazed sites (Royal Botanic Gardens, 2014).	PMST, ACTmapi, PlantNet	Low – no suitable habitat available within the study area, and previous targeted surveys failed to identify the species.

SCIENTIFIC NAME	COMMON NAME	NC ACT ¹	EPBC ACT ²	HABITAT DESCRIPTION	SOURCE ³	LIKELIHOOD OF OCCURRENCE
<i>Swainsona recta</i>	Small Purple-pea	E	E	Found in grassland and open woodland, often on stony hillsides (Royal Botanic Gardens, 2004). Before European settlement it occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum <i>Eucalyptus blakelyi</i> , Yellow Box <i>E. melliodora</i> , Candlebark Gum <i>E. rubida</i> and Long-leaf Box <i>E. goniocalyx</i> . Grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i> , poa tussocks <i>Poa</i> spp. and spear-grasses <i>Austrostipa</i> spp. Plants die back in summer, surviving as a rootstocks until they shoot again in autumn (Department of Environment and Climate Change, 2008).	PMST, ACTmapi, PlantNet	Low – no suitable habitat available within the study area, and previous targeted surveys failed to identify the species.
<i>Thesium australe</i>	Austral Toadflax	V	V	Grows in grassland or woodland often in damp sites. It is a semi-parasitic herb and hosts are likely to be <i>Themeda australis</i> and <i>Poa</i> spp. (Harden, 1992, Department of Environment and Climate Change, 2008).	PMST, ACTmapi	Low – no suitable habitat available within the study area.

- (1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the *Nature Conservation Act 2014*.
- (2) V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory under the *Environment Protection Biodiversity Conservation Act 1999*.
- (3) ACTmapi = Significant Species, Vegetation Communities & Registered Trees (ACT Government), PlantNet = Royal Botanic Gardens PlantNet Spatial Search, PMST = Department of Environment's EPBC Protected Matters Search Tool.

B2 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA

Table B.2 Likelihood of occurrence of threatened fauna assessment

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
Amphibian						
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	V	The species was formerly distributed from the NSW north coast near Brunswick Heads, south along the NSW coast to Victoria. The distribution extended west to Bathurst. The majority of current populations (record from 1990 and more recent) are small, coastal or near coastal populations over the former range, although now more isolated and widely separated. There are larger populations located in the metropolitan areas of Shoalhaven, Sydney and the mid north coast. The Southern Tablelands of NSW only has one known population. The species inhabits marshes, dams and stream-sides, particularly those with <i>Typha</i> spp. or <i>Eleocharis</i> spp. (Office of Environment & Heritage, 2017d).	PMST	Low – some potential habitat is present; however this species is considered likely to have disappeared from the ACT.
<i>Litoria booroolongensis</i>	Booroolong Frog	-	E	Confined to mountain streams of the Great Dividing Range (Cogger, 2000). Usually found on or under boulders and debris in and beside the rocky beds of mountain streams; breeds in summer (Anstis, 2002).	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Litoria castanea</i>	Yellow-spotted Tree Frog	CE	CE	The species requires large permanent ponds or slow flowing streams with plenty of emergent vegetation such as bulrushes. Adults are active during spring and summer and bask on sunny days. Move and forage at night on grassy banks or float on the water's surface. Males call at night from the open water and breeding generally occurs during or following rain. Eggs are laid amongst aquatic vegetation. Shelter during autumn and winter under fallen timber, rocks, other debris or thick vegetation (Department of Environment and Conservation, 2007).	PMST	Low – no preferred habitat present and this species is believed to be extinct within the ACT region, with the only known extant population of the species occurs in the Yass area outside of the locality of the study area.
<i>Litoria raniformis</i>	Southern Bell Frog	V	V	In the past, the Southern Bell Frog was distributed across a large area of south-east Australia at altitudes of up to 1300 m. The Southern Bell Frog is usually found amongst emergent vegetation such as Typha, Phragmites and Eleocharis within or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds, and farm dams (Robinson, 1993). It also occurs in irrigation channels and crops, lignum shrublands, black box and river red gum woodlands and at the periphery of rivers. Apart from breeding and foraging habitat, refuge areas for this species may include soil cracks, fallen timber, debris and dense vegetation on low, frequently inundated floodplains (Cogger et al., 2003). Vegetation types in which this species occurs include open grassland (including crops and pastures), open forest, and ephemeral and permanent non-saline marshes and swamps (Department of the Environment, 2016b).	PMST	Low – some potential habitat is present; however this species is considered likely to have disappeared from the ACT.
Aves						

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Actitis hypoleucos</i>	Common Sandpiper	-	M	The Common Sandpiper frequents a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity. It is mostly encountered along muddy margins or rocky shores and rarely on mudflats. It has been recorded in estuaries and deltas of streams, banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks.	PMST	Low – no preferred habitat present.
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. 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. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. It inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. It feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany.	PMST	Low/ Moderate - marginal foraging habitat present in the study area and rare occurrences of this species cannot be discounted due to complex and varied seasonal movements across its former range.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Apus pacificus</i>	Fork-tailed Swift	-	V, M	Breeds in the northern hemisphere, wintering south to Australia. It is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground. It mostly occurs over inland plains but sometimes above foothills or in coastal areas over cliffs, beaches, islands and well out to sea. It also occurs over towns and cities. It mostly occurs over dry and/or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh, grassland, spinifex sandplains, farmland and sand-dunes. It sometimes occurs above forests. It probably roosts aerially, but has occasionally been observed to land.	PMST	Low – the species is likely to occur on occasion in aerial spaces above the study area, however, the study area does not contain preferred habitat.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds (Parsons Brinckerhoff, 2004).	PMST	Low – no preferred habitat present.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M	Occurs in a variety of habitats: tidal mudflat, mangrove swamps, saltmarshes, shallow fresh, brackish, salt inland swamps and lakes; flooded and irrigated paddocks, sewage farms and commercial saltfields.	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	CE, M	Occurs in inter-tidal mudflats of estuaries, lagoons, mangrove channels and also around lakes, dams, floodwaters and flooded saltbush surrounding inland lakes.	PMST	Low – limited preferred habitat present, however records for the species in the ACT come only from the Jerrabomberra Wetlands.
<i>Calidris melanotos</i>	Pectoral Sandpiper	-	M	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species frequents coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It is usually found in coastal or near coastal habitat but occasionally further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. It has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Calyptorhynchus lathamii lathamii</i>	Glossy Black-cockatoo	V	-	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> , and <i>A. gymnathera</i> . Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites (Office of Environment and Heritage, 2017).	Professional opinion	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	V	-	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging. Also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains (Office of Environment & Heritage, 2017a). Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding (Office of Environment & Heritage, 2017a).	Professional opinion	Low – marginal potential habitat is present for this species in Box Gum Woodland areas however fallen timber, an important habitat component, is limited, and the species has not previously been recorded within the site during surveys. The species may utilise the adjacent Wanniasa Hill Nature Reserve
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Professional opinion	Moderate – marginal habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Gallinago hardwickii</i>	Latham's Snipe	-	M	Occurs in freshwater or brackish wetlands generally near protective vegetation cover. This species feeds on small invertebrates, seeds and vegetation. It migrates to the northern hemisphere to breed.	PMST	Low – no preferred habitat present.
<i>Grantiella picta</i>	Painted Honeyeater	V	V	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. Inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) 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 <i>Amyema</i> .	PMST	Low/ Moderate – abundant mistletoe were recorded within the study area. The species has a low occurrence within the ACT, however rare occurrences of the species cannot be discounted.
<i>Hieraetus morphnoides</i>	Little Eagle	V	-	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Professional opinion	Moderate – the study area contains potential foraging habitat for the species.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	V, M	Widespread in eastern and south-eastern Australia. It 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 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, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes.	PMST, CNM	Low – the species is likely to occur on occasion in aerial spaces above the study area, however, the study area does not contain preferred habitat.
<i>Lalage tricolor</i>	White-winged Triller	V	-	The species is distributed across Australia, where it is resident near water in the north and is nomadic and seasonally migratory through central and southern Australia. In the ACT the species is an uncommon, breeding, summer migrant which occupies grassy woodland areas (ACT Scientific Committee, 2019). Records come from Hall, Mulligans Flat, Goorooyaroo, the Pinnacle, Campbell Park, and the Gigerline-Tharwa area (Environment ACT, 2005b).	Professional opinion	Moderate – marginal habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Lathamus discolor</i>	Swift Parrot	CE	CE	Breeding occurs in Tasmania, majority migrates to mainland Australia in autumn, over-wintering, particularly in Victoria and central and eastern NSW, but also south-eastern Queensland. Until recently it was believed that in New South Wales, swift parrots forage mostly in the western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region, but new evidence indicates that the forests on the coastal plains from southern to northern NSW are also extremely important. In mainland Australia is semi-nomadic, foraging in flowering eucalypts in eucalypt associations, particularly box-ironbark forests and woodlands. Preference for sites with highly fertile soils where large trees have high nectar production, including along drainage lines and isolated rural or urban remnants, and for sites with flowering <i>Acacia pycnantha</i> , is indicated. Sites used vary from year to year. (Garnett and Crowley, 2000, Swift Parrot Recovery Team, 2001).	PMST	Low/ Moderate - marginal foraging habitat present in the study area and rare occurrences of this species cannot be discounted due to complex and varied seasonal movements across its former range.
<i>Limosa lapponica</i>	Bar-tailed Godwit	-	M	The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria, including the offshore islands. Found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas.	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	-	V	The Bar-tailed Godwit (both subspecies combined) has been recorded in coastal areas of all Australian states. The species is widespread in the Torres Strait, and along the east and south-east coasts of Queensland, NSW and Victoria, and from Lake Alexandra to Denial Bay in WA (Threatened Species Scientific Committee, 2016). The subspecies breed in north-east Siberia as well as in west Alaska. During the non-breeding season, the species resides in northern and eastern Australia, and New Zealand. The subspecies occurs primarily in coastal habitats. It has also been recorded in coastal sewage farms and saltworks, and brackish wetlands (Threatened Species Scientific Committee, 2016).	PMST	Low – no preferred habitat present.
<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit	-	CE	The Bar-tailed Godwit (both subspecies combined) has been recorded in coastal areas of all Australian states. The species is widespread in the Torres Strait, and along the east and south-east coasts of Queensland, NSW and Victoria, and from Lake Alexandra to Denial Bay in WA (Department of the Environment, 2015a). The subspecies breeds in northern Siberia, Russia between the Khatanga River and the delta of the Koylma River. During the non-breeding period the species is found primarily in the north of Western Australia, and in south-east Asia. The subspecies occurs primarily in coastal habitats. It has also been recorded in coastal sewage farms and saltworks, and brackish wetlands (Department of the Environment, 2015a).	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Melanodryas cucullata cucullata</i>	Hooded Robin	V	-	Found in south-eastern Australia, generally east of the Great Dividing Range. Found in eucalypt woodland and mallee and acacia shrubland. The species appears unable to survive in remnants smaller than 100-200ha (NSW Scientific Committee, 2001), and avoids dense forests and urban areas. Critical habitat features include large trees for protective cover, grassy areas supporting invertebrates.	Professional opinion	Low - marginal potential habitat for this species is present, however the species requires structurally diverse habitats not supported within the study area. Additionally, the species was not recorded during targeted diurnal bird surveys in 2011.
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	M	Occurs in rainforests, eucalypt woodlands, coastal scrubs, damp gullies in rainforest, eucalypt forest and in more open woodland when migrating.	PMST	Low – marginal habitat present however the species has not been recorded within the locality.
<i>Motacilla flava</i>	Yellow Wagtail	-	M	This species occurs in a range of habitats including estuarine habitats such as sand dunes, mangrove forests and coastal saltmarshes. This species also occurs in open grassy areas including disturbed sites such as sports grounds and has been recorded on the edges of wetlands, swamps, lakes and farm dams. This species migrates from Asia to Australia in spring-summer.	PMST	Low – no preferred habitat present.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M	Widespread in eastern Australia. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1400 m above sea level, and in the ACT, they occur mainly between 800 m above sea level and the treeline.	PMST	Low/ Moderate – marginal habitat present and the species was recently recorded in the adjacent Wanniasa Hill Nature Reserve. Rare occurrence of this species during migratory movements cannot be discounted.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Numenius madagascariensis</i>	Eastern Curlew	-	CE, M	Inhabits coastal estuaries, mangroves, mud flats and sand pits. It is a migratory shorebird which generally inhabits sea and lake shore mud flats, deltas and similar areas, where it forages for crabs and other crustaceans, clam worms and other annelids, molluscs, insects and other invertebrates. Its migration route ranges from its wintering grounds in Australia to its breeding grounds in northern China, Korea and Russia.	PMST	Low – no preferred habitat present.
<i>Pandion haliaetus</i>	Osprey	-	M	Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Petroica boodang</i>	Scarlet Robin	V	-	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.	Professional opinion	Low – while marginal habitat in the form of open woodland occurs within the study area, only a low abundance of fallen timber, an important habitat feature of preferred habitat, is available.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Petroica phoenicea</i>	Flame Robin	V	-	In the NSW region the Flame Robin breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. The species prefers clearings or areas with open understoreys. It migrates in winter to more open lowland habitats. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes. The Flame Robin forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other woody debris. The species often occurs in recently burnt areas however habitat becomes unsuitable as vegetation closes up following regeneration (Office of Environment & Heritage, 2017b). The robin builds an open cup nest of plant fibres and cobweb, which is often near the ground in a sheltered niche, ledge or shallow cavity in a tree, stump or bank (Office of Environment & Heritage, 2017b, Higgins and Peter, 2002).	Professional opinion	Low/ Moderate – marginal habitat present within the study area. Rare occurrences of the species during winter migration cannot be discounted.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Polytelis swainsonii</i>	Superb Parrot	V	B	The species 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. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Tree species known to be used 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. Also eaten are fruits, berries, nectar, buds, flowers, insects and grain (Department of the Environment, 2016a, Garnett and Crowley, 2000).	PMST	Low – limited/ no breeding resources area available and most records for the species come from Canberra's north.
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M	Occurs in a range of habitats including the undergrowth of rainforests/wetter eucalypt forests/gullies, monsoon forests paperbarks, sub-inland and coastal scrubs, mangroves, watercourses, parks and gardens. When migrating they may also be recorded on farms, streets and buildings. Migrates to SE Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range.	PMST	Low – no preferred habitat present.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	The Australian Painted Snipe is restricted to Australia. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds (Department of the Environment and Heritage, 2003).	PMST	Known – one individual was recorded at the edge of a dam in 2011. The study area on occasion may be visited by the species during migratory movements.
Pisces						
<i>Euastacu armatus</i>	Murray River Crayfish	V	-	Inhabit both cold and warm water habitats in the Murray River upstream of Mildura, in the Murrumbidgee River and in some dams (Department of Primary Industries, 2018).	ACTmapi	Low – no suitable habitat present
<i>Maccullochella macquariensis</i>	Trout Cod	E	E	Once widespread in the south-eastern region of the Murray-Darling Basin with records from the Murray, Murrumbidgee and Macquarie rivers in New South Wales/Australian Capital Territory and the Goulburn, Broken, Campaspe, Ovens, King, Buffalo and Mitta Mitta rivers in Victoria. In general, it appears that adults are essentially a pool dwelling, cover-seeking fish. In the ACT the species has been released in the Murrumbidgee River and associated tributaries (ACT Government, 1999).	ACTmapi	Low – no suitable habitat present

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Maccullochella peelii</i>	Murray Cod	-	V	The Murray Cod was historically distributed throughout the Murray-Darling Basin (the Basin), with the exception of the upper reaches of some tributaries. The species still occurs in most parts of this natural distribution, up to approximately 1000 m above sea level. It utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures. (Department of the Environment, 2016d)	PMST, ACTmapi	Low – no suitable habitat present
<i>Macquaria australasica</i>	Macquarie Perch	E	E	The natural range of Macquarie Perch included the upper and middle reaches of the Murray-Darling basin as well as the Shoalhaven and Hawkesbury Rivers. However, this species has recently been sighted in only a few localities within these river systems. Preferred habitat is deep holes covered with rocks, and spawning occurs above shallow running water. Macquarie Perch is a schooling species (Department of the Environment and Water Resources, 2007).	PMST, ACTmapi	Low – no suitable habitat present
Invertebrates						
<i>Perunga ochracea</i>	Perunga Grasshopper	V	-	The Perunga Grasshopper is known to occur in Wagga Wagga, Boorowa, Galong, and ACT and the adjacent NSW areas including Jeir, Queanbeyan and Murrumbateman. The species key habitat seems to be Natural Temperate Grassland dominated by kangaroo, wallaby and spear grasses within forb food plants located in the inter-tussock spaces. The species may also inhabit woodland areas that have a grassy understorey (Environment ACT, 2006).	ACTmapi	Low/ Moderate – some potential habitat is present for the species in areas containing a native understorey. Targeted surveys are recommended.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Synemon plana</i>	Golden Sun Moth	E	CE	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species' historical distribution extended from Bathurst (central NSW) through the NSW Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses (<i>Austrodanthonia</i> spp). Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses <i>Austrostipa</i> spp. or Kangaroo Grass <i>Themeda australis</i> . The flight period is relatively short, typically lasting from six to eight weeks (during November and December in the ACT region, possibly earlier or later in other regions). Males fly only in bright sunshine during the warmest part of the day (1000 - 1400 hrs). Adults emerge continuously throughout the flying season (Office of Environment & Heritage, 2017c, Department of the Environment, 2016c).	PMST, ACTmap	Low/ Moderate – small areas of potential isolated habitat patches occur, and previous targeted surveys did not meet Australian Government guidelines. Further surveys in association with surveys for Perunga Grasshopper are recommended to support the findings of previous surveys given guidelines weren't met .
Mammals						

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	-	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.	PMST	Low - no suitable roosting habitat identified within study area.
<i>Dasyurus maculatus maculatus</i>	Spotted-tail Quoll	V	E	Occurs from the Bundaberg area in south-east Queensland, south through NSW to western Victoria and Tasmania. In NSW, it occurs on both sides of the Great Dividing Range and north-east NSW represents a national stronghold (NSW National Parks and Wildlife Service, 1999c). Occurs in wide range of forest types, although appears to prefer moist sclerophyll and rainforest forest types, and riparian habitat. Most common in large unfragmented patches of forest. It has also been recorded from dry sclerophyll forest, open woodland and coastal heathland, and despite its occurrence in riparian areas, it also ranges over dry ridges. Nests in rock caves and hollow logs or trees. Feeds on a variety of prey including birds, terrestrial and arboreal mammals, small macropods, reptiles and arthropods (NSW National Parks and Wildlife Service, 1999b, NSW National Parks and Wildlife Service, 1999c).	PMST, ACTmapi	Low - no preferred habitat identified within study area. While records occur within the locality, the study area would not contain sufficient unfragmented vegetation to support the species and a lack of nesting resources available within the study area.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Petauroides volans</i>	Greater Glider	V	V	The Greater Glider has a restricted distribution in eastern Australia, from the north Queensland to central Victoria, with an elevated range from sea level to 1200m above sea level. The species is largely restricted to eucalypt forests and woodlands, feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. It is found in abundance in montane eucalypt forest with relatively old trees and an abundance of hollows. It also favours forests with a diversity of eucalypts to cater for seasonal variation in food abundance.	PMST	Low – no preferred habitat present as there is a lack of hollows and no record within the locality.
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	The species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha.	PMST	Low – No preferred habitat and no recent records occur within the locality; the species is presumed to be locally extinct.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Phascolarctos cinereus</i>	Koala	V	V	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. Inhabits eucalypt woodlands and forests. Koalas feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. The preferred tree species vary widely on a regional and local basis. Some preferred species include Forest Red Gum (<i>Eucalyptus tereticornis</i>), Grey Gum (<i>E. punctata</i> .) In coastal areas, Tallowwood (<i>E. microcorys</i>) and Swamp Mahogany (<i>E. robusta</i>) are important food species, while in inland areas White Box (<i>E. albens</i>), Bimble Box (<i>E. populnea</i>) and River Red Gum (<i>E. camaldulensis</i>) are favoured ((NSW National Parks and Wildlife Service, 1999a, NSW National Parks and Wildlife Service, 2003, Office of Environment & Heritage, 2019b), NSW National Parks and Wildlife Service, 2003b, Office of Environment and Heritage, 2017a). In the ACT region, Koalas are thought to be present through the Brindabella Ranges and in the Orroral Valley, Tidbinbilla reserve and Namadgi National Park (Department of the Environment and Energy, 2019).	PMST	Low – marginal preferred habitat identified within the study area in the form of Box Gum Woodland with secondary feed tree species. No post 1980 records for the species within this area of the ACT with the exception of the one report of an individual between Canberra Airport and Queanbeyan in 2014. Additionally, no evidence of Koala usage was recorded within the study area during field surveys.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Grey-headed Flying-foxes are generally found within 200km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Can travel up to 50km from the camp to forage; commuting distances are more often <20km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines (Office of Environment & Heritage, 2017e).	PMST	Moderate – the species may utilise the study area when foraging resources are available.
Reptiles						
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	V	V	This lizard is known from four sites in eastern Australia: near Canberra in the ACT, Tarcutta and Bathurst in NSW, and near Bendigo in Victoria. In general, lizards occur in open grassland habitats that have a substantial cover of small rocks (Osbourne and Jones, 1995). Lizards also show a preference for sunny aspects, avoiding south facing slopes. Some specimens have been collected from grassland sites that appear not to support any native grasses and several animals have been found on the edge of <i>Callitris endlicheri</i> woodland and <i>Eucalyptus macrorhyncha</i> woodland (Barrer, 1992). A burrowing species, it is usually found under rocks on well-drained soil and in ant nests, occasionally with several individuals found under the same rock (Swan et al., 2004).	PMST, ACTmapi	Low – rocky habitats have been degraded and heavily grazed. Targeted surveys in 2012 failed to detect the species.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Delma impar</i>	Striped Legless Lizard	V	V	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found 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 <i>Themeda triandra</i> , spear-grasses <i>Austrostipa</i> spp. and poa tussocks <i>Poa</i> spp., and occasionally wallaby grasses <i>Rytidosperma</i> spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Also sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter (Department of the Environment, 2016b, Office of Environment and Heritage, 2014).	PMST, ACTmap	Low – this species occurs in native grassland and nearby grassy woodland and exotic pasture. As the study area is outside of the pre-1750 distribution of native grassland the species is not considered likely to occur. Additionally, the study area has been heavily grazed and does not support the grass sward preferred by the species.

SCIENTIFIC NAME	COMMON NAME	NC ACT	EPB C ACT	HABITAT DESCRIPTION	SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Tympanocryptis pinguicolla</i>	Grassland Earless Dragon	E	E	Restricted to a small number of Natural Temperate Grassland sites dominated by wallaby grasses (<i>Notodanthonia</i> spp.), spear grasses (<i>Austrostipa</i> spp.), Poa Tussock (<i>Poa sieberiana</i>), Red Grass (<i>Bothriochloa macra</i>), and occasionally Kangaroo Grass (<i>Themeda australis</i>). Introduced pasture grasses occur at many of the sites supporting this species, which has also been captured in secondary grassland. Within its habitat, apparently prefers areas with a more open structure, characterised by small patches of bare ground between the grasses and herbs. In addition to tussocks, partially embedded surface rocks, and spider and insect holes are used for shelter. These are important micro-habitat elements within the grassland habitat. Rocks and arthropod holes provide important thermal refuges during temperature extremes. It feeds on small invertebrates, including ants and spiders. Tends to be inactive beneath rocks or in arthropod burrows during the winter months. Lays up to five eggs in shallow nests or burrows, (sometimes those dug by spiders or other arthropods), between late spring and late summer. Young hatch in late summer and autumn (Department of Environment and Climate Change, 2007).	PMST, ACTmapi	Low – the site does not, nor did it once support Natural Temperate Grassland.

- (1) V = Vulnerable, E = Endangered, CE = Critically Endangered under the *Nature Conservation Act 2014*.
- (2) V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory under the *Environment Protection Biodiversity Conservation Act 1999*.
- (3) ACTmapi = Significant Species, Vegetation Communities & Registered Trees (ACT Government), PlantNet = Royal Botanic Gardens PlantNet Spatial Search, PMST = Department of Environment’s EPBC Protected Matters Search Tool.

APPENDIX C

PMST SEARCH RESULTS





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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 11/05/20 11:05:37

[Summary](#)

[Details](#)

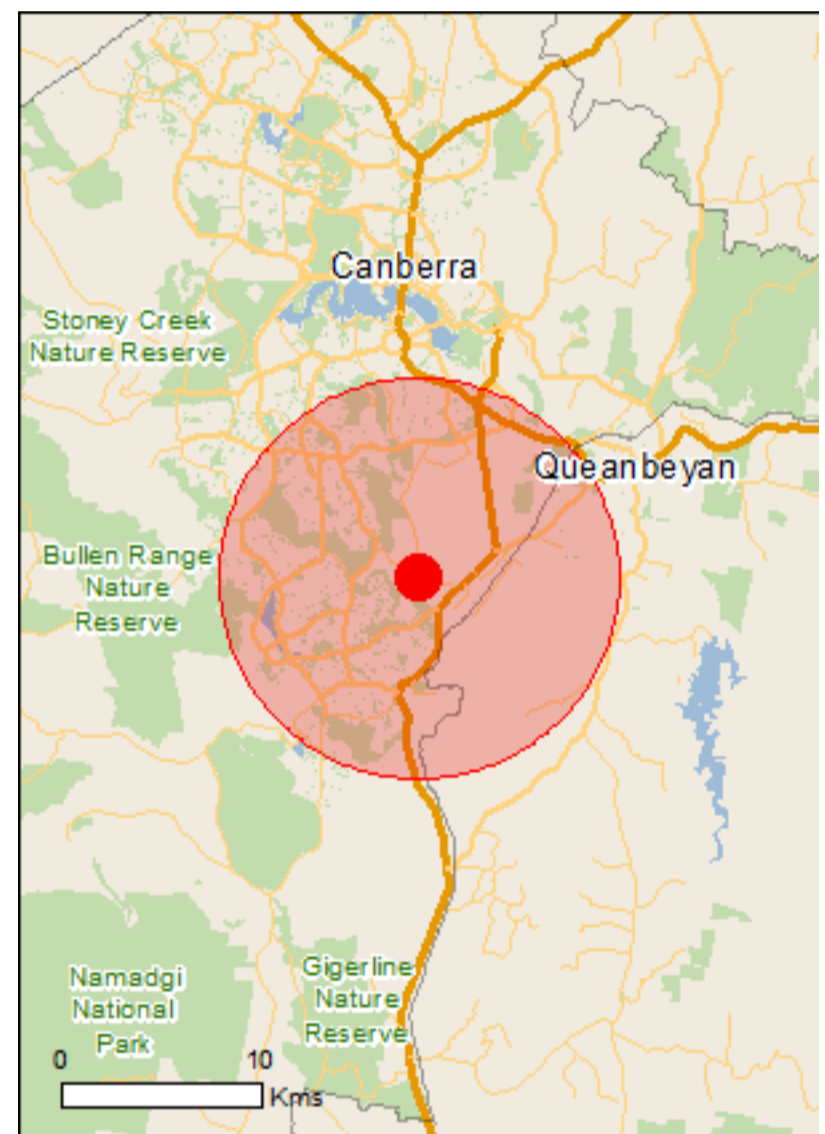
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

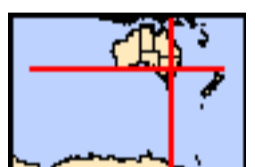
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental 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:	1
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	40
Listed Migratory Species:	14

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 <http://www.environment.gov.au/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 Land:	14
Commonwealth Heritage Places:	14
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	18
Regional Forest Agreements:	1
Invasive Species:	35
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
Old Parliament House and Curtilage	ACT	Listed place

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	800 - 900km upstream	
Hattah-kulkyne lakes	600 - 700km upstream	
Riverland	700 - 800km upstream	
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream	

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.	

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

Listed Threatened Species	[Resource Information]	
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed	Critically Endangered	Species or species

Name	Status	Type of Presence
Godwit (menzbieri) [86432]		habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within 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
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		

Name	Status	Type of Presence
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
Calotis glandulosa Mauve Burr-daisy [7842]	Vulnerable	Species or species habitat may occur within area
Dodonaea procumbens Trailing Hop-bush [12149]	Vulnerable	Species or species habitat may occur within area
Eucalyptus aggregata Black Gum [20890]	Vulnerable	Species or species habitat likely to occur within area
Lepidium ginninderrense Ginninderra Peppercress [78474]	Vulnerable	Species or species habitat may occur within area
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat may occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat known to occur within area
Muehlenbeckia tuggeranong Tuggeranong Lignum [64934]	Endangered	Species or species habitat likely to occur within area
Pomaderris pallida Pale Pomaderris [13684]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Rutidosis leptorrhynchoides Button Wrinklewort [7384]	Endangered	Species or species habitat known to occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat known to occur within area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat likely to occur within area
Tympanocryptis pinguicolla Grassland Earless Dragon [66727]	Endangered	Species or species habitat known to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

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.

Name

Commonwealth Land -
Commonwealth Land - Airservices Australia
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Defence Housing Authority
Defence - 10 WHYALLA ST - FYSHWICK
Defence - 139 CANBERRA AVE - FYSHWICK
Defence - 169 GLADSTONE ST - FYSHWICK

Name
Defence - CHURCHES CENTRE - TUGGERANONG
Defence - DEAKIN OFFICES
Defence - HMAS HARMAN - SYMONSTOWN
Defence - MAWSON OFFICE ACCOMM
Defence - MT JERRABOMBERRA OBSTRUCTION WARNING
Defence - NAVAL COMBAT DATA SYSTEM CENTRE - FYSHWICK
Defence - RAAF BASE FAIRBAIRN

Commonwealth Heritage Places [[Resource Information](#)]

Name	State	Status
Natural		
State Circle Cutting	ACT	Listed place
Historic		
Apostolic Nunciature	ACT	Listed place
Casey House and Garden	ACT	Listed place
Commencement Column Monument	ACT	Listed place
East Block Government Offices	ACT	Listed place
Edmund Barton Offices	ACT	Listed place
Old Parliament House Gardens	ACT	Listed place
Old Parliament House and Curtilage	ACT	Listed place
Parliament House Vista	ACT	Listed place
Patent Office (former)	ACT	Listed place
The Lodge	ACT	Listed place
The Royal Australian Mint	ACT	Listed place
The Surveyors Hut	ACT	Listed place
York Park North Tree Plantation	ACT	Listed place

Listed Marine Species [[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Bullen Range	ACT
Callum Brae	ACT
Coolleman Ridge	ACT
Farrer Ridge	ACT
Isaacs Ridge	ACT
Jerrabomberra Wetlands	ACT
Melrose	ACT
Mt Mugga Mugga	ACT
Mt Taylor	ACT
Oakey Hill	ACT
Queanbeyan	NSW
Red Hill	ACT
Rob Roy	ACT
Tuggeranong Hill	ACT
Unnamed	ACT
Urambi Hills	ACT
Wanniassa Hills	ACT
West Jerrabomberra	ACT

Regional Forest Agreements

[[Resource Information](#)]

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species

Name	Status	Type of Presence
Mus musculus House Mouse [120]		habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and		Species or species

Name	Status	Type of Presence
Sterile Pussy Willow [68497]		habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name		State
Jerrabomberra Wetlands		ACT

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.3941 149.13569

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.