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Block 3 Section 65, Campbell, ACT – Ecological Impact Assessment

Capital Ecology project no. 2785

Dear Mr Thompson,

This letter provides an Ecological Impact Assessment (EIA) for Block 3 Section 65, Campbell, ACT (the 'study area'). The study area (2.54 ha) previously contained 22 defence houses. These houses have been demolished and Defence Housing Australia (DHA) are proposing to redevelop the site for residential purposes (the 'proposed development').

Figure 1 shows the location of the study area. Figure 2 shows the study area and ecological values as described in this EIA, on 2018 aerial imagery.

The study area is located in the suburb of Campbell and is bordered:

- to the north by Fairbairn Avenue, beyond which lies Mt Ainslie Nature Reserve;
- to the east by urban open space, which contains both planted and remnant native vegetation;
- to the south by urban open space, which contains both planted and remnant native vegetation; and
- to the west by Truscott Street and the suburban areas of Campbell.

The primary aim of this EIA is to determine and assess the impacts of the proposed development upon habitat for terrestrial flora and fauna species and ecological communities listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the *ACT Nature Conservation Act 2014* (NC Act).

This EIA has been prepared based on:

- information provided by Purdon Planning Pty Ltd and DHA, notably the location of the proposed development and associated building envelopes (AMC Architecture 2019¹);
- the results of database searches for the study area, including the EPBC Act Protected Matters Search Tool (PMST), ACTMAPi, and Canberra Nature Map;
- a review of relevant studies and other background information, including the surveys and sources referenced herein;
- two four-hour field surveys on 18 May 2018 and 4 July 2018, completed to record and assess the ecological values of the study area; 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 ecosystems of the region.

1. Background

No 'Significant Plants and Animals' are mapped within the study area on the ACT Government ACTMAPi online mapping tool. ACTMAPi identifies areas to the east and south of the study area as NC Act listed Yellow Box – Red Gum Grassy Woodland (commonly known as Box-Gum Woodland).

The 'Territory Plan – Land Use Zone' of the study area is 'DES: DESIGNATED'. The 'Territory Plan - Overlay Zone' of the study area is 'MAAR: Main Avenues and Approach Routes'.

The entire study area is a 'Designated Area' under the National Capital Plan (NCP). Within Designated Areas the National Capital Authority (NCA) has responsibility for determining detailed planning policy and for Works Approval (otherwise known as development assessment) under the *Australian Capital Territory (Planning and Land Management) Act 1988*.

As detailed in Appendix D (Likelihood of Occurrence Assessment), database searches returned 44 EPBC Act and/or NC Act listed threatened species and two EPBC Act and/or NC Act listed threatened ecological communities as having the potential to occur in the locality. Those species assessed as having a moderate or higher likelihood of occurring within the study area are considered in detail in Section 2.

2. Current ecological values

2.1 Tree Assessment Methods

On 18 May 2018, Capital Ecology visited the study area and assessed all of the native trees identified in Enviro Links Design (2017², 2019³) and located within the study area. The results of Capital Ecology's tree habitat assessment are provided in Appendix A.

¹ AMC Architecture. *DHA Masterplan – Site Plan*. Drawing SK01 Revision 8, 1 April 2019.

² Enviro Links Design (2017). *Existing Tree Analysis*. Job No. 1120, DWG No. TA03, Issue C, 8 September 2017.

³ Enviro Links Design (2019). *Existing Tree Retention Analysis*. Job No. 1120, DWG No. TMP01, Issue A, 17 April 2019.

Tree identification numbers were determined based on Enviro Links Design (2017, 2019), and the following details were recorded for each tree.

- Tree Number – a unique identifying number allocated to the tree, based on Enviro Links Design (2017, 2019).
- Species Name and Common Name.
- Remnant / Naturally Occurring or Planted.
- Diameter at Breast Height (DBH) – measured with a DBH tape.
- Height – the approximate height of the tree measured with a clinometer.
- Hollows – the number and characteristics of any hollows present.
- Alive or Dead.
- Overall Habitat Value – Low, Moderate, High, Very High. This was determined based on the presence of hollows, other habitat values such as mistletoe, whether the tree is naturally occurring and/or Plant Community Type (PCT) appropriate, and whether the tree has the potential to develop valuable habitat over time.
- Other Notes – regarding any other notable features observed.

2.2 Vegetation Survey Methods

On 4 July 2018, Capital Ecology undertook a survey to identify, assess and map the current vegetation and habitat values within the study area. The method employed was developed by Capital Ecology in 2015 and has been used for a number of projects in the ACT, including large-scale vegetation mapping projects commissioned by Parks and Conservation Service^{4,5}.

The method can be used to assess and map each of the Plant Community Types (PCTs) occurring in the lowland areas of the Southern Tablelands of NSW and the ACT. As detailed below, the method for woodland mapping draws upon elements of the relevant contemporary Commonwealth Government (Commonwealth of Australia 2006⁶), ACT Government (ACT Government 2015a⁷; ACT Government 2015b⁸), and NSW Government (NSW Government 2014⁹ 2017¹⁰) vegetation mapping guidelines, together with other technical guidelines.

⁴ Capital Ecology (2018a). *2017 Grassland Quality and Extent Mapping*. May 2018. Prepared for Environmental Offsets, ACT Parks and Conservation Service. Authors: S. Reid and R. Speirs. Project no. 2759.

⁵ Capital Ecology (2018b). *2017 Woodland Quality and Extent Mapping – ACT Government Environmental Offsets*. May 2018. Prepared for Environmental Offsets, ACT Parks and Conservation Service. Authors: S. Reid and R. Speirs. Project no. 2756.

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

⁷ ACT Government (2015a). *Monitoring Guidelines for Box-Gum Woodlands*. Conservation Research, October 2015.

⁸ ACT Government (2015b). *ACT Environmental Offsets Calculator Assessment Methodology*. Environment and Planning. May 2015.

⁹ NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

¹⁰ NSW Government (2017). *Biodiversity Assessment Method*. Office of Environment and Heritage.

Step 1. Plant Community Type (PCT) mapping

The on-ground boundaries of each PCT (as defined in ACT Government 2015c¹¹) present within the study area were accurately mapped using either hand-held GPS or by marking boundaries directly onto recent high resolution orthorectified aerial photograph field. PCT boundary delineation was undertaken by walking across and around the study area, carefully reading the landscape, considering numerous less conspicuous landscape elements, such as the:

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

Step 1 is critical to the accurate mapping of temperate vegetation communities and was completed, and mapped in GIS, prior to moving on to Step 2.

Note: The entire study area was determined to contain only one PCT, namely ‘PCT-ACT16 – *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland’.

Step 2. Vegetation zone mapping

The mapped PCT was further divided into vegetation zones based on the structure, floristic composition and overall quality (‘intactness’) of the vegetation. As described above for Step 1, each patch of each discernible (generally homogenous) vegetation zone was accurately mapped using either hand-held GPS or by marking boundaries directly onto recent high resolution orthorectified aerial photograph field maps. Vegetation zone boundary delineation was undertaken by walking across and around the study area, carefully determining and recording the boundary alignment.

Observations were made regarding the type and condition of the vegetation present within the study area. Based on these, the portions of the study area with a native dominant groundstorey were delineated from those with an exotic dominant groundstorey.

As the survey occurred during winter (i.e. not the optimal time of year, which is October to November for woodlands in the ACT), it was not appropriate to perform survey plots and transects to quantify vegetation quality. Therefore, a precautionary approach was taken when determining the condition, quality and diversity of the vegetation present within the study area.

2.3 Tree Assessment Results

The results of the tree habitat assessment are provided in Appendix A and the associated photograph of each of the assessed trees is provided in Appendix C. Figure 2 shows the study area and assessed trees on 2018 aerial imagery.

In total 38 trees within the study area were assessed, 30 of which were determined to be naturally occurring remnant trees. Of the 38 trees, 17 contain hollows and therefore have ‘Very High’ habitat

¹¹ ACT Government (2015c). *ACT Vegetation Types Database – Attachment to the ACT Environmental Offsets Calculator Assessment Methodology*. 18 May 2015.

value. Another 17 trees have 'High' habitat value, based on other characteristics such as the presence of mistletoe/nests and/or on the tree's potential to develop important habitat for fauna in the future (based largely on the species of tree). Four (4) trees have 'Low' habitat value as they have been planted and are an inappropriate species for the PCT of the study area (determined to be 'PCT-ACT16 – *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland').

The trees of 'Very High' habitat value are likely to provide a valuable foraging resource to a variety of woodland birds and a nesting resource to hollow dependent fauna. The proposed development has been designed to retain as many of the trees as practicable. As a result, 10 'Very High' value trees will be retained, 2 'Very High' value trees will be retained if planning and engineering constraints permit, and 5 'Very High' value trees will be removed (refer Figure 2 and Appendix A). Furthermore, 4 'High' habitat value trees will be retained, and an additional 1 'High' value tree and 1 'Low' value tree will be retained if planning and engineering constraints permit.

2.4 Vegetation Survey Results

As determined during Step 1 of the vegetation assessment, the entire study area was found to contain only one PCT, namely 'PCT-ACT16 – *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland'. The results of the field survey, namely a species list obtained by a random meander throughout the study area, are presented in Appendix B.

Both native and exotic trees and shrubs are present within the study area. As described in Section 2.3, the majority of the mature native trees are naturally occurring remnant trees within PCT-ACT16, with Yellow Box *E. melliodora* and Red Gum *E. blakelyi* the most common species (refer Appendix A). A small proportion of the native trees appear to have been planted over 30 years ago. Exotic tree species present in the study area include Elm *Ulmus* spp. and Ash *Fraxinus* spp..

The entire study area has been historically disturbed as it previously contained 22 defence houses and associated urban infrastructure. As a result, the majority of the study area has been intensively landscaped and regularly mown over a long period of time. This has modified the groundlayer and midstorey and encouraged the proliferation of garden plants and other exotic species.

As shown in Figure 2, the areas where the demolished houses once stood are now bare/disturbed land (Appendix C, Photo Plates 39 to 41). The remaining parts of the study area are characterised by groundlayer vegetation entirely dominated by exotic grasses, notably Chilean Needle Grass *Nassella neesiana*, African Love Grass *Eragrostis curvula*, and Couch Grass *Cynodon dactylon* (Appendix A, Photo Plate 42). The exotic dominated areas contain a high diversity of exotic forbs, in particular Ribwort Plantain *Plantago lanceolata*. Some small, isolated patches of Red-leg Grass *Bothriochloa macra* occur along the western portion of the study area (Photo Plate 43).

Due to the study area's history of disturbance and landscaping, the midstorey throughout is characterised by a mix of planted native species (cultivars and non-local) and exotic species (Photo Plate 44). Non-local native species include Fringed Wattle *Acacia fimbriata*, Tea-tree *Melaleuca* spp., and Bottlebrush *Callistemon* spp.. Exotic species include Grey Cotoneaster *Cotoneaster franchetii*, Blue Periwinkle *Vinca major*, and common garden herbs such as Rosemary *Rosmarinus officinalis* and Thyme *Thymus vulgaris*.

2.5 Threatened Ecological Communities

The following two threatened ecological communities (TECs) were identified on the EPBC Act PMST as potentially occurring within the study area. Their presence within the study area, based on EPBC Act and NC Act criteria, is assessed below.

Natural Temperate Grassland of the South Eastern Highlands.

Listed as:

- critically endangered pursuant to the EPBC Act; and
- endangered pursuant to the NC Act.

Description: The Natural Temperate Grassland TEC is characterised by grassy vegetation dominated by moderately tall (25–50 cm) to tall (50–100 cm), dense to open tussock grasses in the genera *Rytidosperma*, *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*, with good quality patches supporting a diversity of native 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.

Potential for occurrence: None – as detailed above, the climax (i.e. pre-European) ecological community for the entire study area is ‘PCT-ACT16 – *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland’. No part of the study area would have once supported a grassland PCT.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Listed as:

- critically endangered pursuant to the EPBC Act; and
- endangered pursuant to the NC 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.

Potential for occurrence (EPBC Act or NC Act): The vegetation within the study area has been assessed against the flowchart provided in the EPBC Act Box-Gum Woodland Policy Statement¹² and does not meet the criteria for Box-Gum Woodland as the groundstorey is predominantly exotic.

Potential for occurrence – NC Act:

Box-Gum Woodland meeting the NC Act listed community was defined in Action Plan 10 (ACT Government 1999¹³) and Action Plan 27 (ACT Government 2004¹⁴) as any polygon in which:

- *the proportion of crown cover contributed by either *E. melliodora* or *E. blakelyi* or both jointly is ≥ 40%; and*
- *understorey is not exotic pasture; and*

¹² Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands.*

¹³ ACT Government (1999). *Yellow Box – Red Gum Grassy Woodland: An endangered ecological community. Action Plan No. 10.* Environment ACT, Canberra.

¹⁴ ACT Government (2004). *Woodlands for Wildlife: ACT Lowland Woodland Conservation Strategy. Action Plan No. 27.* Environment ACT, Canberra.

- *remnants are not isolated trees or clumps.*

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; and*
- *the groundstorey is predominately native; and*
- *a moderate diversity of native groundstorey species is present.*

According to this definition, the vegetation within the study areas does not meet the criteria for this community as the groundstorey is predominantly exotic.

2.6 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 included in the Likelihood of Occurrence Assessment include all of those identified during the database and literature review as potentially occurring within 10 kilometres of the study area. Also included are threatened species listed pursuant to the NC Act alone and considered by Capital Ecology to have some potential to occur within the study area.

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

The completed Likelihood of Occurrence Assessment is provided as Appendix D. Species assigned a moderate or higher likelihood of occurrence within the study area, other than if this is limited to transient visitation, are considered in more detail in Section 2.7 (threatened flora) and Section 2.8 (threatened fauna) of this EIA.

2.7 Threatened Flora Occurrence

One threatened flora species, Hoary Sunray *Leucochrysum albicans* var. *tricolor* (endangered EPBC Act) was assessed as having a moderate potential to occur within the study area. Although listed as 'endangered' under the EPBC Act, Hoary Sunray is a relatively common daisy in the ACT and region, particularly across the Mt Ainslie, Mt Majura, Goorooyarroo reserve network. It is also known to occur along the road verge of Fairbairn Avenue. If the species is present in the study area, or establishes there in the future, it is estimated that the plants are likely to comprise only a very small fraction of the plants present within a one kilometre radius of the study area. The loss of such a small proportion of the local population would be unlikely to significantly impact the species. Furthermore, the proposed development will not result in the clearance of the entire study area, and notably, will not directly impact the road reserve or surrounding open urban space, which represent the portions of the study area containing potential Hoary Sunray habitat. The remaining habitat within the study area, which is

largely comprised of former gardens and has been intensively landscaped, mown and modified, is unlikely to provide constitute Hoary Sunray habitat.

As detailed in the Likelihood of Occurrence Assessment (refer Appendix D), no other threatened flora species with the potential to occur in the locality are considered to have a moderate or higher likelihood of occurrence within the study area.

2.8 Fauna Habitat and Threatened Fauna Occurrence

Native birds recorded during the field survey include Red Wattlebird *Anthochaera carunculata*, Australian Raven *Corvus coronoides*, Australian Magpie *Gymnorhina tibicen*, Superb Fairy-wren *Malurus cyaneus*, and Crested Pigeon *Ocyphaps lophotes*.

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

- Remnant eucalypt trees. Some of the mature remnant trees contain hollows with a void which may be of habitat value to hollow dependant fauna. However, given the disturbed nature of the vegetation and location immediately adjacent to Campbell suburbs and Fairbairn Avenue, it is unlikely that these hollows would be utilised by any of the threatened hollow-dependant native birds which may occur in the locality.
- Remnant and planted eucalypt trees. These trees would provide a nectar resource for numerous honeyeater species and other birds when in flower. The seed from the River Sheoak *Casuarina cunninghamiana*, Radiata Pine *Pinus radiata* and Wattles *Acacia* spp. in the study area would also provide a foraging resource for several parrot species, potentially including the Gang-gang Cockatoo *Callocephalon fimbriatum* and Yellow-tailed Black Cockatoo *Calyptrorhynchus funereus*.
- Planted native trees, including eucalypt trees. These trees are unlikely to contain hollows. They may provide other nesting/roosting habitat for insectivorous bats and some native birds.
- The study area supports a sparse understorey dominated by exotic species. Such areas are unlikely to be of value to threatened fauna species but may be used by common native fauna (e.g. birds, kangaroos, reptiles, arthropods).
- As detailed in the Likelihood of Occurrence Assessment (refer Appendix D), several threatened woodland birds are also likely to visit the study area to forage. However, it is unlikely that the foraging resources present within the study area constitute an important proportion of those present within the locality for any threatened fauna species.
- The study area is unlikely to constitute important habitat for any EPBC Act listed migratory birds, although some migratory species may periodically forage within the study area.

The fauna habitat within study area is adjacent to high quality habitat to the north (Mt Ainslie Nature Reserve) and is bordered to the east and south by NC Act listed Box-Gum Woodland. Given that the study area previously contained houses and suburban gardens, it is unlikely that it constitutes a significant component of a wildlife movement corridor or is otherwise of high importance for fauna habitat connectivity. This is evident as the study area is not identified as a 'Local Link' or as possessing 'Regional Linkage Value' on ACTMAPi.

In summary, the fauna habitat within the study area has been substantially modified by the use of the land for residential purposes, notably the associated intensive landscaping primarily with exotic plants,

mowing of open areas, and other ongoing disturbance. As a result, the only remaining features of fauna habitat of value in the study area are the remnant eucalypt trees. The proposed development has been designed to retain as many of the 'Very High' habitat value remnant trees as practicable (refer Section 2.3 and Section 3).

Woodland birds

The Regent Honeyeater *Anthochaera phrygia* (vulnerable, EPBC Act and the NC Act), Painted Honeyeater *Grantiella picta* (vulnerable, EPBC Act and the NC Act), and Superb Parrot *Polytelis swainsonii* (vulnerable, EPBC Act and the NC Act) may visit the study area to forage on the native trees and shrubs (i.e. *Eucalyptus* spp. and *Acacia* spp.). These species are not known to breed in the study area or nearby, and the foraging habitat in the study area is of relatively low significance in the context of that occurring throughout the locality. In addition, the proposed development has been designed to retain as many of the 'Very High' habitat value remnant native trees as practicable, thereby reducing the potential impacts of the proposed development on threatened bird species.

The remnant native trees, planted native trees, and planted exotic trees would provide a foraging resource for many other native woodland birds. In addition to common native birds, several NC Act listed woodland birds are likely to visit the native trees and shrubs in the study area, including Varied Sittella *Daphoenositta chrysoptera*, Scarlet Robin *Petroica boodang* and Hooded Robin *Melanodryas cucullata cucullata*. These species may visit the study area to forage, but, given the disturbance caused by a nearby busy road and the suburb of Campbell, they are unlikely to nest in the study area. Notwithstanding this, the overall impacts of development within the study area on native fauna will be minimised by retaining as many of the 'Very High' habitat value remnant eucalypt trees as practicable.

3. Avoidance, Minimisation and Mitigation Measures

In order to reduce potential impacts on the ecological values within the study area, a number of measures will be implemented during and following the proposed development. These are described below.

Retention of Remnant Trees

The trees of 'Very High' habitat value are likely to provide a valuable foraging resource to a variety of woodland birds and a nesting resource to some hollow dependent fauna. The proposed development has been designed to retain as many of these trees as practicable and will retain 10 'Very High' value trees, 2 'Very High' value trees if planning and engineering constraints permit, and remove only 5 'Very High' value trees (Figure 2, Appendix A). Furthermore, 4 'High' habitat value trees will also be retained, and an additional 1 'High' value tree and 1 'Low' value tree if planning and engineering constraints permit.

The trees to be retained, and those to be removed, will be identified on the engineering drawings and/or similar documents that pertain to the proposed development. The trees to be retained will be fenced off and protected during construction with reference to the guidance provided in the Australian Standard¹⁵.

¹⁵ Standards Australia (2010). *AS4970-2009 Protection of trees on development sites*.

Weed Management

The weed management measures that will be implemented to prevent the introduction and/or spread of weeds include the following.

- Appropriate vehicle hygiene will be maintained. Vehicles and machinery entering the study area will be clean of weed seed or propagules.
- Only sterile materials such as hessian/jute or rice straw will be used for soil stabilisation or similar purposes.
- For 12 months following conclusion of the works, significant weeds will be controlled throughout the study area by a qualified and experienced weed control contractor.

A weed control program will be developed to prevent the establishment and spread of significant weeds and control other less significant exotic species (lawn/pasture grasses etc.) within road verges, landscaped areas, and other open space.

Recommendations for Landscaping

The following principles will be followed for all landscaping.

- Local native species will be used for landscaping to the fullest extent practicable.

Where practicable within open space areas, all strata will be re-established (i.e. groundcover, midstorey shrubs, and canopy trees) to create habitat complexity. This will discourage urban adapted species and encourage small woodland birds to visit the neighbourhood. Open space plantings will comprise only species appropriate for the applicable historical PCT (PCT-ACT16 Box-Gum Woodland).

4. Summary of Proposed Direct Impacts

As illustrated in Figure 2, the proposed development will result in the maximum clearance of a total area of 22,675 m² (2.27 ha) of vegetation. This is comprised of 22,675 m² (2.27 ha) of exotic vegetation and 20 to 24 eucalypt trees (Figure 2, Appendix A). The proposed development will not impact a listed ecological community or potentially important habitat for any listed threatened flora or fauna species.

5. Legislative Requirements

5.1 EPBC Act Referral

Matters of National Environmental Significance

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their potential to impact upon 'Matters of National Environmental Significance' (MNES). MNES currently listed under the EPBC Act are:

- listed threatened species and communities;
- listed migratory species;
- Ramsar wetlands of international importance;

- Commonwealth marine environment;
- world heritage properties;
- national heritage places;
- the Great Barrier Reef Marine Park;
- nuclear actions; and
- a water resource, in relation to coal seam gas development and large coal mining development.

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Guidelines for determining whether an impact is significant are provided by the Department of the Environment (Commonwealth of Australia 2013¹⁶). If it is determined that a proposed action will, or is likely to, have a significant impact on a MNES, the action must be referred to the Commonwealth Minister for the Environment and Energy. The Department of the Environment and Energy will then consider the referred action and the Minister (or his/her Delegate) will make a determination regarding whether the action requires approval under the EPBC Act and associated conditions and controls.

With respect to the above, the proposed development is unlikely to impact any MNES. As such, EPBC Act referral is unwarranted and is not recommended.

Whole of Environment

As the proposed action will be carried out by a Commonwealth agency (DHA) and will occur on Commonwealth/National land, the significance of the proposed actions on the 'whole of environment' must also be assessed. Guidelines for determining whether an impact is significant are provided by the Department of the Environment (Commonwealth of Australia 2013¹⁷) and are addressed below. If it is determined that a proposed action will, or is likely to, have a significant impact on the 'whole of environment', the action must be referred to the Commonwealth Minister for the Environment and Energy. The Department of the Environment and Energy will then consider the referred action and the Minister (or his/her Delegate) will make a determination regarding whether the action requires approval under the EPBC Act and associated conditions and controls.

In deciding whether or not the proposed action is likely to have a significant impact, the following must be considered.

- The environmental context

The study area has been historically disturbed as it previously contained 22 defence houses and associated urban infrastructure. As a result, the majority of the study area has been intensively

¹⁶ 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

¹⁷ Commonwealth of Australia (2013). *Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies - Significant Impact Guidelines 1.2. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment

landscaped and regularly mown over a long period of time. This has heavily modified the groundlayer and midstorey and encouraged the proliferation of exotic species.

The study area is adjacent to high quality habitat to the north (Mt Ainslie Nature Reserve) and is bordered to the east and south by NC Act listed Box-Gum Woodland. Given the historic disturbance to the study area, it is unlikely that it constitutes a significant component of a wildlife movement corridor or is otherwise important for fauna habitat connectivity. This is evident as the study area is not identified as a 'Local Link' or as possessing 'Regional Linkage Value' on ACTMAPi.

As a result, the only notable ecological values within the study area are the remnant eucalypt trees. The proposed development has been designed to retain as many of these trees as practicable, thereby reducing the potential impacts of the proposed development (refer Section 2.3 and Section 3). In addition, and as discussed below, the removal of a small number of mature eucalypts from a previously developed and highly disturbed area is unlikely to impact the environment.

- The potential impacts likely to be generated by the action, including indirect consequences of the action

As discussed above, the only notable ecological values within the study area are the remnant eucalypt trees. The proposed development will remove 20 to 24 of these mature eucalypts (Figure 2, Appendix A). Given the historic disturbance to the study area and its long-term use for housing, it is unlikely that the trees within the study area have recently constituted a significant resource for fauna in the locality. Furthermore, the study area is adjacent to high quality habitat to the north (Mt Ainslie Nature Reserve) and is bordered to the east and south by NC Act listed Box-Gum Woodland. These areas contain a high number of mature eucalypt trees. As such, the trees to be removed in the study area comprise only a very small fraction of the similar trees within a one kilometre radius. The loss of such a small proportion of the local vegetation would be unlikely to significantly impact the environment. Nonetheless, the proposed development has been designed to retain as many of the 'Very High' habitat value remnant native trees as practicable, thereby reducing the potential impacts of the proposed development.

With respect to the above, it is very unlikely that the removal of 20 to 24 mature eucalypts will directly or indirectly impact the environment.

- Whether mitigation measures will avoid or reduce these impacts

The study area previously contained 22 defence houses. It still contains most of the associated urban infrastructure. As a result, the majority of the study area has been intensively landscaped and regularly mown over a long period of time. This has modified the groundlayer and midstorey and encouraged the proliferation of exotic species. The selection of this site for the proposed development greatly reduces and avoids impacts on a wide variety of environmental considerations.

As discussed previously, the only notable ecological values within the study area are the remnant eucalypt trees. In particular, the trees of 'Very High' habitat value are likely to provide a valuable foraging resource to a variety of woodland birds and a nesting resource to some hollow dependent fauna. The proposed development has been designed to retain as many of these trees as practicable and will retain 10 'Very High' value trees, 2 'Very High' value trees if planning and engineering constraints permit and remove only 5 'Very High' value trees (Figure

2, Appendix A). Furthermore, 4 'High' habitat value trees will also be retained, and an additional 1 'High' value tree and 1 'Low' value tree if planning and engineering constraints permit.

In combination, the mitigation measures outlined above substantially avoid and/or reduce impacts on the environment.

With respect to the above, the proposed development is unlikely to impact on the 'whole of environment'. As such, EPBC Act referral is unwarranted and is not recommended.

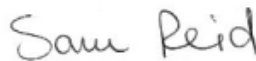
We trust that this EIA provides the information, assessment, and advice required. If, however, you should have any questions relating to any of the matters discussed herein, please do not hesitate to contact us.

Yours sincerely,



Robert Speirs

Director / Principal Ecologist



Dr Sam Reid

Consultant Ecologist

Attachments:

Figure 1. Locality Plan

Figure 2. Study Area and Ecological Values

Appendix A. Tree Habitat Assessment

Appendix B. Vegetation Survey Results Table

Appendix C. Photo Plates

Appendix D. Threatened Species Likelihood of Occurrence Assessment

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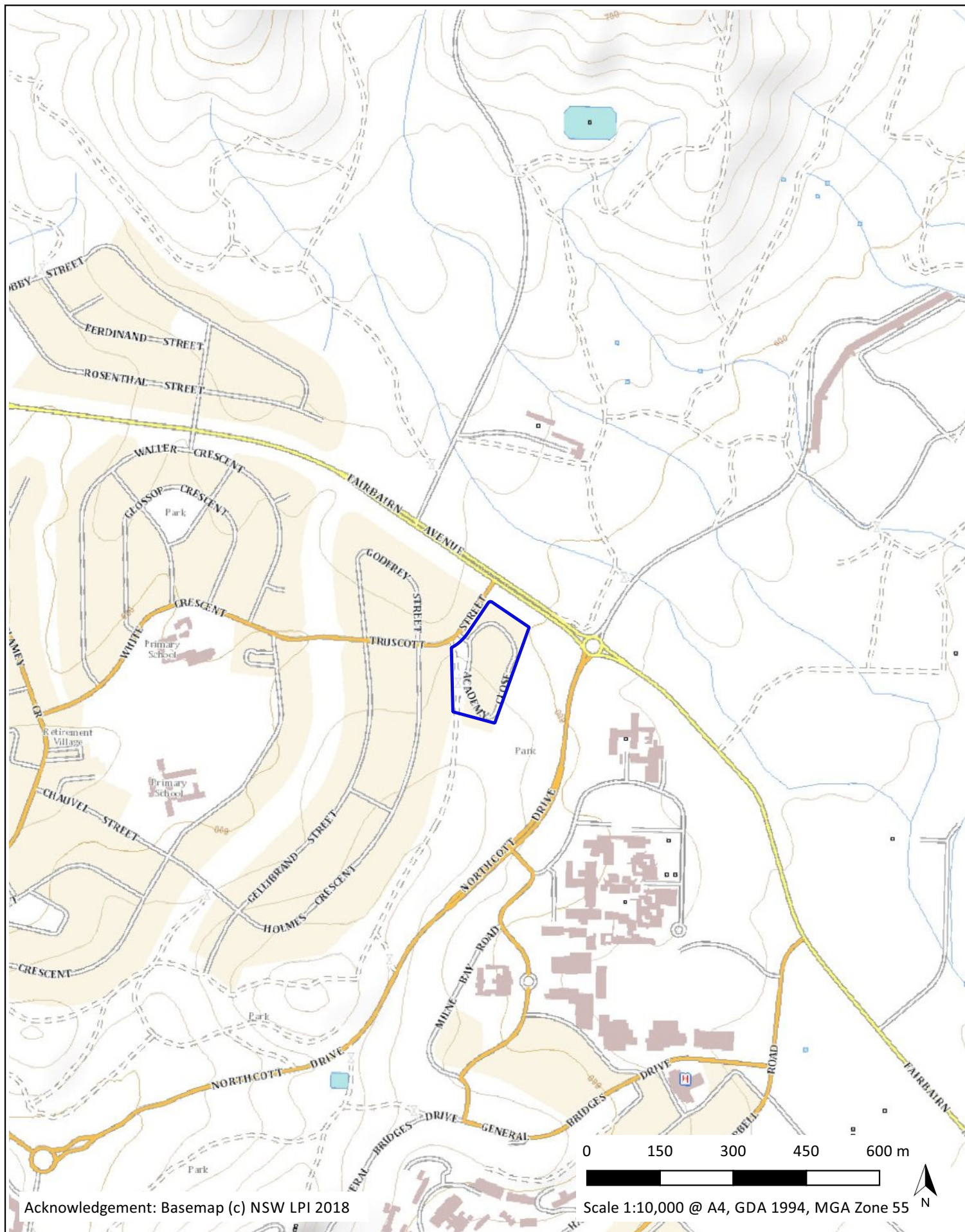


Figure 1. Locality Plan

Legend

Study Area

Capital Ecology Project No: 2785

Drawn by: S. Reid

Date: 31 July 2018



Figure 2. Study Area and Ecological Values

Appendix A. Tree Habitat Assessment

Tree Number	Species Name	Common Name	Remnant/ Planted	DBH (cm)	Height (m)	Overall Habitat Value	Hollows				Alive/ Dead	Notes Other Habitat Values (nests, mistletoe etc.)	Proposed Development - Trees to be Retained or Removed
							S	M	L	XL			
T01	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	55/50	13	Very High	1	-	1	-	A	Substantial dieback	Remove
T02	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	58	12	High	-	-	-	-	A	Substantial dieback	Remove
T03	<i>E. melliodora</i>	Yellow Box	Remnant	102	25	Very High	4	2	2	-	A	3 x Mistletoe	Retain
T04	<i>E. polyanthemos</i>	Red Box	Planted	54	15	Low	-	-	-	-	A		Remove
T05	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	59	17	High	-	-	-	-	A		Retain
T06	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	58	18	High	-	-	-	-	A		Retain
T07	<i>E. melliodora</i>	Yellow Box	Remnant	84	22	Very High	3	1	-	-	A	Half of tree is dead	Retain
T08	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	61	8	Very High	2	-	-	-	A	Substantial dieback	Retain if planning and engineering constraints permit
T30	<i>E. melliodora</i>	Yellow Box	Remnant	47	13	Very High	1	1	-	-	D	Tree is dead	Remove
T31	<i>E. melliodora</i>	Yellow Box	Remnant	69	12	High	-	-	-	-	A		Retain
T32	<i>E. melliodora</i>	Yellow Box	Remnant	85	16	Very High	3	3	-	-	A		Retain if planning and engineering constraints permit
T33	<i>E. gonicalyx</i>	Bundy	Planted	66	12	Low	-	-	-	-	A		Remove
T35	<i>E. melliodora</i>	Yellow Box	Remnant	69	13	Very High	1	1	-	-	A		Retain
T36	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	89	15	Very High	2	2	3	-	A		Retain
T37	<i>E. melliodora</i>	Yellow Box	Remnant	72	17	Very High	1	1	-	-	A		Retain
T39	<i>E. melliodora</i>	Yellow Box	Remnant	36	9	High	-	-	-	-	A		Remove
T40	<i>E. melliodora</i>	Yellow Box	Remnant	40	7	High	-	-	-	-	A		Remove
T41	<i>E. melliodora</i>	Yellow Box	Remnant	25	10	High	-	-	-	-	A		Remove
T42	<i>E. melliodora</i>	Yellow Box	Remnant	72	18	Very High	2	1	-	-	A		Remove
T43	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	65	12	Very High	-	1	-	-	A	Substantial dieback	Remove
T52	<i>E. melliodora</i>	Yellow Box	Remnant	69	14	High	-	-	-	-	A		Remove
T53	<i>E. bridgesiana</i>	Apple Box	Remnant	73	11	High	-	-	-	-	A		Remove
T54	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	60	14	High	-	-	-	-	A	1 x Mistletoe present	Remove
T55	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	68	12	Very High	-	1	1	-	A	1 x Mistletoe; 2 x Small stick nest; Substantial dieback	Retain
T56	<i>E. melliodora</i>	Yellow Box	Remnant	73	17	Very High	2	-	-	-	A		Retain
T58	<i>E. polyanthemos</i>	Red Box	Planted	38	9	Low	-	-	-	-	A		Retain if planning and engineering constraints permit
T59	<i>E. bridgesiana</i>	Apple Box	Planted	55	14	High	-	-	-	-	A		Remove
T60	<i>E. rubida</i>	Candlebark	Planted	50	10	High	-	-	-	-	A		Remove
T61	<i>E. melliodora</i>	Yellow Box	Planted	45/29/27	11	High	-	-	-	-	A		Retain if planning and engineering constraints permit
T62	<i>E. melliodora</i>	Yellow Box	Remnant	59	15	Very High	2	1	-	-	A		Retain
T63	<i>E. melliodora</i>	Yellow Box	Remnant	61	17	Very High	-	1	-	-	A		Retain
T64	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	64/45	16	Very High	2	-	-	-	A	3 x Mistletoe	Retain
T66	<i>E. polyanthemos</i>	Red Box	Planted	49	13	High	-	-	-	-	A	1 x Nest box	Remove
T67	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	87	14	Very High	1	2	-	-	A	1 x Nest box	Remove
T69	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	55	10	High	-	-	-	-	A		Remove
T70	<i>E. melliodora</i>	Yellow Box	Remnant	78	16	High	-	-	-	-	A		Retain
T71	<i>E. blakelyi</i>	Blakely's Red Gum	Remnant	60	17	High	-	-	-	-	A	1 x Mistletoe; Substantial dieback	Remove
T71B	<i>E. gonicalyx</i>	Bundy	Planted	46	10	Low	-	-	-	-	A	Not shown in 'Existing Tree Analysis' (27/11/17)	Remove

*Estimated size class of each hollow based upon entrance diameter (i.e. Small <5 cm, Medium 5-15 cm, Large 15 – 25 cm and Extra Large >25 cm)

Appendix B. Vegetation Survey Results Table

Table A1. Plant species list recorded in the study area

Species Name	Common Name
Exotic	
<i>Acer negundo</i>	Box Elder
<i>Briza maxima</i>	Quaking Grass
<i>Bromus</i> sp.	Brome
<i>Carpobrotus aequilaterus</i>	Chilean Pigface
<i>Centaureum</i> sp.	Common Centaury
<i>Cotoneaster franchetii</i>	Grey Cotoneaster
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cynodon dactylon</i>	Couch Grass
<i>Eragrostis curvula</i>	African Love Grass
<i>Festuca arundinacea</i>	Tall Fescue
<i>Fraxinus</i> sp.	Ash
<i>Iris</i> sp.	Iris
<i>Hirschfeldia incana</i>	Hoary Mustard
<i>Hypericum perforatum</i>	St John's Wort
<i>Hypochaeris radicata</i>	Cat's Ear
<i>Malva</i> sp.	Mallow Weed
<i>Modiola caroliniana</i>	Red-flowered Mallow
<i>Nassella neesiana</i>	Chilean Needle Grass
<i>Nassella trichotoma</i>	Serrated Tussock
<i>Opuntia</i> sp.	Prickly Pear
<i>Paspalum dilatatum</i>	Paspalum
<i>Passiflora</i> sp.	Passion Vine
<i>Petrorhagia nanteuil</i>	Proliferous Pink
<i>Pinus radiata</i>	Radiata Pine
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Prunus</i> sp.	Plumb Tree
<i>Ricinus communis</i>	Castor Oil Plant
<i>Rosmarinus officinalis</i>	Rosemary
<i>Shonchus</i> sp.	Sow Thistle
<i>Thymus vulgaris</i>	Thyme
<i>Ulmus</i> sp.	Elm
<i>Vinca major</i>	Blue Periwinkle
<i>Vulpia</i> sp.	Silver Grass
<i>Yucca</i> sp.	Yucca
Native	
<i>Acacia fimbriata</i>	Fringed Wattle
<i>Bothriochloa macra</i>	Red-leg Grass
<i>Callistemon</i> sp.	Bottlebrush
<i>Chloris truncata</i>	Windmill Grass
<i>Casuarina cunninghamiana</i>	River Sheoak
<i>Dianella revoluta</i>	Blue Flax-lily
<i>Melaleuca</i> sp.	Tea Tree
<i>Rhytidosperra</i> sp.	Wallaby Grass

Appendix C. Photo Plates



Plate 1 – Tree 01.



Plate 2 – Tree 02.



Plate 3 – Tree 03.

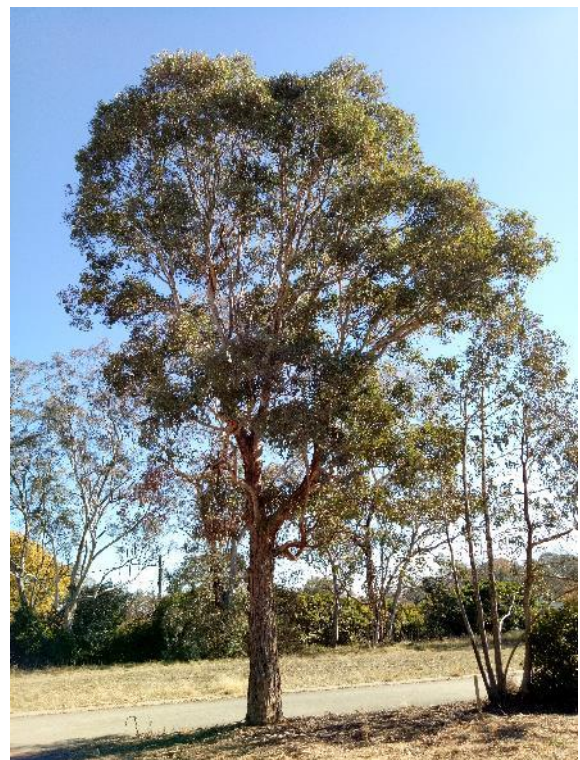


Plate 4 – Tree 04.



Plate 5 – Tree 05.



Plate 6 – Tree 06.



Plate 7 – Tree 07.



Plate 8 – Tree 08.



Plate 9 – Tree 30.



Plate 10 – Tree 31.



Plate 11 – Tree 32.

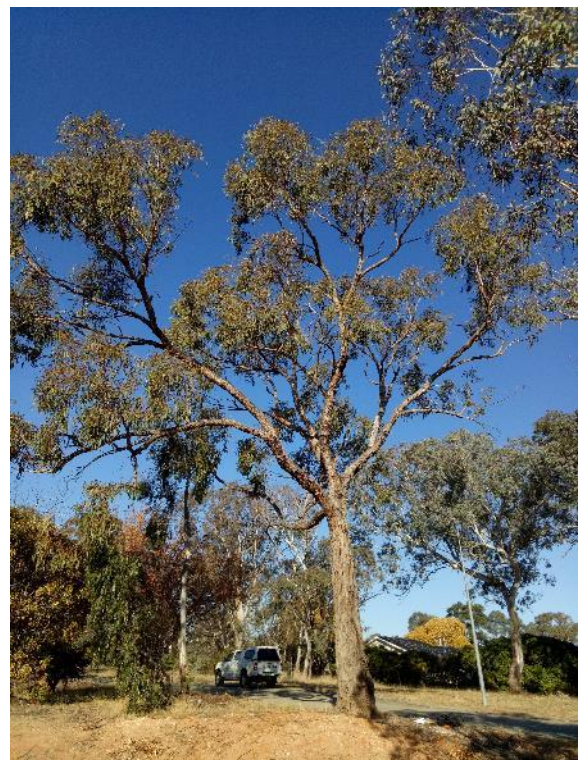


Plate 12 – Tree 33.



Plate 13 – Tree 35.



Plate 14 – Tree 36.



Plate 15 – Tree 37.



Plate 16 – Tree 39.



Plate 17 – Tree 40.



Plate 18 – Tree 41.



Plate 19 – Tree 42.



Plate 20 – Tree 43.



Plate 21 – Tree 52.

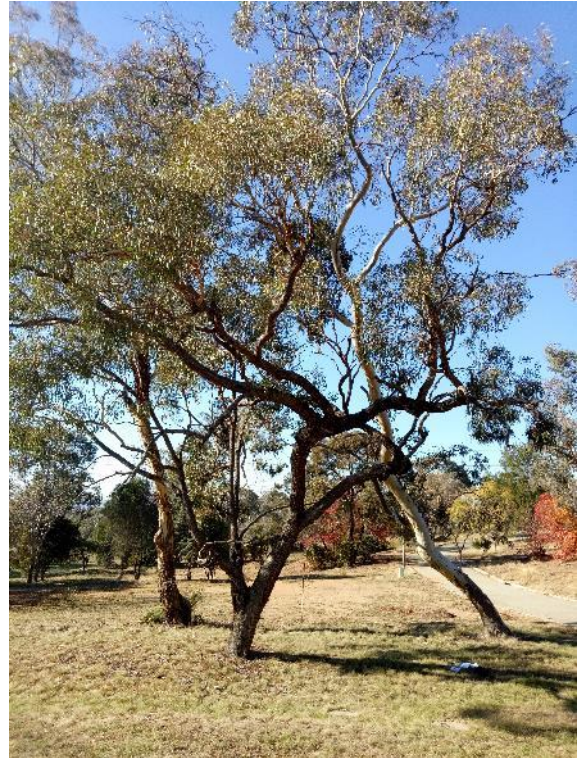


Plate 22 – Tree 53.



Plate 23 – Tree 54.



Plate 24 – Tree 55.



Plate 25 – Tree 56.



Plate 26 – Tree 58.



Plate 27 – Tree 59.



Plate 28 – Tree 60.



Plate 29 – Tree 61.



Plate 30 – Tree 62.



Plate 31 – Tree 63.



Plate 32 – Tree 64.



Plate 33 – Tree 66.



Plate 34 – Tree 67.



Plate 35 – Tree 69.



Plate 36 – Tree 70.



Plate 37 – Tree 71.

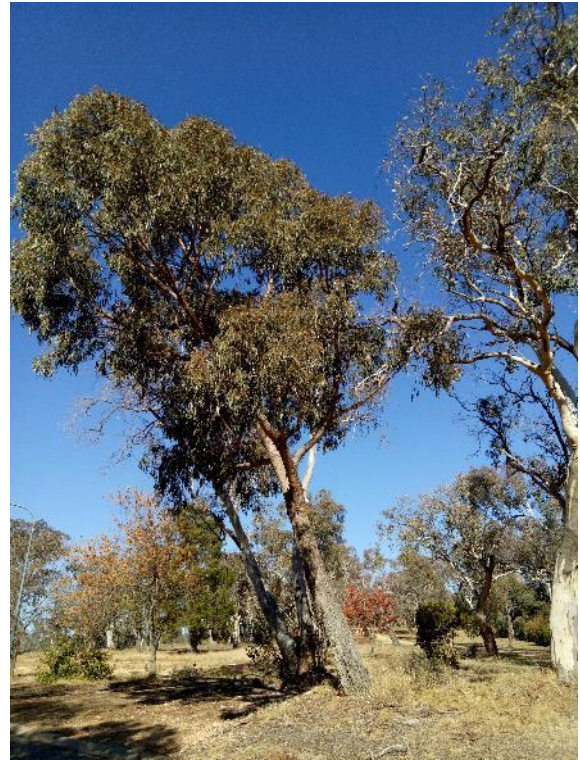


Plate 38 – Tree 71B.



Plate 39 – Disturbed land.



Plate 40 – Disturbed land.



Plate 41 – Disturbed land.



Plate 42 – Exotic dominated groundlayer.



Plate 43 – Some areas, while still exotic dominated, contained a higher proportion of native grasses such as Red-leg Grass.



Plate 44 – Landscaped former gardens, containing planted native and exotic trees and shrubs.

Appendix D. Threatened Species Likelihood of Occurrence Assessment

Key for the below 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
Plants				
<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.	Negligible The study area is highly disturbed and has been substantially modified by landscaping and mowing. There is no potential habitat in the study area for the species.
<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 study area 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	Negligible The species is not present in the study area.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
			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.	
<i>Lepidium ginninderrense</i> Ginninderra Peppercress	V	E	The species is known from two natural sites in northern ACT, both within Natural Temperate Grassland.	Negligible There is no potential habitat in the study area for the species.
<i>Lepidium hyssopifolium</i> Basalt Peppercress	E	-	This species is known from a few populations in NSW, Victoria and Tasmania. The Basalt Pepper-cress is known to establish on open, bare ground with limited competition from other plants. It was previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance such as road and rail verges, on the fringes of developed agricultural land or within small reserves in agricultural land. Many populations are now generally found amongst exotic pasture grasses and beneath exotic trees.	Negligible There is no potential habitat in the study area for the species.
<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.	Moderate The species is known to occur nearby in Mt Ainslie Nature Reserve and along the road verge of Fairbairn Avenue.
<i>Pelargonium</i> sp. <i>Striatellum</i> Omeo Stork's-bill	E	-	An undescribed species of <i>Pelargonium</i> , 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 study area 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	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
			<i>Eucalyptus</i> or <i>Callitris</i> woodland. In the ACT, it is only found on the eastern banks of the rivers.	
<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>	<p>Negligible</p> <p>The study area is highly disturbed and has been substantially modified by landscaping and mowing. There is no potential habitat in the study area for the species.</p>
<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.	<p>Negligible</p> <p>The study area is highly disturbed and has been substantially modified by landscaping and mowing. There is no quality habitat in the study area for the species, and it is unlikely that it is present and was not recorded during the field surveys.</p>
<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.	<p>Negligible</p> <p>The study area is highly disturbed and has been substantially modified by landscaping and mowing. There is no potential habitat in the study area for the species.</p>

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>Thesium australe</i> Austral Toadflax	V	-	Found in very small to large populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is often found in damp sites in association with Kangaroo Grass, but it is also found on other grass species at inland sites. Occurs on clay soils in grassy woodlands or coastal headlands.	Negligible The study area is highly disturbed and has been substantially modified by landscaping and mowing. There is no potential habitat in the study area for the species.
Mammals				
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	-	The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. The species roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin <i>Petrochelidon ariel</i> . The species frequents low to mid-elevation dry open forest and woodland close to roosts and is often found in well-timbered areas containing gullies.	Low No potential roosting habitat is present in the study area or nearby. As the species is known to forage close to roost sites, it is unlikely to forage in the study area.
<i>Dasyurus maculatus maculatus</i> Spot-tailed Quoll (SE mainland population)	E	V	The Spot-tailed Quoll occurs along the east coast of Australia and the Great Dividing Range. The species uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000ha, while males have larger home ranges of between 2000 and 5000ha. Breeding occurs from May to August.	Negligible The species is highly unlikely to occur within the study area.
<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	Negligible The study area is highly disturbed and has been substantially modified by landscaping and mowing. There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
			glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	
<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. The study area also does not contain potential habitat for the species.
<i>Pteropus poliocephalus</i> Grey-headed Flying Fox	V	-	The Grey-headed Flying Fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. Whilst Brisbane, Newcastle, Sydney and Melbourne are occupied continuously, the species is widespread throughout their range during summer. In autumn the species occupies coastal lowlands and is uncommon inland. In winter the species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW and on the northwest slopes (associated with flowering eucalypts of these areas). The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. The roost at Commonwealth Park in Canberra is the only known roost in the ACT region.	Low The species may periodically forage within the study area on flowering eucalypts, however the study area is highly unlikely to contain habitat of significance to the species. The study area is not located near any known camps.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
Birds				
<i>Anthochaera phrygia</i> Regent Honeyeater	E	E	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. It also utilises a number of other eucalypt species. Nectar and fruit from the mistletoes <i>Amyema miquelii</i> , <i>A. pendula</i> , and <i>A. cambagei</i> are also eaten during the breeding season. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and sheoaks as well as within mistletoe haustoria (section of the root which connects with the host tree). An open cup-shaped nest is constructed by the female of bark, grass, twigs and wool.	Moderate The species may periodically visit the study area 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 There is no potential habitat in the study area for the 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 There is no potential habitat in the study area for 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.	Moderate The species may periodically visit the study area to forage, however it is unlikely to nest in the study area.

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<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.	Moderate The species may periodically visit the study area to forage, however it is unlikely to nest in the study area.
<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.	Low The study area may be part of the range of an individual or pair of Little Eagles, but the species is unlikely to forage or nest in the study area.
<i>Lathamus discolor</i> Swift Parrot	E	V	The Swift Parrot occurs in woodlands and forests of NSW (and occasionally the ACT) from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low The species may move through the study area during winter, however this is unlikely due to the paucity of records of the species in the region.
<i>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 There is no potential habitat in the study area 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 There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	NC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence/Impact
<i>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 There is no potential habitat in the study area 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.	Moderate The species may periodically visit the study area to forage, however it is unlikely to nest in the study area.
<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.	Moderate The species may periodically visit the study area to forage, however it is unlikely to nest in the study area.
<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.	Moderate The species may periodically visit the study area to forage, however it is unlikely to nest in the study area.
<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 There is no potential habitat in the study area for the species.
Amphibians				
<i>Litoria aurea</i> Green and Golden Bell Frog	V	-	The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks, although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land.	Negligible There is no potential habitat in the study area for the species.

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<i>Litoria booroolongensis</i> Booroolong Frog	E	-	<p>The Booroolong Frog is restricted to tablelands and slopes in NSW and north-east Victoria at 200–1300 m above sea level. The species is predominantly found along the western-flowing streams and their headwaters of the Great Dividing Range, and a small number of eastern-flowing streams in the north end of its range.</p> <p>The Booroolong Frog occurs along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins, or near slow-flowing connected or isolated pools that contain suitable rock habitats. Streams range from small slow-flowing creeks to large rivers in dissected mountainous country, tablelands, foothills and lowland plains. Primary habitat requirements for the Booroolong Frog are extensive rock bank structures along permanent rivers. The species can occur in cleared grazing land and pasture.</p>	<p>Negligible</p> <p>There is no potential habitat in the study area for the species.</p>
<i>Litoria castanea</i> Yellow-spotted Tree Frog	E	-	<p>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.</p>	<p>Negligible</p> <p>There is no potential habitat in the study area for the species.</p>
Reptiles				
<i>Aprasia parapulchella</i> Pink-tailed Worm-lizard	V	V	<p>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.</p>	<p>Negligible</p> <p>There is no potential habitat in the study area for the species.</p>
<i>Delma impar</i> Striped Legless Lizard	V	V	<p>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</p>	<p>Negligible</p> <p>There is no potential habitat in the study area for the species.</p>

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			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.	
<i>Tympanocryptis pinguicolla</i> Grassland Earless Dragon	E	E	In the Canberra-Monaro region the 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 native grassland habitat in the Majura and Jerrabomberra valleys in the ACT and at 'Letchworth' near Queanbeyan in NSW.	Negligible There is no potential habitat in the study area for the species.
Fish and Crustacea				
<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 in the study area for the 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 in the study area for the species.
Insects				
<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-	Negligible There is no potential habitat in the study area for the species.

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			Gum Woodland, such sites are usually nearby the historical ecotone between the two ecological communities.	
<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 in the study area for the species.