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## **Proposed development of Block 1, Section 3, Symonston, ACT – Ecological Impact Assessment**

**Capital Ecology project no. 3176**

Dear Mr Nobbs and Mr Nash,

This letter provides an Ecological Impact Assessment (EIA) for the proposed development of a memorial park within Block 1, Section 3, Symonston, ACT (the 'site'). The site encompasses approximately 9.73 ha of land located at the corner of Mugga Lane and Narrabundah Lane. The memorial park (referred to herein as the 'proposed development') will include several buildings (administration buildings, shared services building, chapels, crematoria), carparks, a service road, irrigated lawns, two constructed wetlands, and a new walking trail to connect with the Callum Brae walking trail.

In 2019 the proposed development was referred to the then Commonwealth Department of Agriculture, Water and the Environment (the 'Department') and determined to be a 'not controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 26 May 2020 (ref. EPBC 2019/8595).

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

The proposed development seeks to retain the natural ecological values of the site, and to the greatest extent practicable, limit impacts to the Box-Gum Woodland and mature remnant eucalypt trees in the site. The development layout has undergone several revisions and subsequently been revised from that submitted in the EPBC Act referral. Whilst still retaining the ecological values of the site to the greatest extent practicable, this current revision has been completed to avoid impacts to the significant aboriginal heritage values in the site which have been identified and documented post submission of the EPBC Act referral (Navin Officer Heritage Consultants 2022<sup>1</sup>).

Figure 1 shows the location of the site in the South Canberra locality, Figure 2 shows the site on current aerial imagery, Figure 3 shows the previous and revised footprints for the proposed development, Figure 4 shows the site with Capital Ecology's 2018 vegetation mapping on 2022 aerial imagery, Figure 5 shows the extent of the EPBC Act Box-Gum Woodland within the site and the total proposed area of direct impact, Figure 6 shows the extent of the NC Act native vegetation within the site and total proposed area of direct impact, and Figure 7 shows the difference in impact between the previous and revised footprints for the proposed development.

The primary aim of this EIA is to determine and assess the likely impacts of the proposed development upon habitat for terrestrial flora and fauna species and ecological communities listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the ACT *Nature Conservation Act 2014* (NC Act). This EIA also assesses the difference in the impact between the previous development layout submitted with the EPBC Act referral and the current proposed layout.

This EIA has been prepared with regard to:

- information provided by InvoCare, Purdon Planning, RFA Architects, and the other members of the project team, notably the South Canberra Memorial Park Concept Plan<sup>2</sup>, and the revised development layout<sup>3</sup>;
- the results of database searches for the site, including the EPBC Act Protected Matters Search Tool (PMST), ACTMAPi, and Canberra Nature Map;
- a review of relevant studies and other background information;
- field surveys on 12 September and 20 September 2018, completed to record and assess the ecological values of the site; and
- the knowledge of the authors regarding the biota of the locality, specifically the threatened ecological communities, flora, and fauna (and associated habitat) with the potential to occur in the lowland woodland ecosystems of the region.

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<sup>1</sup> Navin Officer Heritage Consultants (2022). *Cultural Heritage Assessment – Crematorium and Memorial Park. Block 1 Section 3 Symonston*. A Report to Purdon Planning on behalf the Whitby Group. September 2022.

<sup>2</sup> Clouston Associates (2018). *South Canberra Memorial Park Concept Plan – S18-037 – Issue H 23/05/2019*. Prepared for InvoCare.

<sup>3</sup> RFA Architects (2022). *Proposed Site Plan – Masterplan – Stage DA – Drawing No: A-2100. Rev 3, 14/09/2022*. Prepared for InvoCare.

## 1. Background

### 1.1 Previous Assessments and Approvals

The impacts of the 'proposed development' of the South Canberra Memorial Park within Block 1, Section 3, Symonston, ACT (the 'site') were assessed via Capital Ecology's Ecological Impact Assessment<sup>4</sup> (EIA). Based on the findings of the EIA, the proposed development was referred to the then Department of Agriculture, Water and the Environment (the 'Department') for a decision regarding whether it is an action requiring assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (ref. EPBC 2019/8595).

Following subsequent communications with the Department, InvoCare submitted a variation to the proposed action, in accordance with Section 156A(3)(b) of the EPBC Act. This variation withdrew the memorialisation component of the memorial park and included the addition of a conservation management plan for the EPBC Act Box-Gum Woodland ecological community on the site.

The referral decision was returned as a 'not controlled action' on 26 May 2020<sup>5</sup>.

### 1.2 Revised Development Layout

The previous development layout had a total development footprint of 5.97 ha (59,700 m<sup>2</sup>), involving construction of several buildings including two cremators, access roads and carparks, a constructed wetland and habitat pond, and landscaping with planted native and exotic species.

The direct and potential indirect impacts on biodiversity from the previous proposed development are summarised below.

#### Direct Impacts

The previous development proposed the following direct impacts (refer to Capital Ecology's 2019 EIA).

- Clearance of 0.31 ha of EPBC Act/NC Act listed Box-Gum Woodland.
- Clearance of 5.11 ha of NC Act native vegetation.
- Removal of 14 mature remnant trees.
- Removal of a substantial number of planted eucalypt trees within PCT-ACT16 Zone 3.

#### Potential Indirect Impacts

The previous development had the potential to have the following indirect impacts.

- Degradation of the retained patches of EPBC Act/NC Act Box-Gum woodland, through introduction and proliferation of weeds, increased foot traffic, rubbish, etc.
- Degradation of the Box-Gum Woodland and other significant ecological values occurring in the adjoining Canberra Nature Park reserves (Callum Brae Nature Reserve, Mount Mugga Mugga, etc.), through introduction and proliferation of weeds, increased foot traffic, rubbish, etc.

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<sup>4</sup> Capital Ecology (2019). *Proposed development of Block 1, Section 3, Symonston, ACT – Ecological Impact Assessment*. Capital Ecology project no. 2860.

<sup>5</sup> Department of Agriculture, Water and the Environment (2020). *Notification of REFERRAL DECISION – not controlled action South Canberra Memorial Park, ACT (EPBC 2019/8595)*. Date of Decision 20/05/2020.

- Indirect impacts on adjoining native fauna habitat due to the operation of the Memorial Park (i.e. smoke from crematorium operation, noise and lighting from vehicles, etc.).

As described above, the previous development layout included a 'woodland memorialisation' area that would have impacted upon a portion of EPBC Act Box-Gum Woodland in the northwest portion of the site. Following communications with the Department during the referral process, this component of the proposed development was removed from the proposed development.

Aboriginal cultural heritage studies completed after the EIA and EPBC Act referral process identified several areas of significant heritage values (refer Attachment 1. General Arrangement Plan). The layout of the proposed development was amended in order to avoid these areas.

The direct and potential indirect impacts of the proposed development are described in detail in Section 4. In summary, the amended development differs from the previous layout in the following ways.

- The removal of the 'woodland memorialisation' area in the northern portion of the site.
- The adjustment of the alignment and boundary of the entrance road.
- The creation of a new walking trail to connect with the Callum Brae walking trail.
- The removal of the proposed service road in the southern portion of the site running parallel with Mugga Lane.
- General design changes to the proposed built infrastructure, including the addition of a pond in the central part of the proposed development.

## 2. Methods

### 2.1 Database and Literature Review

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

- A list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the site was obtained using the Department's online EPBC Act Protected Matters Search Tool (PMST) on 22 August 2018 and updated on 11 October 2022.
- A review of the ACT Government ACTMAPi mapping tool and Canberra Nature Map to obtain the most current layers and point data for the significant ecological values of the locality. These values include species listed as threatened pursuant to the EPBC Act and/or the NC Act, together with flora species considered 'rare or uncommon in the ACT' and fauna which are otherwise of a conservation focus.
- Previous and current studies undertaken by Capital Ecology and others in the locality.

### 2.2 Remnant Tree Mapping

Each of the remnant (i.e. naturally occurring and over 20 cm Diameter at Breast Height [DBH]) woodland eucalypts in the site was identified to species and marked via handheld GPS.

## 2.3 Vegetation Survey and Mapping

The vegetation across the entire site was surveyed and mapped in accordance with the detailed methodology provided in Chapter 3 of the ACT *Environmental Offsets Calculator Assessment Methodology* (ACT Government 2015<sup>6</sup>) (the ‘Survey Methodology’). The vegetation survey and mapping involved the three-staged process outlined in the sections below.

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

### 2.3.1 Plant Community Type (PCT) mapping

The on-ground boundaries of each of the Plant Community Types (PCTs) (as provided in the Survey Methodology and the ACT Vegetation Types Database) present in the site were accurately mapped. Mapping of the PCTs (i.e. the climax communities) was undertaken by walking the boundaries and marking them using a combination of hand-held GPS and marking directly on to high resolution orthorectified aerial photograph field maps.

PCT boundaries were defined based on:

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

The above was informed by the both the current vegetation (2018 and 2019 aerial images and site surveys) and that shown in the 1955 aerial image provided on ACTMAPi.

### 2.3.2 Vegetation Zone definition and mapping

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

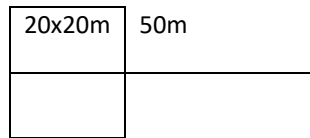
### 2.3.3 Plots and transects – Site Value Assessment

A series of Site Value vegetation assessment survey plot/transect combinations were completed, with the aim to adequately sample each Vegetation Zone. The Site Value is the quantitative measure of the condition of the vegetation for each Vegetation Zone. For each plot/transect the ten site attributes listed in Table 3 of the Survey Methodology were collected. The number of survey plot/transects completed within each Vegetation Zone was determined in accordance with Table 2 of the Survey Methodology and totalled six (6) across the three (3) Vegetation Zones. All plot/transects were placed randomly within the relevant Vegetation Zone with the aim of achieving a representative sample.

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<sup>6</sup> ACT Government (2015). ACT *Environmental Offsets Calculator Assessment Methodology*.

As illustrated in Diagram 1, Each plot/transect combination involved a 20x20 m (400 m<sup>2</sup>) plot within which all species were recorded. A 50 m transect traverses the plots and runs 30 m further; along this all of the other attributes were collected.



**Diagram 1. Vegetation survey plot/transect combination**

## 2.4 Likelihood of Occurrence Assessment

The Likelihood of Occurrence Assessment for threatened flora and fauna species is a categorisation used to determine the likelihood that the subject species occurs within a site. The results are based on the findings of completed desktop studies and field surveys, expert opinion, and consideration of the species' currently recognised distribution and preferred habitat.

Threatened species and populations identified in the Likelihood of Occurrence Assessment include all of those identified during the database and literature review as potentially occurring within five kilometres of the site. Included are threatened species listed pursuant to the EPBC Act and/or the BC Act and considered by Capital Ecology to have some potential to occur within the site.

The likelihood of a species occurring within the site is categorised as either negligible, low, moderate, or high. A species that has been identified within the site during the surveys for this EIA or by other confirmed records is expressed as confirmed.

The completed Likelihood of Occurrence Assessment is provided as Appendix A. Species assigned a moderate or higher likelihood of occurrence within the site, other than if this is limited to transient visitation, are considered in more detail in Section 2.4 (threatened flora) and Section 2.5 (threatened fauna) of this EIA.

## 3. Results

### 3.1 Vegetation

#### 3.1.1 Descriptive Overview

The site comprises 9.73 ha of land zoned 'Non Urban - NUZ1 – Broadacre' under the Territory Plan (ACTMAPi 2018) and bordered by:

- Callum Brae Nature Reserve (Canberra Nature Park) to the south;
- Mugga Lane to the northwest, with Mount Mugga Mugga Nature Reserve (Canberra Nature Park) located across Mugga Lane; and
- Narrabundah Lane to the northeast.

An approx. 100 m wide band running along the boundary adjoining Narrabundah Lane, together with a smaller patch in the western extent of the site, are mapped on ACTMAPi as 'EPBC Listed Box Gum Woodland' and 'ACT Listed Box Gum Woodland'. These areas are components of a large patch Box-Gum Woodland, the majority of which is protected within the adjoining Callum Brae Nature Reserve. The extent of the site identified as Box-Gum Woodland on ACTMAPi broadly aligns with the area not directly impacted by the site's former use as the Mugga Lane Zoo. The zoo buildings and associated infrastructure, together with the plentiful rubbish dumped post closure of the zoo, were removed several years ago. The remaining evidence of the site's former use are the concrete building slabs, a shipping container, several clumps of Bamboo *Bambusa* sp. and Blue Perriwinkle *Vinca major*, the numerous planted non-local eucalypts, and the highly disturbed groundstorey across much of the site.

#### 3.1.2 Plant Community Types and Vegetation Zones

As illustrated in Figure 4, the site contains a single open woodland PCT.

Capital Ecology assessed and mapped the vegetation within the site categorising it according to its climax community and current condition. The single PCT and its constituent Vegetation Zones are described below and illustrated in Figure 4. Appendix B provides the list of species recorded.

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

PCT-ACT16 occurs on toe-slopes and other areas of similar elevation on soils of moderate to high fertility and generally moderate depth. In its climax form this community would have been characterised by an open canopy, sparse or absent mid and shrubstorey, together with a defined grassy groundstorey supporting a high diversity of native forbs.

As illustrated in Figure 4, PCT-ACT16 now occurs in the following three discernible Vegetation Zones.

- Zone 1 – Zone 1 comprises the approx. 100 m wide band of relatively intact remnant Box-Gum Woodland running along the boundary adjoining Narrabundah Lane, together with a smaller patch in the western extent of the site. These patches contain remnant Yellow Box and Blakely's Red Gum trees with canopy regeneration over a low to moderate diversity groundstorey dominated by Tall Speargrass *Austrostipa bigeniculata* and other common disturbance-tolerant native grasses and forbs.
- Zone 2 – Zone 2 comprises the low-lying areas associated with the small drainage line running through the northern extent of the site. Zone 2 is characterised by remnant mature Blakely's

Red Gum trees with canopy regeneration over a groundstorey dominated by *Phalaris Phalaris aquatica* and other common environmental weeds.

- Zone 3 – Zone 3 comprises the majority of the site and aligns with the areas which were used for the former Mugga Lane Zoo. This former use, together with the extensive clean-up which occurred several years ago, resulted in the blanket clearance of the natural midstorey, shrubstorey and groundstorey strata. The scattered retained remnant eucalypts are the only element of the site’s climax vegetation community that remain in Zone 3. The current groundstorey vegetation is sparse and is dominated by weeds such as Serrated Tussock *Nassella trichotoma*, Blackberry *Rubus fruticosus*, St John’s Wort *Hypericum perforatum*, Briar Rose *Rosa rubiginosa*, Hoary Mustard *Hirschfeldia incana*, Paterson’s Curse *Echium plantagineum*, and Cat’s Ear *Hypochaeris radicata*.

As mentioned above, Zone 3 contains several clumps of Bamboo and Blue Perriwinkle, together with numerous approx. 20-30 year old planted eucalypts, these being a mix of:

- species characteristic of PCT-ACT16, including Yellow Box, Blakely’s Red Gum, and Apple Box *E. bridgesiana*;
- species indigenous to the ACT, yet generally characteristic of wet or dry sclerophyll forest PCTs rather than woodland, including Brittle Gum *E. mannifera* and Ribbon Gum *E. viminalis*; and
- species which do not naturally occur in the ACT, including White Box *E. albens*, Mugga Ironbark *E. sideroxylon*, Argyle Apple *E. cinerea*, and Blue Gum *E. globulus*.

Table 1 provides a summary of the Vegetation Zones mapped in the site and Plates 1 to 4 provide representative photographs of the Vegetation Zones.

**Table 1. Vegetation Zones**

PCT	Zone Number	Vegetation Zone ID	Photograph Plate	Canopy	Groundstorey Dominance	Groundstorey Diversity	Total Area (Ha)
ACT16	1	ACT-16-1	1	Present	Native	Low-Mod	2.89
	2	ACT-16-2	2	Present	Exotic	Low	0.44
	3	ACT-16-3	3	Present	Exotic	Low	6.39

### 3.1.3 Plots and Transects

The results of the 6 floristic plot/transect combinations are provided in Appendix B. The results provide clear confirmation of the distinction between the identified Vegetation Zones of ACT-PCT16.



**Plate 1. PCT-ACT16 – Zone 1 – Native dominated groundstorey of low to moderate diversity. Remnant Eucalypt canopy with regeneration. Zone 1 meets the definition of EPBC Act Box-Gum Woodland**



**Plate 2. PCT-ACT16 – Zone 2 – Exotic dominated groundstorey of low diversity. Remnant Eucalypt canopy with regeneration.**



**Plate 3. PCT-ACT16 – Zone 3 – Exotic dominated groundstorey of low diversity. Canopy comprised of planted eucalypts with scattered remnant eucalypts, both with regeneration.**

### 3.2 Threatened Ecological Communities

#### 3.2.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

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

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

Description – As detailed in Commonwealth of Australia (2016<sup>7</sup>), the NTG-SEH TEC is characterised by grassy vegetation dominated by moderately tall (25–50cm) to tall (50–100cm), dense to open tussock grasses in the genera *Austrodanthonia* (note: now *Rytidosperma*), *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*. Up to 70% of all plant species may be forbs. The community may be treeless or contain up to 10% cover of trees, shrubs or sedges. Natural Temperate Grassland occurs within the biogeographical region of the South Eastern Highlands in valleys influenced by cold air drainage and in broad plains.

Presence in the site – Absent – As discussed above, the entire site would have supported PCT-ACT16 (Box-Gum Woodland) pre-1750. Accordingly, the site does not support the NTG-SEH TEC.

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<sup>7</sup> Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG-SEH) ecological community.*

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

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

Presence in the site – Confirmed – The entire site would have once supported the climax community of this TEC (i.e. PCT-ACT16).



Assessments of structure and floristic composition were undertaken in each of the three condition categories (Vegetation Zones) of PCT-ACT16 present in the site. The purpose of these assessments was to determine whether the patches of each Vegetation Zone support characteristics sufficient to meet the listing criteria for the EPBC Act listed TEC. The assessment process follows that provided in Commonwealth of Australia (2006<sup>8</sup>). The results of this assessment are provided in Table 2. As detailed in Table 2, the area mapped as PCT-ACT16 – Zone1 meets the criteria for the EPBC Act listed TEC. PCT-ACT16 – Zones 2 and 3 do not meet the listing criteria.

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<sup>8</sup> Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. *Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of Environment and Heritage.

**Table 2. Assessment against the listing criteria for the EPBC listed TEC – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.**

Criterion		Assessment Results		
		PCT-ACT16 Zone 1	PCT-ACT16 Zone 2	PCT- ACT16 Zone 3
1.	<i>Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?</i>	Yes Yellow Box and Blakely's Red Gum are co-dominant throughout this zone.	Yes Blakely's Red Gum is dominant throughout this zone.	Yes A few scattered remnant Yellow Box and Blakely's Red Gum trees remain in the zone. These species are expected to have been dominant or co-dominant throughout this zone historically.
2.	<i>Does the patch have a predominantly native understorey?</i>	Yes The understorey was recorded as 71% to 94% native species cover.	No The understorey was recorded as only 5% native species cover.	No The understorey was recorded as only 22% to 24% native species cover.
3.	<i>Is the patch 0.1 ha (1000 m<sup>2</sup>) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.</i>	Yes Each patch is greater than 0.1 ha in size and 16 native non-grass understorey species were recorded in total across the three plots. Four of these species are important species.	N/A Refer Criterion 2 results.	N/A Refer Criterion 2 results.
<i>Or</i>				
	<i>Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?</i>	Yes The larger patch of Zone 1 is greater than 2 ha and supports regeneration of overstorey eucalypts and an average of 20 or more mature trees per hectare. In addition, whilst encompassing only 1,990 m <sup>2</sup> , the smaller patch has continuous canopy cover with that in the adjoining Rural Block 2228 and thus should also be considered the listed TEC in accordance with the listing criteria.	N/A Refer Criterion 2 results.	N/A Refer Criterion 2 results.
	<b><i>Does the patch meet the criteria for the listed TEC?</i></b>	<b>Yes</b>	<b>No</b>	<b>No</b>

### 3.2.2 Nature Conservation Act 2014 (ACT)

The following two ecological communities are listed as critically endangered pursuant to the ACT NC Act.

#### **Natural Temperate Grassland**

Presence in the site – Absent – As discussed above, the entire site would have supported PCT-ACT16 (Box-Gum Woodland) pre-1750. Accordingly, the site does not support the NC Act listed NTG TEC.

#### **Yellow Box – Blakely’s Red Gum Grassy Woodland**

Woodland meeting the NC Act listed community was defined in the ACT Native Woodland Conservation Strategy and Action Plans (ACT Government 2019a<sup>9</sup>). The key defining characteristics of Yellow Box – Blakely’s Red Gum Grassy Woodland are:

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

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

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

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

Based on the above criteria, the area which meets the NC Act definition is consistent with that meeting the EPBC Act definition (i.e. PCT-ACT16 Zone 1).

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<sup>9</sup> ACT Government (2019a). *ACT Native Woodland Conservation Strategy and Action Plans*. Environment, Planning and Sustainable Development, Canberra.

## 2.3 Native Vegetation

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

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

According to this definition, PCT-ACT16 Zone 1 constitutes native vegetation under the NC Act (refer Figures 4 and 6). The remnant eucalypts in Zones 2 and 3, together with the planted eucalypts in Zone 3 of species characteristic of PCT-ACT16 (i.e. Yellow Box and Blakely's Red Gum), constitute native vegetation where these have a canopy cover of 10% or greater. The planted non-local eucalypts will not reproduce the climax community of the site. Such vegetation does not constitute native vegetation under the NC Act.

## 3.4 Threatened Flora Occurrence

No EPBC Act and/or NC Act listed threatened flora species were recorded in the site during the field surveys, nor are any identified as occurring in the site on ACTMAPi or Canberra Nature Map. As detailed in the Likelihood of Occurrence Assessment (refer Appendix A), whilst there is some potential for several threatened or rare flora species to occur in PCT-ACT16 Zone 1, the former use and associated disturbance of the site is likely to preclude the persistence of such species in PCT-ACT16 Zones 2 and 3.

## 3.5 Fauna Habitat and Threatened Fauna Occurrence

### 3.5.1 Native fauna recorded

As detailed in Appendix C, one native mammal (Eastern Grey Kangaroo *Macropus giganteus*) and 20 native bird species were recorded during the field surveys. All of these are common urban-adapted species in the ACT and region. Note that no targeted surveys have been undertaken, these species were recorded incidentally.

### 3.5.2 Fauna habitat

As recorded during the survey, the site supports the following fauna habitat features.

- 106 mature remnant eucalypt trees (86 Blakely's Red Gum, 14 Yellow Box, 4 Scribbly Gum, 2 Apple Box). Many of these trees are over 100 years old, and a few of them are likely to be over 200 years old. Most of these trees contain numerous hollows which would provide nesting/roosting habitat to a variety of native birds, insectivorous bats, and arboreal mammals. Several pairs of common native bird species (i.e. Eastern Rosella *Platycercus eximius*, Crimson Rosella *Platycercus elegans*, Galah *Eolophus roseicapilla*, and Spotted Pardalote *Pardalotus punctatus*) were observed nesting in hollows in the remnant trees.
- The site's remnant eucalypts would provide a nectar resource for a range of honeyeaters and other nectarivorous birds and mammals when in flower. The mistletoe on some of these trees would also provide a potentially important nectar resource.
- In addition to many common native birds, several EPBC Act and/or NC Act listed birds, and numerous other species considered conservation dependant in the region, may forage and potentially breed in the site, including Dusky Woodswallow *Artamus cyanopterus cyanopterus*, Speckled Warbler *Chthonicola sagittata*, Spotted Harrier *Circus assimilis*, Brown Treecreeper

*Climacteris picumnus victoriae*, Varied Sittella *Daphoenositta chrysoptera*, White-fronted Chat *Epthianura albifrons*, Little Eagle *Hieraaetus morphnoides*, Hooded Robin *Melanodryas cucullate cucullate*, Scarlet Robin *Petroica boodang*, Flame Robin *Petroica phoenica* and Diamond Firetail *Stagonopleura guttata*. Again, the more intact Box-Gum Woodland (i.e. PCT-ACT16 Zone 1) and the remnant trees elsewhere in the site are the primary habitat feature of potential value to such species.

- The midstorey and shrubstorey is generally sparse throughout the site. This is likely to limit the habitat value of the site for most of the region’s threatened and rare woodland birds which generally prefer to inhabit woodland with such features.
- Most of the site (i.e. PCT-ACT16 Zones 2 and 3) is characterised by a groundstorey dominated by exotic grasses and forbs, which is unlikely to be of substantial value to any threatened fauna species. The patches with a native dominant groundstorey (i.e. PCT-ACT16 Zone 1) contain only a sparse cover of native grasses and forbs, this low cover being exacerbated by the current drought conditions and heavy grazing by Eastern Grey Kangaroos. The native groundstorey vegetation is likely to be of value to numerous common native species, and potentially to several threatened woodland birds.
- The rocky outcrop in the western extent of the site may be of habitat value to common reptile species (e.g. Eastern Bearded Dragon *Pogona barbata*, Eastern Brown Snake *Pseudonaja textilis* etc.) and numerous invertebrates, however based on its location, small size, and general lack of loose surface rocks, this patch is unlikely to support any threatened reptile species.

### 3.6 Pest Plants

Twenty-four (24) exotic plant species were recorded in the site. Whilst the majority of these are common weeds across agricultural land throughout the region, the species in Table 3 are listed as Weeds of National Significance (Commonwealth) and/or are listed as declared pest plant species in the ACT.

**Table 3. Noxious weed occurrence**

#### Key for below table

- WoNS - (Commonwealth) Weed of National Significance
- Declared pest plant species in the ACT listed under the *Pest Plants and Animals (Pest Plants) Declaration 2005*
  - Must be suppressed
  - Must be contained
  - Prohibited
  - Notifiable

Name	Growth Form	Status	Description of Occurrence	Threat Level
<i>Echium plantagineum</i> <b>Paterson's Curse</b>	Forb <1.2 m	Must be contained	Scattered plants across ACT16 Zones 2 and 3.	Low
<i>Eragrostis curvula</i> <b>African Love Grass</b>	Tussock <1.2 m	Must be contained	Scattered plants across ACT16 Zones 2 and 3 and along the boundaries adjoining Narrabundah Lane and Mugga Lane.	High – In the absence of concerted control the infestation will continue to spread throughout the site.

Name	Growth Form	Status	Description of Occurrence	Threat Level
<i>Hypericum perforatum</i> <b>St John's Wort</b>	Forb <1 m	Must be contained	Heavy infestation across ACT16 Zones 2 and 3.	High
<i>Nassella trichotoma</i> <b>Serrated Tussock</b>	Tussock <0.6 m	WoNS, Must be contained / prohibited	Scattered plants throughout site.	High – control measures are required to prevent the infestation from proliferating within the site.
<i>Pinus radiata</i> <b>Radiata Pine</b>	Large tree	Must be contained	Planted trees in patches around the periphery of the site. No evidence of self-seeding was observed within the site.	Low
<i>Pyracantha angustifolia</i> <b>Orange Firethorn</b>	Shrub <4 m	Prohibited	Few scattered self-sown plants along drainage line in the north of the site.	Moderate – Control of this species is recommended to prevent its proliferation within the site.
<i>Rosa rubiginosa</i> <b>Briar Rose</b>	Shrub <3 m	Must be suppressed / Prohibited	Scattered plants across ACT16 Zones 2 and 3.	Moderate – Control of this species is recommended to prevent its proliferation within the site.
<i>Rubus fruticosus</i> <b>Blackberry</b>	Shrub/bramble <3 m	WoNS, Must be contained / prohibited	Few scattered plants across ACT16 Zones 2 and 3.	Moderate – The infestation is currently at low levels but should be controlled to prevent proliferation of the species within the site.
<i>Vinca major</i> <b>Blue Periwinkle</b>	Forb <0.5 m	Prohibited	Large patches near entrance from Mugga Lane.	Moderate – Control of this species is recommended to prevent its proliferation within the site.

### 3.7 Pest Animals

The exotic pest species European Rabbit *Oryctolagus cuniculus*, European Brown Hare *Lepus europaeus*, Common Myna *Acridotheres tristis*, House Sparrow *Passer domesticus*, and Common Starling *Sturnus vulgaris* were recorded in the site during the surveys. Each of these species is commonly encountered on such peri-urban sites.

## 4. Impacts on Biodiversity from the Proposed Development

The proposed development has a total development footprint of 2.96 ha (29,600 m<sup>2</sup>) and will involve construction several buildings including two cremators, access roads and carparks, a constructed wetland and habitat pond, and landscaping with planted native and exotic species.

The direct and potential indirect impacts on biodiversity from the proposed development are summarised below.

### Direct Impacts

The proposed development will have the following direct impacts.

- Clearance of 0.33 ha of EPBC Act/NC Act listed Box-Gum Woodland (Figure 5).
- Clearance of 2.96 ha of NC Act native vegetation (Figure 6).
- Removal of 7 mature remnant trees (Figure 5).
- Removal of a substantial number (estimated to be 74) of the planted eucalypt trees within PCT-ACT16 Zone 3.

As shown in Figure 7, the revised layout differs in the portions of the site that are to be impacted but generally has a similar or lower impact to that previously proposed. It is noted that the clearance of EPBC Act/NC Act listed Box-Gum Woodland has slightly increased from 0.31 ha to 0.33 ha, resulting in 0.02 ha (200 m<sup>2</sup>) of additional clearance of this TEC. The difference in impact is summarised below in Table 1.

**Table 1. Proposed Impact Area**

	Total Impact Area	NC Act Native Vegetation	EPBC Act Box-Gum Woodland	Remnant Trees
Previous Impact Area	5.97 ha	0.31 ha	0.31 ha	14 remnant trees removed
Proposed Impact Area	2.96 ha	0.33 ha	0.33 ha	7 remnant trees removed
<b>Difference</b>	<b>-3.01 ha</b>	<b>0.02 ha</b>	<b>0.02 ha</b>	<b>7 less remnant trees removed</b>

### Potential Indirect Impacts

The proposed development has the potential to have the following indirect impacts.

- Degradation of the retained patches of EPBC Act/NC Act Box-Gum woodland, through introduction and proliferation of weeds, increased foot traffic, rubbish, etc.
- Degradation of the Box-Gum Woodland and other significant ecological values occurring in the adjoining Canberra Nature Park reserves (Callum Brae Nature Reserve, Mount Mugga Mugga, etc.), through introduction and proliferation of weeds, increased foot traffic, rubbish, etc.
- Indirect impacts on adjoining native fauna habitat due to the operation of the Memorial Park (i.e. smoke from crematorium operation, noise and lighting from vehicles, etc.).

However, as detailed in Section 5, indirect impacts arising from the operation of the Memorial Park are likely to be minimal as InvoCare seeks to create a clean, well-managed and maintained site that provides a space that is quiet, reflective, and embraces the natural beauty of the surrounding environment.

## **5. Measures to Avoid and Mitigate Impacts on Biodiversity**

A key objective for the proposed development is to provide a setting that retains the natural ecological values of the site. As described below, several measures have been incorporated into the design of the proposed development in order to avoid or reduce impacts on the ecological values of the site.

### **Avoidance of the EPBC Act / NC Act Box-Gum Woodland**

A small impact of 0.16 ha on EPBC Act / NC Act Box-Gum Woodland is proposed to allow for the construction of the carpark and entrance off Narrabundah Lane (Figures 3 and 7). One large mature remnant tree will be removed from this area (a reduction of one tree in this area). The carpark and entrance have been designed to minimise the area of impact on Box-Gum Woodland by largely restricting the footprint to the area of lower quality vegetation (PCT16 Zone 3) shown in Figures 3 and 4.

The revised development layout impacts upon an area of Box-Gum Woodland in the central portion of the development, mainly for the creation of the reflection pond. This impact totals 0.17 ha and removes three additional remnant trees.

The combined impact of these two areas results in the clearance of 0.33 ha of EPBC Act / NC Act Box-Gum Woodland.

All other areas of EPBC Act / NC Act Box-Gum Woodland in the site will be avoided as part of the proposed development.

### **Retention of Mature Remnant Trees**

The proposed development has been designed to retain as many of the site's remnant eucalypts as practicable. As a result, the proposed development will retain 97 (91%) of the large remnant eucalypts (Figure 4) and manage them in accordance with the Australian Standard<sup>10</sup>.

### **Site Clean-up and Maintenance**

InvoCare will actively manage and maintain the site as a Memorial Park. This will include the initial removal of the rubbish and other waste from the site's previous use as the Mugga Lane Zoo, together with InvoCare's ongoing management and maintenance of the site. This initial and ongoing management and maintenance will effectively mitigate the potential indirect impacts of the development, including the build-up of rubbish, introduction and/or proliferation of weeds or pest animals, etc.

### **Preparation of Woodland Conservation Management Plan**

InvoCare will develop and implement of a Woodland Conservation Management Plan (WCMP) (or similarly titled plan) to ensure the condition and extent of the retained EPBC Act Box-Gum Woodland is maintained. This WCMP will be developed to obtain endorsement from a relevant ACT Government ecologist and will include the following.

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<sup>10</sup> Standards Australia (2010). *AS4970-2009 Protection of trees on development sites*.

1. Designation of the areas of EPBC Act Box-Gum Woodland into specific 'woodland management units' (WMU) based on the condition and characteristics of the subject area of woodland and its corresponding management requirements.
2. Accurate spatial delineation of the boundaries of each WMU, suitable for incorporation into GIS and AutoCAD for figure preparation and to guide on-ground boundary establishment.
3. On-ground establishment of the boundaries of WMUs, likely via fencing or other suitable permanent demarcation.
4. Development and installation of signage at key publicly accessible points around the WMUs.
5. An initial works program, including:
  - intensive but sensitive (i.e. conducted by suitably trained personnel) targeted weed control throughout the WUMs, the aim of which is to remove as much as possible of the existing weed cover;
  - a sensitively conducted site clean-up to remove rubbish, decrepit fences etc.; and
  - planting of tree, shrub, and groundstorey species indigenous to EPBC Act Box-Gum Woodland if/where it is identified as likely to be beneficial for the WMU and it is consistent with design and other site management requirements (e.g. bushfire).
6. A monitoring framework which will be implemented to monitor key variables (i.e. KPIs) which indicate changes (either improvement or degradation) in condition in the WMUs.
7. An ongoing works program, adjusted as required based on monitoring results, including:
  - periodic targeted weed control, the methods and timing of which will be defined based on the identified requirements;
  - maintenance of boundaries and signage to prevent foot traffic or other impacts in the WMUs; and
  - maintenance, and replacement if necessary, of any indigenous plantings.
8. An adaptive management framework which will guide how on-ground management is to change if/where it is identified that the KPIs are not being met (i.e. condition degrades), or conversely if it is identified that management measures are no longer needed or are unsuitable.

## 6. Legislative Requirements

### 6.1 Commonwealth

#### 6.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their potential to impact on 'Matters of National Environmental Significance' (MNES). Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Guideline criteria for determining whether an impact is likely to be significant are provided

under the Act (Commonwealth of Australia 2013<sup>11</sup>). Should it be determined that a proposed action will have, or is likely to have, a significant impact on a MNES, referral of the action to the Commonwealth Minister for Environment and Energy is required for a decision regarding whether the proposed action requires assessment and approval under the EPBC Act. If impacts to MNES cannot be avoided or substantially minimised/mitigated, then the Minister is likely to decide that the proposed action is a 'controlled action'. If the EPBC Act assessment determines that the proposed action will result in a residual impact (i.e. after application of avoidance, mitigation etc.) that is significant, then an offset will be required, the specifics of which are determined in accordance with the EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012<sup>12</sup>).

### **Application to the site and proposed development**

One TEC, White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, occurs within the site. As detailed in the EPBC Act Significant Impact Guidelines (Commonwealth of Australia 2013), whilst there are several criteria against which to assess the likelihood that a proposed action will significantly impact an EPBC Act listed ecological community, it is important to note that the first states that –

*An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will reduce the extent of an ecological community.*

With regard to the above, although the proposed development has been designed to avoid and minimise impacts to EPBC Act Box-Gum Woodland to the greatest extent practicable, the clearance of 0.33 ha (3,290 m<sup>2</sup>) will be unavoidable (Figure 5). As discussed in the EPBC Act Significant Impact Criteria Assessment prepared for the proposed development (Appendix D), this reduction of 0.33 ha of EPBC Act Box-Gum Woodland is unlikely to have a significant impact upon the EPBC Act listed TEC.

As the proposed development will result in a small reduction in the extent of the ecological community, the action was referred to the Commonwealth under the EPBC Act.

It is noted that 0.02 ha (200 m<sup>2</sup>) of additional clearance of this TEC is due to the avoidance of significant cultural heritage values. Given the slight increase in impact is generally consistent with the action as proposed in the referral, it is not considered necessary to resubmit an EPBC Act referral for the additional impact to the TEC.

Although tree removal for development in the portions of the site mapped as PCT-ACT16 Zone 3 may impact potential foraging habitat for several EPBC Act listed threatened woodland bird species, such impacts are unlikely to be significant for any such species. Seven large remnant trees will be removed as part of the proposed development. The remainder of the trees to be removed were planted as part of the landscaping for the former Mugga Lane Zoo. The potential impacts of the proposed development have been minimised by designing the development footprint in a manner that will clear mainly highly degraded vegetation and provide for the retention of 99 (93%) mature remnant trees.

With regard to other MNES, there is no potential for development in the site to impact upon wetlands of international importance (Ramsar wetlands). Whilst there is the potential for a few migratory species

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<sup>11</sup> Commonwealth of Australia (2013). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment.

<sup>12</sup> Commonwealth of Australia (2012). *EPBC Act Environmental Offsets Policy*. Australian Government Department of Sustainability, Environment, Water, Population and Communities.

to periodically visit the site on a transient basis, the site is unlikely to provide important habitat for any migratory species.

In light the above, it is not considered necessary to resubmit an EPBC Act referral for the proposed action.

## 6.2 Australian Capital Territory

### 6.2.1 Planning and Development Act 2007

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

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

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

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

Regarding Item 1, the clearance of 0.33 ha of NC Act critically endangered Box-Gum Woodland (refer Section 3.2.2) may have a significant adverse environmental impact on this TEC. Additionally, given their potential value to NC Act listed woodland birds, impacts to the site's remnant eucalypts may have a significant adverse environmental impact on one or more of the (a) to (g) species above. Either of these impacts would trigger the requirement to prepare an EIS.

**Item 2. Proposal involving—**

- (a) *the clearing of more than 0.5ha of native vegetation in a native vegetation area, other than on land that is designated as a future urban area under the territory plan, unless the conservator of flora and fauna produces an environmental significance opinion that the clearing is not likely to have a significant adverse environmental impact*

Regarding Item 2, as detailed in Section 2.3, the portions of the site which support native vegetation (as per the NC Act definition) are:

- PCT-ACT16 Zone 1; and
- the areas of PCT-ACT16 Zones 2 and 3 where the remnant eucalypts and planted eucalypts of species characteristic of PCT-ACT16 (i.e. Yellow Box and Blakely's Red Gum) have a canopy cover of 10% or greater.

The proposed development will result in the clearance of 0.33 ha of PCT-ACT16 Zone 1, and 2.63 ha of PCT-ACT16 Zone 3. With a total area of native vegetation clearance of 2.96 ha, the proposed development triggers the requirement to prepare an EIS.

#### Summary and implications

Whilst the proposed development will trigger the requirement to prepare an EIS, it is unlikely that the impacts will be significant for any NC Act listed ecological value (i.e. listed flora or fauna species or ecological communities). Accordingly, it is appropriate to apply for an Environmental Significance Opinion (ESO) from the ACT Conservator of Flora and Fauna. If an ESO is provided, and ecological and heritage values are the only applicable Schedule 4 EIS triggers, then the ACT Government may allow the Development Application (DA) to be lodged for assessment via the Merit Track, thereby avoiding the requirement to prepare an EIS.

#### **6.2.2 Tree Protection Act 2005**

In urban areas, all trees over 12 metres in height and/or 1.5 m in circumference (at 1.3 m above ground level) are classified as protected (Regulated) trees under the ACT *Tree Protection Act 2005* (TP Act). Approval from the ACT Tree Protection Unit must be obtained prior to removing or otherwise impacting regulated trees.

The site is zoned as non-urban 'NUZ1: Broadacre'. As the TP Act only applies to development on a '*built-up urban area*', it does not apply to the site or the proposed development.

#### **6.2.3 Pest Plants and Animals Act 2005**

Nine (9) species listed on the ACT Pest Plants and Animals (Pest Plants) Declaration 2015 (no 1) under the ACT *Pest Plants and Animals Act 2005*, were recorded within the site (refer Table 3). Leaving the site underdeveloped has the potential to increase the spread and/or dominance of significant weed species. Likewise, the development works proposed for the site have the potential to increase the spread of weed species. However, as described in Section 3, the implementation of appropriate weed control measures will prevent weed spread and/or proliferation within the site and surrounds.

## 7. Conclusion

InvoCare are committed to a development that preserves and enhances the ecological and aesthetic values of the site. As such, the proposed development has been designed to retain the ecological values of the site to the greatest extent practicable and measures will be implemented to avoid and minimise any direct and/or indirect impacts to biodiversity.

In summary, the proposed development:

- will directly impact 0.33 ha of the EPBC Act and/or NC Act listed Box-Gum Woodland TEC;
- will remove 9 remnant eucalypt trees, with the remaining 97 to be retained in the site;
- is unlikely to impact any EPBC Act and/or NC Act listed threatened flora species (or species considered 'rare and uncommon' in the ACT); and
- is unlikely to significantly impact any EPBC Act and/or NC Act listed threatened or migratory fauna species (or species considered conservation dependant in the region).

In light of the above, the following are the key legislative requirements for the proposed development.

- The proposed clearance of 0.33 ha of EPBC Act listed Box-Gum Woodland does not substantially differ from the action determined to be a 'not controlled action'. As such, it is considered that the project remains consistent with the action as proposed in the referral, and therefore it is not necessary to revisit the matter with the Department.
- The proposed clearance of 0.33 ha of NC Act listed Box-Gum Woodland and the proposed clearance of greater than 0.5 ha of native vegetation each trigger the requirement to prepare an EIS. Notwithstanding this, it is unlikely that the impacts will be significant for any NC Act listed ecological value (i.e. listed flora or fauna species or ecological communities) and therefore it is appropriate to apply for an ESO from the ACT Conservator of Flora and Fauna. If an ESO is provided, and ecological and heritage values are the only applicable Schedule 4 EIS triggers, then the ACT Government may allow the DA to be lodged for assessment via the Merit Track, thereby avoiding the requirement to prepare an EIS.

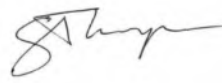
We trust that this EIA provides the assessment and advice required. If, however, you should have any questions relating to any of the matters discussed herein, please do not hesitate to contact us.

Yours sincerely,



Robert Speirs

Director / Principal Ecologist



Shannon Thompson

Spatial Ecologist

## Attachments:

Figure 1. Locality Plan

Figure 2. The Site and Proposed Development on Aerial Imagery

Figure 3. Previous and Currently Proposed Development Footprints

Figure 4. Vegetation Mapping

Figure 5. Proposed Impacts to EPBC Act / NC Act Box-Gum Woodland

Figure 6. Proposed Impacts to NC Act Native Vegetation

Figure 7. Difference in Total Impacts

Attachment 1. General Arrangement Plan

Appendix A. Likelihood of Occurrence Assessment

Appendix B. Vegetation Survey Results Tables

Appendix C. Native Fauna Records

Appendix D. EPBC Act Significant Impact Criteria Assessment

## References

ACT Government (1999). *Yellow Box – Red Gum Grassy Woodland: An endangered ecological community*. Action Plan No. 10. Environment ACT, Canberra.

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Legend

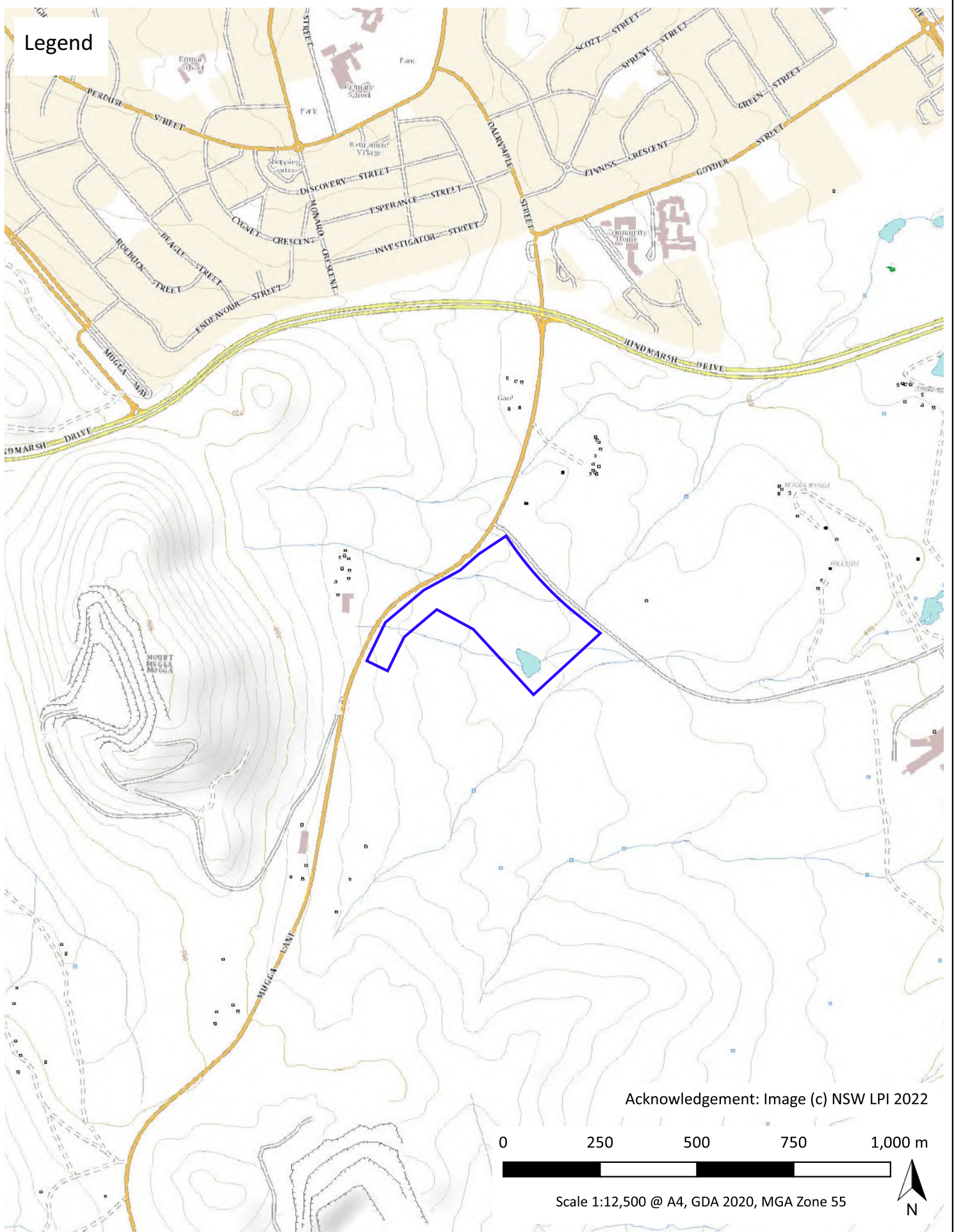


Figure 1. Locality Plan

Capital Ecology Project No: 3176  
Drawn by: S. Thompson  
Date: 12 October 2022



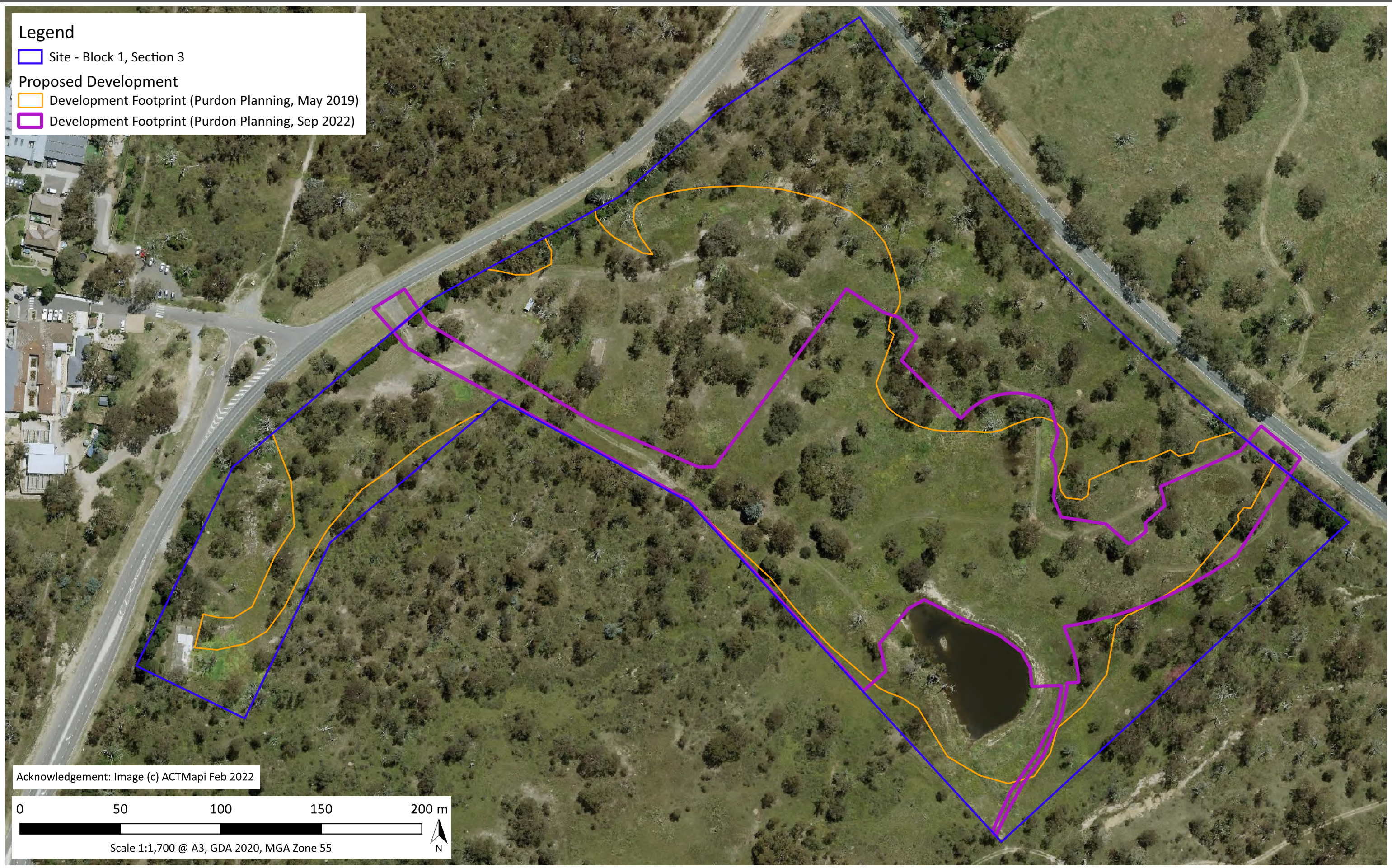


Figure 2. The Site and Proposed Development on Aerial Imagery

Capital Ecology Project No: 3176  
 Drawn by: S. Thompson  
 Date: 12 October 2022



**Legend**  
Site - Block 1, Section 3  
**Proposed Development**  
Development Footprint (Purdon Planning, May 2019)  
Development Footprint (Purdon Planning, Sep 2022)



Acknowledgement: Image (c) ACTMapi Feb 2022

0 50 100 150 200 m  
Scale 1:1,700 @ A3, GDA 2020, MGA Zone 55

Figure 3. Previous and Currently Proposed Development Footprints

Capital Ecology Project No: 3176  
Drawn by: S. Thompson  
Date: 12 October 2022



**Legend**

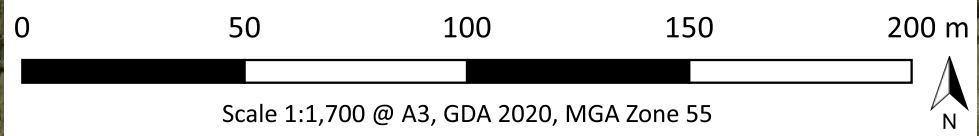
- Site - Block 1, Section 3
- PCT-ACT16 – Eucalyptus melliodora - E. blakelyi Tableland Grassy Woodland
- ACT16 Zone1 - NativeDom - RemnantCanopy - Regen  
Low-Mod Diversity (EPBC BGW)
- ACT16 Zone2 - ExoticDom - RemnantCanopy - Regen  
LowDiversity
- ACT16 Zone3 - ExoticDom - RemnantCanopy+PlantedTrees - Regen  
LowDiversity

**Remnant Trees**

- Scribbly Gum (*Eucalyptus rossii*)
- Apple Box (*Eucalyptus bridgesiana*)
- Blakely's Red Gum (*Eucalyptus blakelyi*)
- Yellow Box (*Eucalyptus melliodora*)



Acknowledgement: Image (c) ACTMapi Feb 2022



**Figure 4. Vegetation Mapping**

Capital Ecology Project No: 3176  
 Drawn by: S. Thompson  
 Date: 12 October 2022



**Legend**

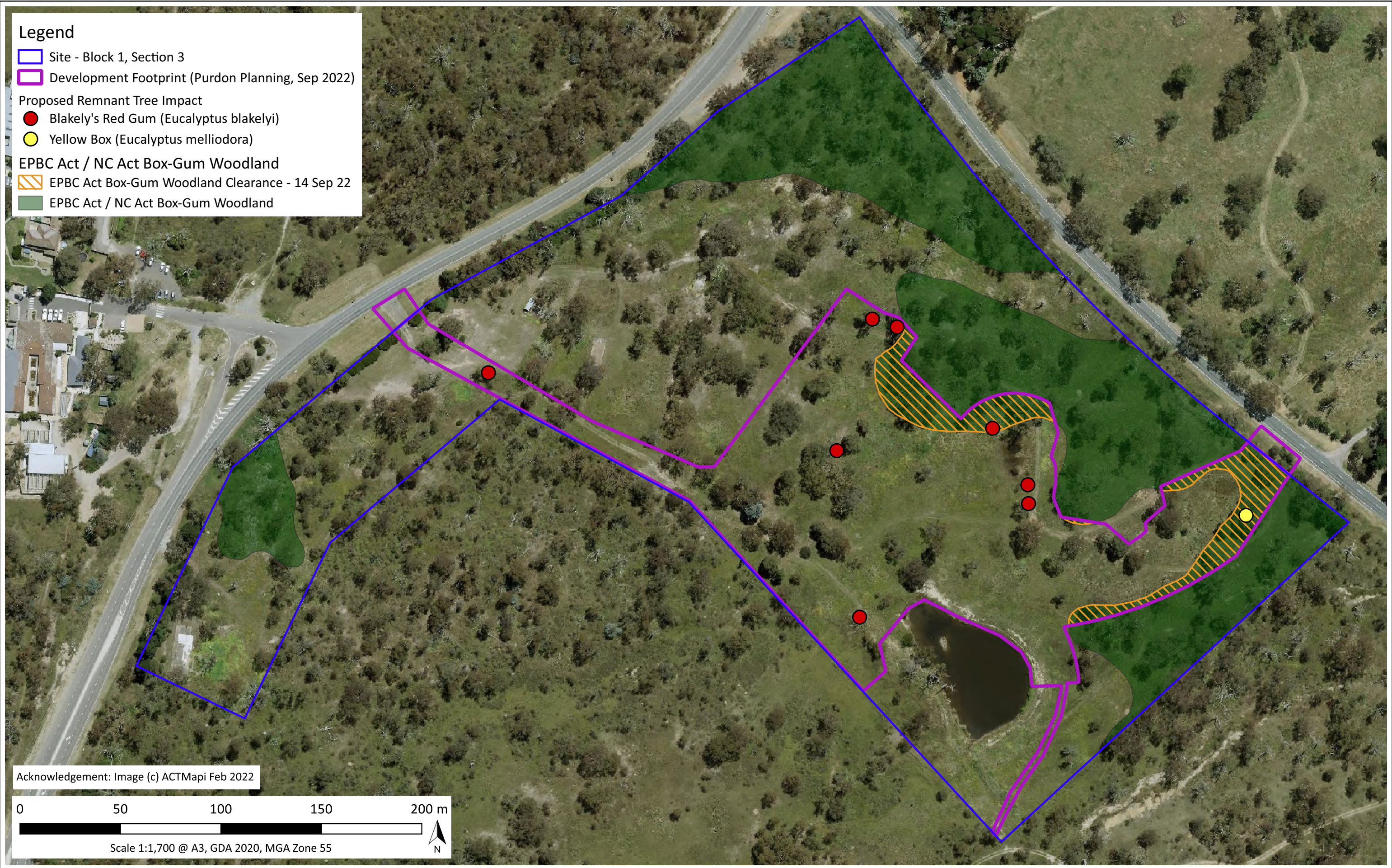
- Site - Block 1, Section 3
- Development Footprint (Purdon Planning, Sep 2022)

**Proposed Remnant Tree Impact**

- Blakely's Red Gum (*Eucalyptus blakelyi*)
- Yellow Box (*Eucalyptus melliodora*)

**EPBC Act / NC Act Box-Gum Woodland**

- EPBC Act Box-Gum Woodland Clearance - 14 Sep 22
- EPBC Act / NC Act Box-Gum Woodland



Acknowledgement: Image (c) ACTMapi Feb 2022

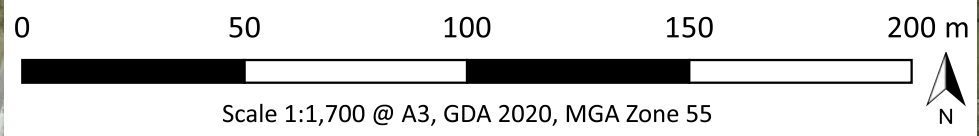


Figure 5. Proposed Impacts to EPBC Act / NC Act Box-Gum Woodland

**Legend**

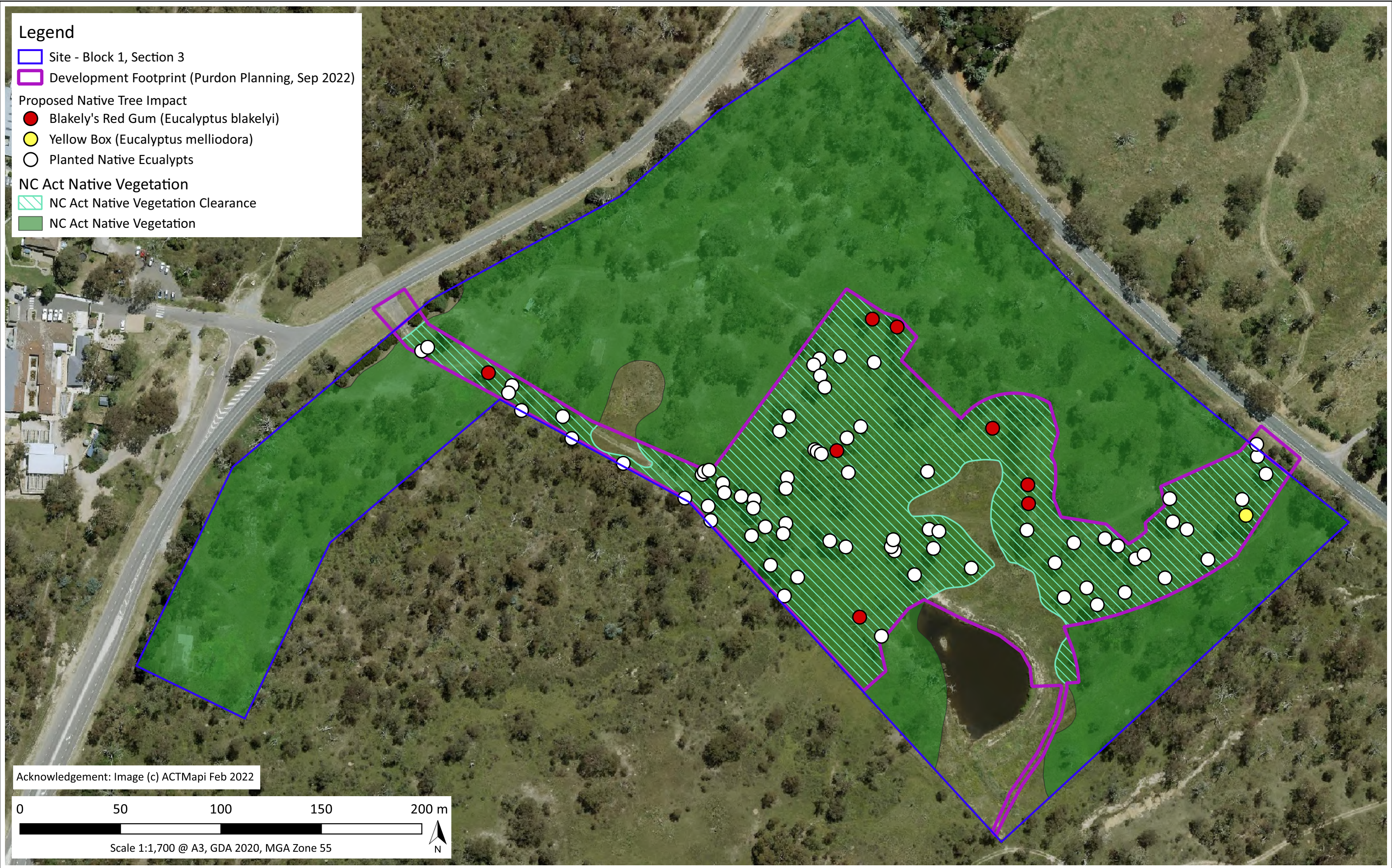
- Site - Block 1, Section 3
- Development Footprint (Purdon Planning, Sep 2022)

**Proposed Native Tree Impact**

- Blakely's Red Gum (*Eucalyptus blakelyi*)
- Yellow Box (*Eucalyptus melliodora*)
- Planted Native Eucalypts

**NC Act Native Vegetation**

- NC Act Native Vegetation Clearance
- NC Act Native Vegetation



Acknowledgement: Image (c) ACTMapi Feb 2022

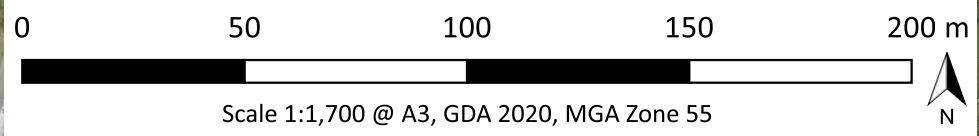


Figure 5. Proposed Impacts to NC Act Native Vegetation

Capital Ecology Project No: 3176  
 Drawn by: S. Thompson  
 Date: 12 October 2022

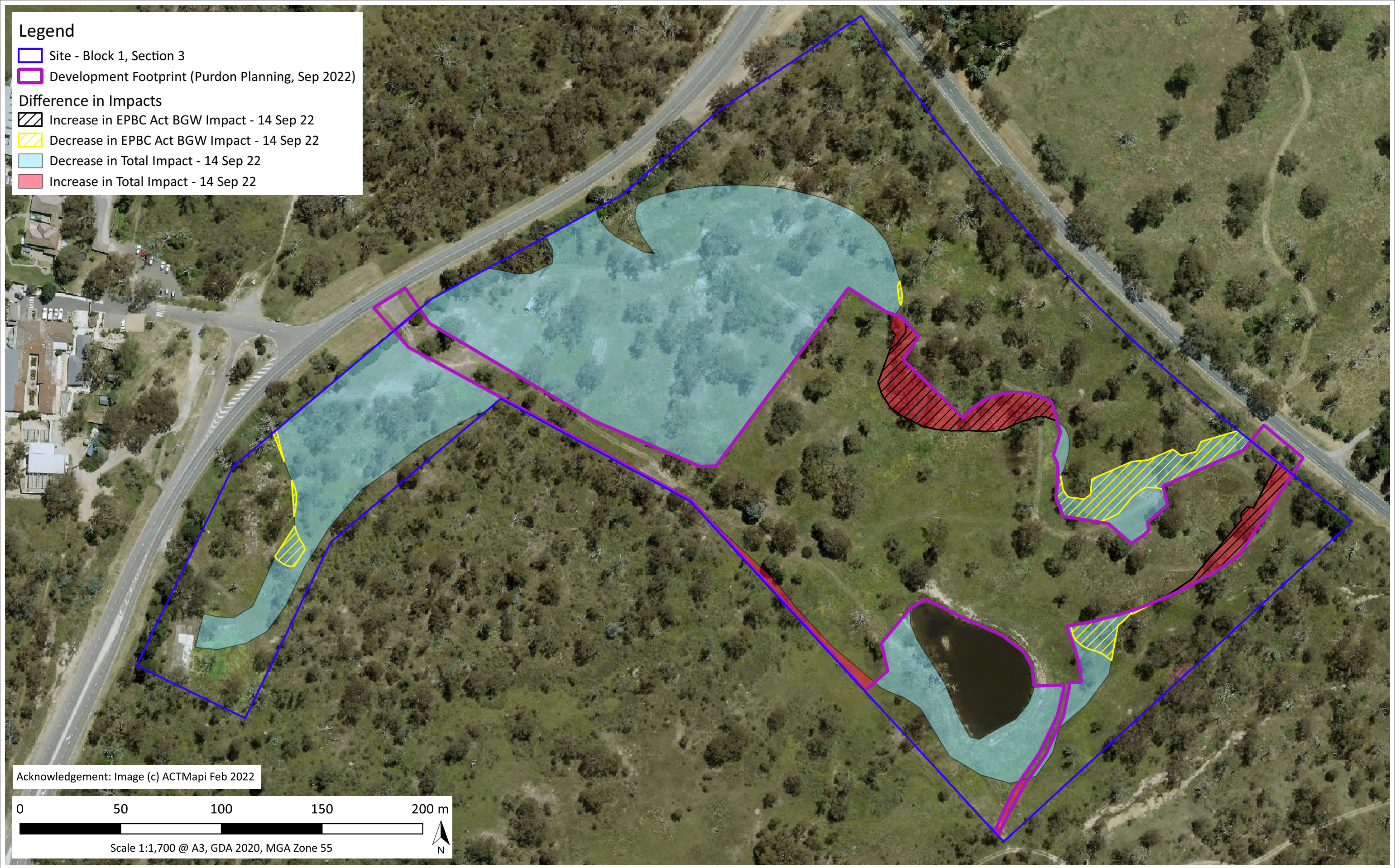


**Legend**

- Site - Block 1, Section 3
- Development Footprint (Purdon Planning, Sep 2022)

**Difference in Impacts**

- Increase in EPBC Act BGW Impact - 14 Sep 22
- Decrease in EPBC Act BGW Impact - 14 Sep 22
- Decrease in Total Impact - 14 Sep 22
- Increase in Total Impact - 14 Sep 22



Acknowledgement: Image (c) ACTMapi Feb 2022

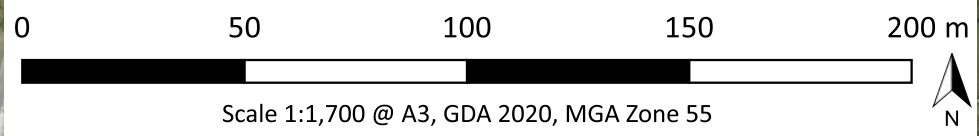
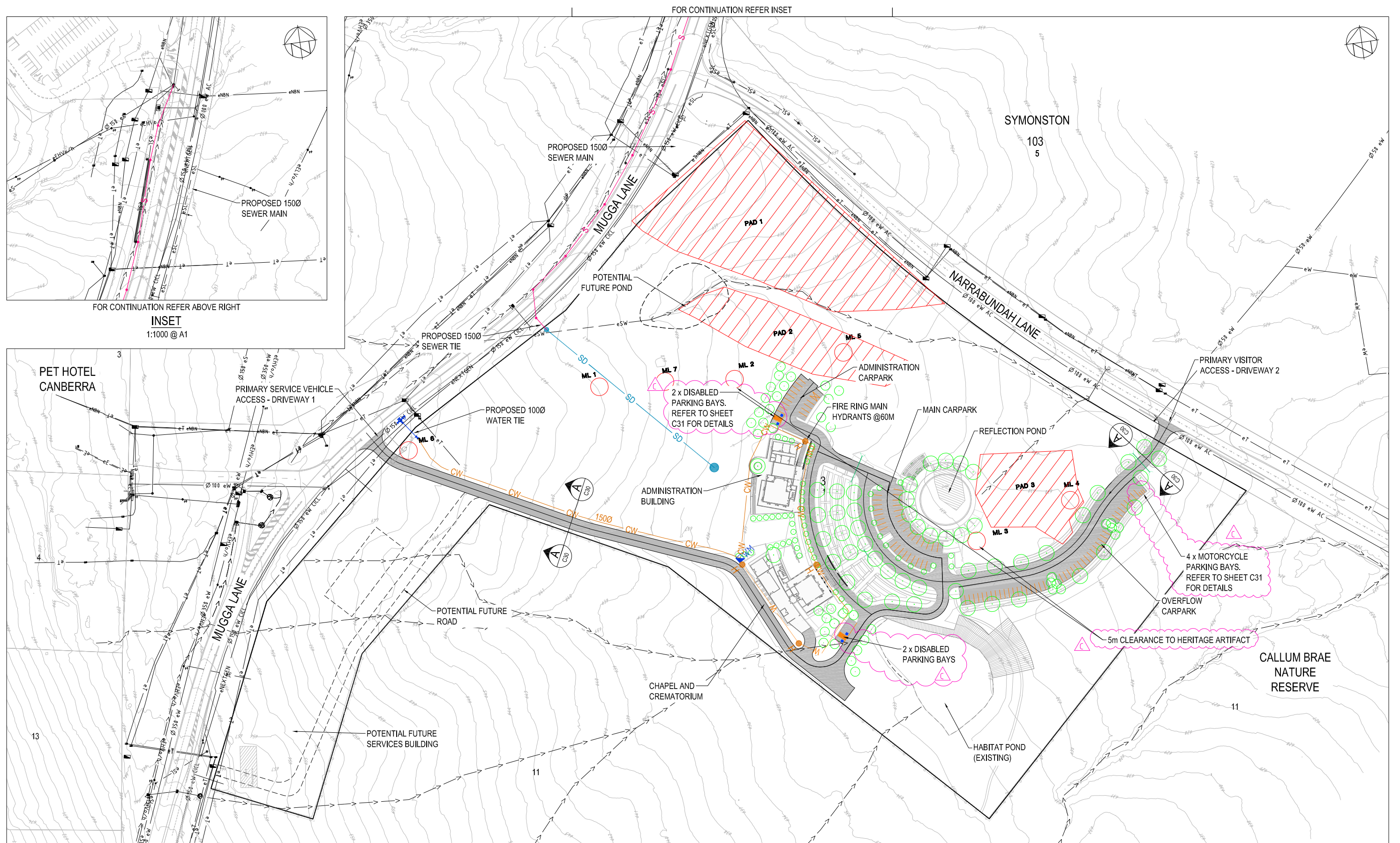


Figure 7. Difference in Total Impacts

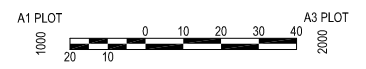
Capital Ecology Project No: 3176  
 Drawn by: S. Thompson  
 Date: 12 October 2022



DATE PLOTTED: 31 August 2022 10:46 AM BY: JOHN PIECHOWSKI



GENERAL ARRANGEMENT PLAN  
1:1000 @ A1



No.	AMENDMENT	APPROVED	DATE	AVENED BY	ARCHITECT
E	DA AMENDMENT	KM	11.07.2022	PGN	
D	ROAD AND CARPARK AMENDMENTS	KM	04.03.2022	KN	
C	RESPONSE TO DA COMMENTS	KM	25.01.2022	LMR	
B	DA SUBMISSION	KM	25.05.2021	LMR	
A	DRAFT FOR CLIENT REVIEW	AN	04/04/2021	LMR	

ARCHITECT

**rfa**  
architects

LANDSCAPE

**enviro links design**

CLIENT

**InvoCare**  
Innovation Vocation Care

PLANNER

**PURDON PLANNING**

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APPROVED	AN	DATE	1/06/2021
CHECKED	KM	DATE	25/05/2021
DESIGNED BY	AMG		
DRAWN BY	LMR		
CAD FILE	I:\7803 Symonston Section 3 Block 1 Traffic & DA\20 Drawings\201 C14\01 Current Drawings\7803-DA-0205 GAP.dwg		
SCALE	1:1000	SHEET No.	

PROJECT

**SYMONSTON SECTION 3 BLOCK 1 DEVELOPMENT APPLICATION**

DRAWING TITLE		
<b>GENERAL ARRANGEMENT PLAN</b>		
PROJECT No.	DRAWING No.	AMDT
<b>7803-01</b>	<b>C10</b>	<b>E</b>

## Appendix A. Likelihood of Occurrence Assessment

**Table A1. Conservation status and likelihood of occurrence of threatened species and ecological communities**

Key to this table:

- 1) Listed pursuant to the EPBC Act as Critically Endangered (CE), Endangered (E), or Vulnerable (V)
- 2) Listed pursuant to the NC Act as Endangered (E) or Vulnerable (V)

Note: The brief descriptions of species distribution and habitat are paraphrased from or based on information sourced from the threatened species profiles, recovery plans and listing determinations prepared for each species by the Commonwealth and ACT governments. These resources and their references can be found on the relevant government websites.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<b>Plants</b>				
<i>Ammobium craspedioides</i> Yass Daisy	V	-	The Yass Daisy is a perennial herb that bears large yellow flowerheads, with each flowerhead supported by a 30-60 cm stem. It is found from Crookwell (north of Goulburn) to near Wagga Wagga, with most populations occurring in the Yass District. The Yass Daisy occurs in dry forest, Box-Gum Woodland and secondary derived grassland of these communities. It tolerates light grazing and areas that are irregularly mown or slashed. Flowering occurs from October to November.	Negligible The species is not known to occur in the locality and was not recorded during field surveys.
<i>Amphibromus fluitans</i> River Swamp Wallaby-grass	V	-	River Swamp Wallaby-grass has been recorded along the Lachlan River at sites at Laggan near Crookwell and the headwaters of the Wollondilly River. The species grows mostly in permanent swamps, as well as lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground, such conditions being caused by seasonally fluctuating water levels.	Negligible There is no potential habitat in the site for the species.
<i>Caladenia actensis</i> Canberra Spider Orchid	CE	E	This orchid is endemic to the ACT and is only known from two populations on the western lower slopes of Mount Ainslie and Mount Majura. It was previously recorded at Aranda and Campbell, but no longer exists at those locations. The Canberra Spider Orchid grows on shallow, gravelly, brown clay loam soils. The species occurs amongst a groundcover of grasses, forbs and low shrubs, often among rocks. It grows on the transition zone (ecotone) between grassy woodland and dry sclerophyll forest.	Low The species is not known to occur near the site.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Dodonaea procumbens</i> Trailing Hop-bush	V	-	Trailing Hop-bush is found in the dry areas of the Monaro, between Michelago and Dalgety where it occurs mostly in Natural Temperate Grassland or Snow Gum <i>Eucalyptus pauciflora</i> Woodland. A single known population occurs at Lake Bathurst (the northern-most occurrence of the species) where it occurs adjacent to the lake bed in grassland dominated by Corkscrew Grass <i>Austrostipa scabra</i> and Curly Sedge <i>Carex bichenoviana</i> . The species grows on sandy-clay soils in open bare patches where there is little competition from other species. The species often occurs on roadside batters and does not persist in heavily grazed pastures.	Negligible There is no potential habitat in the site for the species.
<i>Eucalyptus aggregata</i> Black Gum	V	-	Black Gum occurs on the central and southern tablelands of NSW, and in a small disjunct population in Victoria. In NSW, it occurs predominantly in the South Eastern Highlands Bioregion. The species is a small to medium-sized woodland tree which grows in grassy woodlands on alluvial soils in moist sites along creeks on broad, cold and poorly drained flats and hollows. It commonly occurs with Candlebark <i>Eucalyptus rubida</i> , Ribbon Gum <i>E. viminalis</i> , and Snow Gum <i>E. pauciflora</i> , with a grassy understorey of River Tussock <i>Poa labillardieri</i> . Most populations are located on private land or road verges and travelling stock routes.	Negligible The species is not present within the site.
<i>Lepidium ginninderrense</i> Ginninderra Peppercross	V	E	The species is known from two natural sites in northern ACT, both within Natural Temperate Grassland.	Negligible There is no potential habitat in the site for the species.
<i>Lepidium hyssopifolium</i> Basalt Peppercross	E	-	This species is known from a few populations in NSW, Victoria and Tasmania. The Basalt Pepper-cross is known to establish on open, bare ground with limited competition from other plants. It was previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance such as road and rail verges, on the fringes of developed agricultural land or within small reserves in agricultural land. Many populations are now generally found amongst exotic pasture grasses and beneath exotic trees.	Low The species is not known to occur near the site and was not recorded during the field surveys.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Leucochrysum albicans</i> var. <i>tricolor</i> Hoary Sunray	E	-	The Hoary Sunray occurs from Queensland to Victoria and in Tasmania. In the ACT the species can be seen in spring in abundance on the roadside along Fairbairn Avenue and into Mt Ainslie Nature Reserve, on the western slopes of Mt Majura and adjacent to the Federal Highway road easement. The species is usually found in ungrazed and lightly grazed areas, along roadsides in particular. It appears to be very sensitive to grazing but responds to disturbance as a coloniser and appears to tolerate mowing. Flowers spring to summer.	<b>Moderate</b> The species is known to occur in Callum Brae Nature Reserve and elsewhere in the locality. It was not recorded during field surveys, however it is unlikely to be conspicuous if present due to the very dry conditions and heavy Kangaroo grazing. If the species does occur in the site, then this potential occurrence is likely to be limited to the more intact Box-Gum Woodland (i.e. PCT-ACT16 Zone 1).
<i>Pelargonium</i> sp. <i>Striatellum</i> Omeo Stork's-bill	E	-	An undescribed species of Pelargonium, Omeo Stork's Bill is a tufted perennial herb threatened by grazing, recreational activities, and exotic species. It is known to occur just above the high-water level of ephemeral lakes in NSW and Victoria.	Negligible There is no potential habitat in the site for the species.
<i>Pomaderris pallida</i> Pale Pomaderris	V	-	A compact perennial shrub, growing to 1.5 m high. It is found in the ACT, southern NSW and eastern Victoria. In the ACT it is scattered along the Cotter, Paddy's and Murrumbidgee Rivers and through the Molonglo Gorge. It is found along the plateau edge and very steep upper slopes and cliffs of river valleys, in shallow, pale brown sandy loam soil over granite rock. It grows in shrubland, surrounded by <i>Eucalyptus</i> or <i>Callitris</i> woodland. In the ACT, it is only found on the eastern banks of the rivers.	Negligible The species is not known to occur near the site. Furthermore, the species is reasonably conspicuous during any season to those familiar with it. It is unlikely that the species is present and was not identified.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	E CE (listed as <i>Prasophyllum</i> sp. Wybong)	E	<p>When first described in 1991, the Tarengo Leek Orchid was known only from the Hall Cemetery in the ACT. It has since been found at four sites in New South Wales: Captains Flat Cemetery, Ilford Cemetery, Steves Travelling Stock Route (TSR) at Delegate and the Tarengo TSR near Boorowa.</p> <p>The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The three cemetery sites originally contained grassy woodland, dominated by Snow Gum <i>Eucalyptus pauciflora</i> and Black Gum <i>E. aggregata</i> at Captains Flat, and Blakely's Red Gum <i>E. blakelyi</i> and Yellow Box <i>E. melliodora</i> at Hall and Ilford. Both Tarengo TSR and Steves TSR are natural grasslands.</p> <p>The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and TSRs, land from which grazing has been restricted.</p>	Low The species is not known to occur near the site.
<i>Rutidosia leptorrhynchoides</i> Button Wrinklewort	E	E	In the ACT and NSW, Button Wrinklewort occurs in box-gum woodland, secondary grassland derived from box-gum woodland or in natural temperate grassland. It prefers open spaces where it does not have to compete for light. It is known from several sites in the ACT, NSW and Victoria, where it is threatened by habitat loss, grazing and weed encroachment.	Negligible The species is not known to occur near the site and it was not recorded during the field surveys.
<i>Swainsona recta</i> Small Purple-pea	E	E	The Small Purple-pea occurs in the grassy understorey of woodlands and open forests dominated by Blakely's Red Gum, Yellow Box, Candlebark and Bundy. The species grows in association with understorey dominants that include Kangaroo Grass, Poa tussocks and Spear-grasses. Plants die back in summer, surviving as rootstocks until they shoot again in autumn. The species is intolerant of grazing but generally tolerant of fire, which also enhances germination by breaking the seed coat and reducing competition from other species.	Low The species is not known to occur near the site and it was not recorded during the field surveys.
<i>Thesium australe</i> Austral Toadflax	V	-	Found in very small to large populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is often found in damp sites in association with Kangaroo Grass, but it is also found on other grass species at inland sites. Occurs on clay soils in grassy woodlands or coastal headlands.	Low The species is not known to occur near the site and the site is unlikely to constitute potential habitat for this species. The grassy woodland does not support the usual host species (i.e. Kangaroo Grass).

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<b>Mammals</b>				
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	-	The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. The species roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin <i>Petrochelidon ariel</i> . The species frequents low to mid-elevation dry open forest and woodland close to roosts and is often found in well-timbered areas containing gullies.	Low No potential roosting habitat is present in the site or nearby. As the species is known to forage close to roost sites, it is unlikely to forage in the site.
<i>Dasyurus maculatus maculatus</i> Spot-tailed Quoll (SE mainland population)	E	V	The Spot-tailed Quoll occurs along the east coast of Australia and the Great Dividing Range. The species uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August.	Negligible The species is highly unlikely to visit the site.
<i>Petauroides Volans</i> Greater Glider	V	-	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	Negligible The site does not contain potential habitat for the species.

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

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

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Calyptorhynchus lathami</i> Glossy Black-cockatoo	-	V	The Glossy Black-cockatoo has a patchy distribution, having once been widespread across most of the south-east of Australia. The species is now distributed throughout an area which extends from the coast near Eungella in eastern Queensland to Mallacoota in Victoria. Glossy black-cockatoos feed on casuarina seeds, however they occasionally consume seeds from eucalypts, angophoras, acacias and hakeas, as well as insect larvae. In the ACT region the species feeds almost exclusively on Drooping Sheoak <i>Allocasuarina verticillata</i> . Pairs mate for life and nest in the hollows of large, old living or dead eucalypt trees. Breeding takes place between March and August.	Low The site does not contain potential breeding habitat or substantial foraging habitat for this species (note the species feeds almost exclusively on Drooping Sheoak).
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	-	V	In the ACT region, Brown Treecreepers occur in dry woodlands and open forest below 1,000 m. The species is relatively common along the Clear Range and along the Lower Naas River. Other populations occur at Mulligans Flat Reserve, Campbell Park, Burbong and former quarries south of the airport in the northern part of the ACT, and at Castle Hill, north of Tharwa. Brown Treecreepers also frequent paddocks and grasslands where there are sufficient logs, stumps and dead trees nearby. The species prefers relatively undisturbed woodland and dry open forest where the native understorey, especially grasses, has been preserved. The species usually prefers predominantly rough-barked trees such as Stringybarks and rough barked Boxes.	<b>Moderate</b> The species is likely to occur in the adjoining Callum Brae Nature Reserve and Mt Mugga Mugga Nature Reserve and may visit the site. The more intact Box-Gum Woodland (i.e. PCT-ACT16 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.
<i>Daphoenositta chrysoptera</i> Varied Sittella	-	V	In the ACT region, the Varied Sittella occurs in a wide variety of woodland and forest habitats, particularly in lowland areas. The species prefers areas with a dominance of rough barked trees, notably Red Stringybark at relatively high density. The species is rarely recorded in sparsely treed areas.	<b>Moderate</b> The species may visit the site to forage and/or nest. The more intact Box-Gum Woodland (i.e. PCT-ACT16 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.
<i>Grantiella picta</i> Painted Honeyeater	V	V	The Painted Honeyeater is found in Queensland and New South Wales west of the Great Dividing Range, through to northern Victoria. The species displays some migratory movement and is occasionally found in the Northern Territory and is a vagrant to South Australia and the ACT. The species frequents eucalypt forests and woodlands, particularly those that are infested heavily with mistletoes. In the ACT, the species' primary habitat is River Oak <i>Casuarina cunninghamiana</i> along river systems, especially the Murrumbidgee River.	Low The species may periodically visit the site to forage, however it is not known to nest in the locality.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Hieraaetus morphnoides</i> Little Eagle	-	V	The Little Eagle is distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment and occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. The species is sensitive to human disturbance.	<b>Moderate</b> The site may be part of the range of an individual or pair of Little Eagles and the remnant eucalypts in the site provide potential nest sites.
<i>Lathamus discolor</i> Swift Parrot	E	V	The Swift Parrot occurs in woodlands and forests of NSW (and occasionally the ACT) from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low The species may move through the site during winter, however this is unlikely due to the paucity of records of the species in the region.
<i>Limosa lapponica baueri</i> Bar-tailed Godwit	V	-	The Bar-tailed Godwit is a large migratory shorebird. In Australia, the species has been recorded in the coastal areas of all Australian states. It usually forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours. The Bar-tailed Godwit breeds in north-east Siberia and west Alaska. Potential habitat for the species in or nearby the ACT is limited to Jerrabomberra Wetlands and Lake George.	Negligible The site does not support potential habitat for the species.
<i>Limosa lapponica menzbieri</i> Northern Siberian Bar-tailed Godwit	CE	-	The Northern Siberian Bar-tailed Godwit is a large migratory shorebird. In Australia, the species has been recorded in the coastal areas of all Australian states. It usually forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours. The Northern Siberian Bar-tailed Godwit breeds in northern Siberia. Potential habitat for the species in or nearby the ACT is limited to Jerrabomberra Wetlands and Lake George.	Negligible The site does not support potential habitat for the species.
<i>Melanodryas cucullata cucullata</i> Hooded Robin (southeastern form)	-	V	The Hooded Robin occupies drier eucalypt forest, woodland and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps. The species uses stumps, posts or fallen timber from which to locate prey on the ground. In the ACT region, the species is found in woodland, often with scattered Yellow Box and/or Blakely's Red Gum, with long grass and low shrubs, or fallen logs.	<b>Moderate</b> The species may visit the site to forage and/or nest. The more intact Box-Gum Woodland (i.e. PCT-ACT16 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Numenius madagascariensis</i> Eastern Curlew	CE	-	The eastern curlew is Australia's largest shorebird and a long-haul flyer. The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It is extremely shy and will take flight at the first sign of danger.	Negligible The site does not support potential foraging habitat for the species.
<i>Petroica boodang</i> Scarlet Robin	-	V	The Scarlet Robin is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes, breeding in drier eucalypt forests and temperate woodlands.	<b>Moderate</b> The species may visit the site to forage and/or nest. The more intact Box-Gum Woodland (i.e. PCT-ACT16 Zone 1) and remnant eucalypts are the features of potential habitat significance to the species.
<i>Polytelis swainsonii</i> Superb Parrot	V	V	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Breeds in hollow branches of tall eucalypt trees within 9 km of feeding areas.	<b>Moderate</b> The species may occasionally forage within the site although is not known to breed in the vicinity of the site.
<i>Rostratula australis</i> Australian Painted Snipe	E	-	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. The species prefers freshwater wetlands, ephemeral or permanent, although it has been recorded in brackish waters.	Negligible The site does not provide potential habitat for the species and it is only rarely recorded at a few locations in the ACT region (i.e. Jerrabomberra Wetlands, upper Yerrabi Ponds etc.).
<b>Amphibians</b>				
<i>Litoria aurea</i> Green and Golden Bell Frog	V	-	The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks, although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land.	Negligible The site does not support potential habitat for this species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Litoria castanea</i> Yellow-spotted Tree Frog	E	-	The Yellow-spotted Tree Frog previously had a disjunct distribution, being recorded on the New England Tablelands and on the Southern Tablelands from Lake George to Bombala. The species has only recently (2010) been rediscovered on the Southern Tablelands. Prior to this the species had not been recorded on the Southern Tablelands since the 1970s. Found in large permanent ponds, lakes and dams with an abundance of bulrushes and other emergent vegetation, it shelters during autumn and winter under fallen timber, rocks, other debris or thick vegetation.	Negligible The site does not support potential habitat for this species.
<b>Reptiles</b>				
<i>Aprasia parapulchella</i> Pink-tailed Worm-lizard	V	V	The Pink-tailed Worm-lizard is a fossorial species which lives beneath surface rocks and occupies ant burrows. It feed on ants, particularly their eggs and larvae. Thought to lay eggs within the ant nests under rocks that it uses as a source of food and shelter and for thermoregulation. Key habitat features are a cover of native grasses, particularly Kangaroo Grass, sparse or no tree cover, little or no leaf litter, and scattered small rock with shallow embedment in the soil surface.	Negligible There is no potential habitat (surface rock scatter with suitable native grasses and minimal leaf litter) within the site for this species.
<i>Delma impar</i> Striped Legless Lizard	V	V	The Striped Legless Lizard is patchily distributed in grasslands of south-eastern NSW, the ACT, north-eastern, central and south-western Victoria, and south-eastern South Australia. In the ACT, the species is known to occur at four separate locations - in grassland areas of Gungahlin, Majura and Jerrabomberra Valleys, and Yarramundi. Unsuitable habitat, roads and urban development separate these sites. Most areas where the species persists are thought to have had low to moderate levels of agricultural disturbance in the past and it has been suggested that ploughing in particular may be incompatible with the survival of the species. Until recently, the species was thought to inhabit only native grasslands dominated by species such as Tall Speargrass and Kangaroo Grass. In recent years, surveys have revealed the Striped Legless Lizard in many sites dominated by exotic species such as Phalaris, Serrated Tussock and Flatweed (Biosis Research 2012). They have also been found in several secondary grassland sites, generally within two kilometres of primary grassland.	Negligible The site does not support potential habitat for this species.
<i>Tympanocryptis lineata</i> Canberra Grassland Earless Dragon	E	E	The Canberra Grassland Earless Dragon is restricted to Natural Temperate Grassland that is dominated by perennial tussock-forming species. It is known to make use of grass tussocks as well as small holes in the ground that are also used by invertebrates such as wolf spiders and crickets. The species is known to occur in suitable habitat in the Majura and Jerrabomberra valleys of the ACT and NSW.	Negligible The site does not support potential habitat for this species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<b>Fish and Crustacea</b>				
<i>Maccullochella peelii</i> Murray Cod	V	-	The Murray Cod's natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. The species is found in the waterways of the Murray– Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater species and will not tolerate high salinity levels.	Negligible There is no potential habitat within the site for this species.
<i>Macquaria australasica</i> Macquarie Perch	E	E	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their substantial tributaries.	Negligible There is no potential habitat within the site for this species.
<b>Insects</b>				
<i>Perunga ochracea</i> Perunga Grasshopper	-	V	The Perunga Grasshopper is usually recorded opportunistically by ecologists undertaking vegetation surveys or targeted surveys for other species. The species is generally a natural grassland specialist, and although some records occur in Box-Gum Woodland, such sites are usually nearby the historical ecotone between the two ecological communities.	Negligible There is no potential habitat within the site for this species.
<i>Synemon plana</i> Golden Sun Moth	CE	E	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut and the species has been recorded at many sites in the lowland areas of the ACT. The species occurs in Natural Temperate Grasslands and Box-Gum Grassy Woodland in which the groundcover is dominated by Wallaby Grasses ( <i>Rytidosperma</i> spp.). It is believed that the females lay up to 200 eggs at the base of the Wallaby Grass tussocks. After hatching, the larvae tunnel underground where they remain feeding on the roots of Wallaby Grass tussocks. The species is also known to feed on the introduced species (and Weed of National Significance), Chilean Needle Grass <i>Nassella neesiana</i> .	Negligible There is no potential habitat within the site for this species.

## Appendix B. Vegetation Survey Results Tables

**Table B1. Vegetation Plot/Transect Data**

Parameter	Plot/transect					
	16.1.1	16.1.2	16.1.3	16.2.1	16.3.1	16.3.2
Native plant species richness in 20x20 m plot	7	13	16	4	4	5
Number of large trees in 20x50 m plot	1	2	5	2	0	2
Overstorey regeneration in whole zone	<i>E. melliodora</i> <i>E. blakelyi</i>			<i>E. blakelyi</i>	<i>E. melliodora</i> <i>E. blakelyi</i>	
Total length of fallen logs in 20x50 m plot	4 m	0 m	12 m	6 m	8 m	0 m
Native overstorey (%) cover in 50 m transect	7	9	2	13	16	10.5
Native mid-storey (%) cover in 50 m transect	0.2	0	10	0	0	1.5
Native groundcover (grasses) in 50 m transect	15 (71%)	29 (94%)	12 (75%)	2 (5%)	9 (24%)	4 (22%)
Native groundcover (shrubs) in 50 m transect	0	0	0	0	0	0
Native groundcover (other) in 50 m transect	1	1	2	0	0	0
Exotic plant cover in 50 m transect	5	1	2	38	28	16

**Table B2. Plant species recorded within Plot/Transects**

Species Name	Common Name	Plot/transect					
		16.1.1	16.1.2	16.1.3	16.2.1	16.3.1	16.3.2
<b>Exotic</b>							
<i>Acetosella vulgaris</i>	Sheep Sorrel			X			
<i>Bromus sp.</i>	Brome				X		
<i>Cirsium vulgare</i>	Spear Thistle				X		
<i>Cyperus Eragrostis</i>	Umbrella Sedge				X		
<i>Dactylis glomerata</i>	Cock's Foot Grass			X			
<i>Echium plantagineum</i>	Paterson's Curse				X	X	X
<i>Elucine tristachya</i>	Goose Grass					X	X
<i>Eragrostic curvula</i>	African Lovegrass		X				X
<i>Erodium sp.</i>	Stork's Bill				X		
<i>Hirschfeldia incana</i>	Hoary Mustard				X	X	X
<i>Hypericum perforatum</i>	St John's Wort	X	X	X		X	X
<i>Hypochaeris radicata</i>	Cat's Ear			X		X	
<i>Malva sp.</i>	Mallow Weed		X		X	X	X
<i>Marrubium vulgare</i>	White Horehound				X		
<i>Modiola caroliniana</i>	Carolina Mallow				X		
<i>Nassella trichotoma</i>	Serrated Tussock		X	X			
<i>Phalaris aquatica</i>	Phalaris				X		
<i>Plantago lanceolata</i>	Ribwort Plantain		X	X			X
<i>Prunus sp.</i>	Plum				X		
<i>Pyracantha angustifolia</i>	Orange Firethorn				X		
<i>Rosa rubiginosa</i>	Sweet Briar		X		X		
<i>Rumex crispus</i>	Dock				X		
<i>Urtica dioica</i>	Stinging Nettle				X		
<i>Vinca major</i>	Blue Periwinkle						X
<b>Native</b>							
<i>Acacia implexa</i>	Hickory Wattle			X			

Species Name	Common Name	Plot/transect					
		16.1.1	16.1.2	16.1.3	16.2.1	16.3.1	16.3.2
<i>Acaena ovina</i>	Sheeps Burr	X		X			X
<i>Aristida ramosa</i>	Three-awn Grass		X	X			
<i>Austrostipa scabra</i>	Corkscrew Grass	X	X			X	X
<i>Bothriochloa macra</i>	Red-leg Grass	X	X	X	X	X	X
<i>Bracteantha viscosa</i>	Sticky Everlasting Daisy			X			X
<i>Cassinia quinquefolia</i>	Cough Bush			X			
<i>Cheilanthes sieberi</i>	Rock Fern	X					
<i>Chrysocephalum apiculatum</i>	Common Everlasting		X				
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting			X			
<i>Cymbonotus lawsonianus</i>	Bear's Ear			X			
<i>Elymus scaber</i>	Wheatgrass		X				
<i>Eucalyptus blakelyi</i>	Red Gum	X	X	X		X	
<i>Eucalyptus melliodora</i>	Yellow Box	X	X	X	X		
<i>Geranium solanderi</i>	Native Geranium	X	X	X	X		
<i>Gonocarpus tetragynus</i>	Common Raspwort		X				
<i>Goodenia hederacea</i>	Ivy Goodenia			X			
<i>Juncus filicaulis</i>	Pinrush			X	X		
<i>Isotoma fluviatilis</i>	Swamp Isotome			X			
<i>Leptorhynchos squamatus</i>	Scaly Buttons		X				
<i>Lomandra filiformis coriacea</i>	Wattle Matrush		X	X			
<i>Microlaena stipoides</i>	Weeping Grass	X		X		X	
<i>Oxalis perennans</i>	Oxalis	X	X			X	
<i>Panicum effusum</i>	Hairy Panic		X	X			
<i>Plantago varia</i>	Variable Plantain		X				
<i>Rhytidosperra sp.</i>	Wallaby Grass		X	X	X		X

## Appendix C. Native Fauna Records

Table C1 provides a list of the native fauna species recorded during the field surveys. Note that no targeted surveys were completed, these species were recorded incidentally. All species recorded are common urban-adapted species in the ACT and region.

**Table C1. Native fauna recorded during field surveys**

Species Name	Common Name
<b>Mammals</b>	
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<b>Birds</b>	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
<i>Cacatua sanguinea</i>	Little Corella
<i>Corvus coronoides</i>	Australia Raven
<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Egretta novaehollandiae</i>	White-faced Heron
<i>Eolophus roseicapilla</i>	Galah
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Malurus cyaneus</i>	Superb Fairy-wren
<i>Manorina melanocephala</i>	Noisy Miner
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Platycercus elegans</i>	Crimson Rosella
<i>Platycercus eximius</i>	Eastern Rosella
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Smicrornis brevirostris</i>	Weebill
<i>Strepera graculina</i>	Pied Currawong

## Appendix D. EPBC Act Significant Impact Criteria Assessment

### White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland

The *EPBC Act Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (Commonwealth of Australia 2013) provide a number of criteria for use in determining whether an 'action' will have, or is likely to have, a significant impact upon an EPBC Act listed 'critically endangered or endangered ecological community'. An assessment of the proposed development against each of these criteria is provided below.

- *Is there a real chance or possibility that the action will reduce the extent of the ecological community?*

The proposed development will involve the clearance of 0.33 ha of EPBC Act Box-Gum Woodland for the construction of memorial park, associated buildings, services, and facilities. The construction of carparks and entrance road will result in 0.16 ha of clearance, with the revised development layout in the central portion of the proposed development resulting in 0.17 ha of clearance.

The majority of the EPBC Act Box-Gum Woodland (primarily the northern boundary) has been excluded from the development footprint. Four patches with a total area of 2.57 ha will be retained, with the development layout designed to avoid direct impacts and to limit indirect impacts.

The development layout has also been designed in a manner that will permit the retention of most (i.e. 91%) of the remnant eucalypt trees in the site, with 9 mature remnant trees removed in the development footprint.

Given the above, after all avoidance and mitigation measures are considered, the unavoidable clearance for the proposed action will result in a permanent reduction in the extent of the community of 0.33 ha.

- *Is there a real chance or possibility that the action will fragment or increase fragmentation of the ecological community, for example by clearing vegetation for roads or transmission lines?*

The site adjoins Callum Brae Nature Reserve along its southern boundary and is bordered by Mount Mugga Mugga Nature Reserve across Mugga Way to the west. Both reserves are connected to a wider network of reserves within Canberra Nature Park (Red Hill Nature Reserve, Issacs Ridge Nature Reserve, Wanniasa Hill Nature Reserve).

While the site is separated from Mount Mugga Mugga Nature Reserve by Mugga Way, the proposed action may result in a small reduction of connectivity between Mount Mugga Mugga and Callum Brae Nature Reserves. However, the vegetation removed as part of the proposed action will be replanted with Box-Gum Woodland appropriate species following earthworks and construction. As such, the action is likely to increase the woody vegetation cover and improve its structure, thereby potentially improving connectivity within the Canberra Nature Park network.

As such, the proposed action is unlikely to further fragment the ecological community.

- *Is there a real chance or possibility that the action will adversely affect habitat critical to the survival of the ecological community?*

The small patch of Box-Gum Woodland within the site has been highly modified and is not a particularly significant remnant of the ecological community.

The site's historic use as the Mugga Lane Zoo has resulted in the notable degradation of the site's ecological values. All areas of the site support at least moderate level weed infestation (notably African Love Grass), and the degree of this infestation will continually increase under a status quo management arrangement. This increase in weed infestation will likely lead to a future reduction in the area of the site which meets the criteria for the listed community or prevent the patch from being a mappable feature. The action will therefore not affect the survival of the ecological community.

- *Is there a real chance or possibility that the action will modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?*

The direct impacts of the proposed development will not extend beyond the site. In addition, measures will be implemented to facilitate the retention and conservation of the more intact patches of Box-Gum Woodland in the site. Appropriate sediment and erosion control measures will be put in place to ensure no additional impacts extend beyond the development footprint.

The operation of the crematorium has the potential to have a minor impact on the environment, however these operations are unlikely to significantly impact the ecological community either in the site or across the adjoining land.

The current surface water either drains into the existing dam and/or flows under Narrabundah Lane via a culvert. The proposed action will not substantially alter the drainage patterns of the site or surrounds.

Given the above, it is unlikely that the proposed development will modify or destroy abiotic factors necessary for the survival of the ecological community.

- *Is there a real chance or possibility that the action will cause a substantial change in the species composition of an occurrence of the ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?*

The proposed development is unlikely to adversely alter the species composition of the patch of Box-Gum Woodland retained within the site, or that within any other patch.

Conversely, the proposed development will improve the species composition of the retained remnant vegetation within the site via the implementation of weed control measures and the planting of locally native flora characteristic of the Box-Gum Woodland community.

- *Is there a real chance or possibility that the action will cause a substantial reduction in the quality or integrity of an occurrence of the ecological community, including, but not limited to:*
  - *assisting invasive species, that are harmful to the listed ecological community, to become established, or*
  - *causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?*

Many of the exotic pasture species and/or exotic grassland weeds which occur in the ACT already occur throughout the site and broader locality (refer Appendix B). The proposed development is unlikely to result in the introduction and establishment of additional invasive weeds. The construction works for the proposed development may temporarily increase the occurrence of the weed species already

present, however appropriate vehicle hygiene and ongoing weed management measures will be implemented to minimise the risk of weed introduction and spread (refer Section 5 of this EIA).

Some exotic pest fauna species are likely to occur within the site and surrounds. The proposed development is highly unlikely to increase the incidence of these species. Notably, the proposed development is not of a type that is likely to introduce or increase the numbers of exotic avifauna present in the area.

It is likely that herbicides will be used within the site to control the existing weed infestation and improve the overall ecological condition of the site. These herbicides will be applied in a targeted manner to treat specific species. Weed control works will be undertaken by suitably qualified and experienced personnel. It is noted that such chemicals are currently widely used in the locality.

The proposed development will result in a minor reduction in the extent of the community, however it will improve the integrity of the remaining portion of the patch through the control of significant weeds and planting of locally native flora characteristic of the Box-Gum Woodland community.

- *Is there a real chance or possibility that the action will interfere with the recovery of the ecological community?*

The action will result in a minor reduction in the extent of the community through the clearance of part of a small patch occurring at the edge of a network of nature reserves. This patch is not of particular significance for the conservation of the community in the region, and therefore, the proposed impact is unlikely to interfere with the recovery of the ecological community. Additionally, the retained patches of Box-Gum Woodland are likely to be improved and rehabilitated through the control of weeds and the planting of appropriate native flora.

## Conclusion

The results of this assessment suggest that the reduction of 0.33 ha of EPBC Act Box-Gum Woodland due to the proposed action is unlikely to have a significant impact upon the EPBC Act listed endangered ecological community.