



North Terrace Ecological and Bushfire Assessment

Constraints report for proposed rezoning

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North Terrace Developments Pty Ltd

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Prepared by	Matthew Dowle, Mitchell Scott, Mick George, Tristen Jones
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Abbreviations

Abbreviation	Description
APZ	Asset Protection Zone
DotE	Department of the Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EPA Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
FFA	Flora & Fauna Assessment
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NW Act	Noxious Weeds Act 1993
OEH	NSW Office of Environment and heritage
TEC	Threatened Ecological Community
THSC	The Hills Shire Council
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
WoNS	<i>Weeds of National Significance</i>

Executive summary

Eco Logical Australia Pty Ltd (ELA) undertook an assessment of the study area to identify ecological and bushfire constraints for the proposed rezoning of North Terrace from its current status as E2 (Environmental Conservation) to a balance of E4 (Environmental Living) and E2 (Environmental Conservation), to support a potential residential development. ELA understands that the overall proposal has been designed to deliver a net environmental benefit to the area.

The report concludes there is significant potential to deliver a net environmental benefit through having the development in a small portion of moderate ecological value area resourcing improvements in a large residual area which will retain a protective E2 (Environmental Conservation) zoning and will be managed according to a Conservation Management Plan.

This document reports on the ecological values within the study area, considers the potential impacts from the proposed rezoning and presents an outline for a site Conservation Management Plan. The document also provides commentary on the specific issues raised by the NSW Rural Fire Service and Office of Environment & Heritage to the Department of Planning & Environment in response to the Pre-Gateway Review – PGR_2015Quean_00100 3R Kavanagh Street Jerrabomberra (North Terrace).

The vegetation within the study area is characterised by a dry sclerophyll forest community dominated by *Eucalyptus macrorhyncha* (Red Stringybark) and *E. polyanthemos* (Red Box). It has a shrubby mid story primarily of regrowth *Kunzea ericoides* (Burgan) and *Acacia* species which varies in density and species composition. This vegetation does not form part of a threatened ecological community.

The majority of the site represents areas of previous disturbance, either by clearing or fire, and is traversed by a number of tracks and trails. Disturbance (historical and ongoing) has impacted the ecological values of the site and may be exacerbated by recreational use of the site for walking, motor and mountain bike riding and the walking of domestic animals.

One threatened flora species, *Leucochrysum albicans* var. *tricolor* (Hoary Sunray), listed as endangered under the EPBC Act, was recorded along the northern boundary of the study area. Although no population count was conducted, an estimated 150-200 individuals were observed, with mature individuals making up approximately only 25% of the population. All individuals were observed along the track.

No threatened fauna were recorded during the site inspection. However, the site has the potential to provide habitat for Rosenberg's Goanna (*Varanus rosenbergi*), as evidenced by the presence of termite mounds within the site. The site also provides potential habitat for some Microchiropteran bats and woodland birds. The Gang-gang Cockatoo (*Callocephalon fimbriatum*), Scarlet Robin (*Petroica boodang*), Varied Sittella (*Daphoenositta chrysoptera*), Eastern Bentwing Bat (*Miniopterus (schreibersii) orianae oceansis*), Eastern Falsistrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*) and Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) were recorded in the adjacent Mount Jerrabomberra Reserve during previous surveys (ELA 2011).

Bushfire is an important consideration for development of the subject land and compliance with PBP is required for any development application following a successful rezoning to be supported by Queanbeyan City Council and the NSW Rural Fire Service. The APZ constraints presented in this report are provided in accordance with PBP and varies for each boundary from 20 m in the south to 35 m in the east. The APZ widths are based on an assessment of the vegetation and slope and are shown external to the development site where this can be accommodated without impacting other land management objectives.

The management of APZ areas located outside the boundaries of the proposed development site will be incorporated into the Conservation Management Plan (CMP) to be developed for the area.

The vegetation associated with Mount Jerrabomberra Reserve has been identified as a regional Biolink in the Mt Jerrabomberra Plan of Management (2004) and BES (2008) report. Whilst the study area forms part of the linked areas of remnant vegetation described in the documents, it does not form part of the main linkages for the corridor as described in the documents, these being those between North Terrace and Jerrabomberra or South Queanbeyan and Jerrabomberra and along Barracks Creek, (refer **Figure 6**).

The study included some preliminary desktop assessment of Aboriginal Cultural Heritage values of the site including an AHIMS database search on 12 November 2015. The search revealed no Aboriginal sites recorded in or near the location or any Aboriginal places having been declared in or near the above location. Predictive models relevant to the local area suggest the occurrence of Aboriginal objects would be most likely to occur near creek lines, or within 200 m of major drainage lines, particularly on adjacent reasonably level elevated ground or slopes or on ridge crests, spurs and knolls, serving as natural access routes. While the area around the Mount Jerrabomberra Nature Reserve is not a riparian corridor it's close proximity to the Molonglo (located 3.5km to the north) and Queanbeyan Rivers (located 2km to the west) and the high number of previously recorded Aboriginal heritage sites surrounding these river corridors renders the area as having archaeological potential. Additionally, the Mount Jerrabomberra Plan of Management (2004) recounts early historic sources confirming that Mount Jerrabomberra had spiritual significance to the Ngunnawal people (2004:15) and therefore it is likely that archaeological signatures of Aboriginal visitation to the Mount Jerrabomberra area exist.

A constraints assessment was conducted to determine the relative ecological constraints and areas of conservation significance across the site, with an intention to inform the proposed development footprint. The site was determined to primarily consist of areas of moderate ecological constraint, with a small section of high ecological constraint (Hoary Sunray). Notwithstanding the majority of the area being determined to be of moderate ecological value the study noted the current E2 (Environmental Conservation) zoning which has a general focus of protecting areas of high ecological value. The areas of moderate or low ecological constraint should be the areas targeted for any development, with areas of high ecological constraint set aside for conservation and/or protection.

The study considers that sensitive residential development confined to areas of moderate or low ecological constraints is consistent with an E4 (Environmental Living) zone. The proposal to retain the non-developed lands in E2 (Environmental Conservation) zone, notwithstanding the moderate ecological values determined by this study, will provide the highest level of protection for the ecological values of the area during and post development and have the greatest chance of delivering the clients intent for a net environmental improvement in the area.

A framework for a (CMP) has been provided that identifies the management considerations that would be required to reduce impacts to ecological values across the site and optimise conservation outcomes, particularly on the land retaining the E2 (Environmental Conservation) zoning. The CMP would also include measures to ensure that the area can continue to play an effective role as part of a regional Biolink. The study further concluded that the CMP provides potential for significant beneficial outcomes to those areas that will be managed primarily for conservation.

An assessment of impacts to threatened species, namely those identified as having a likely or known occurrence in the study area, will need to be considered at the Development Application stage in relation to State (7-part test) and Commonwealth (Significance Assessment) legislation.

It is noted that some threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, assessments of significance for these species are likely to be unnecessary as only marginal foraging habitat is present (no breeding habitat), and any impacts would likely be considered negligible. Furthermore, a development would be unlikely to isolate or fragment habitat for these highly mobile species or modify the potential habitat to the extent that it would place a viable local population at risk of extinction.

1 Introduction

1.1 Background

Eco Logical Australia Pty Ltd (ELA) undertook an assessment of the North Terrace study area to identify ecological and bushfire constraints for the subdivision of North Terrace for residential development.

ELA understands that Knight Frank on behalf of North Terrace Developments Pty Ltd are seeking support for the proposed rezoning of a portion of the lot comprising North Terrace which is owned by North Terrace Developments Pty Ltd to E4 (Environmental Living), from its current status as E2 (Environmental Conservation). The zoning of E4 would allow for the limited development of residential dwellings on a portion of the lot in accordance with the guidelines for E4 zoning under the Queanbeyan Local Environment Plan. Development is proposed on the lot up to a height of 670 m above sea level, with the remainder of the lot above this height to be retained as E2, and enhanced as part of the broader wildlife corridor that is represented by Mount Jerrabomberra and associated areas of connected vegetation.

1.2 Study area

The study area is located to the south of Southbar Road, Queanbeyan on an undeveloped lot which forms part of the foothills of Mount Jerrabomberra. The study area is located to the west of an existing urban area (zoned E4 – Environmental living). The study area is currently zoned E2 (Environmental Conservation) under the Queanbeyan Local Environment Plan.

The majority of the adjoining land is protected as Mount Jerrabomberra Reserve. Mount Jerrabomberra is a locally significant landscape feature which rises to 779 m above sea level and is characterised by three distinct peaks. A map of the study area and its local context is provided in **Figure 1**.

1.3 Terminology

The following terminology has been used for this report and is consistent with the NSW *Threatened Species Assessment Guidelines* (DPI 2008):

- *Subject site* - means the area directly affected by the proposal.
- *Study area* - means the subject site and any additional areas, which are likely to be affected by the proposal, either directly or indirectly.
- *Locality* - the same meaning as ascribed to local population of a species or local occurrence of an ecological community.



Figure 1: Location of study area and subject site

2 Legislative context

2.1 Overview

Various legislative instruments, policies and guidelines apply to the assessment, planning and management of biodiversity values within the study area. The following table provides an overview of the relevance of the legislation and policy to this report and identifies the stages when the legislation applies (**Table 1**).

Table 1: Relevant legislation and policy

Name	Relevance to the project
Commonwealth	
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) Matters of National Environmental Significance have been identified on or near the site in this report. Whilst a rezoning is not defined as an 'action' under the EPBC Act, and therefore a referral to the Commonwealth Department of Environment does not need to occur for the proposed rezoning, subsequent development will need to consider whether a referral is required due to a potential significant impact on Matters of National Environmental Significance.
State	
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	The EP&A Act 1979 provides the statutory basis for a rezoning assessment, and requires assessment of impacts to threatened species and endangered ecological communities. This report identifies native vegetation communities and threatened species listed under the TSC Act so as to inform the rezoning process for the area as to potential ecological constraints. Information is also provided on the potential ecological impact of the proposed rezoning.
<i>Threatened Species Conservation Act 1995</i> (TSC Act)	The land on which the rezoning is proposed is not biodiversity certified under s126 of the TSC Act and therefore consideration of impacts to threatened species and endangered ecological communities listed under the TSC Act are required.
<i>Native Vegetation Act 2003</i> (NV Act)	The Native Vegetation Act does not apply to a rezoning, and thus no further assessment is required.
<i>Fisheries Management Act 1994</i> (FM Act)	The development does not involve harm to mangroves or other protected marine vegetation, dredging, reclamation or blocking of fish passage, and therefore a permit under the FM Act is not required.
<i>Water Management Act 2000</i> (WM Act)	The project does not involve works on waterfront land. A Controlled Activity Approval under s91 of the WM Act is not required.
Planning	
Queanbeyan LEP 2012	The rezoning and any potential development requires considerations under Part 2.1, specifically E4 Environmental Living (proposed area to develop) and E2 Environmental Conservation (proposed area to conserve); and consideration under Part 7.3.
<i>Rural Fires Act 1997</i> (RF Act)	The proposed development is located on Bushfire Prone Land and involves a proposed rezoning to allow residential development. As required under s100B of the RF Act, a bushfire safety authority is required.

3 Methods

3.1 Literature review and data audit

A desktop literature review was undertaken by Eco Logical Australia to determine the location and extent of previous known field surveys, to identify the known constraints within the study area and evaluate the presence and likelihood of occurrence of threatened species, populations and ecological communities listed under both the TSC Act and EPBC Act within the precinct. The following documentation and data was reviewed:

- NSW Bionet records
- EPBC Protected Matters Search
- Atlas of Living Australia
- Search of OEH online database for existing vegetation mapping
- KMA, 2004, Preliminary Flora and Fauna Assessment, North Terrace, South Bar Road, City of Queanbeyan
- Planning for People, 2004, Mount Jerrabomberra Plan of Management
- ELA, 2011, Curtis Estate Flora and Fauna Assessment.

Aerial photography (SIXmaps) of the study area and surrounds was also used to investigate the extent of vegetation cover and landscape features. In addition, relevant GIS datasets (soil, geology, drainage) were reviewed to guide field survey work.

Species searches from both the NSW Atlas and EPBC Act MNES were combined to produce a list of threatened species that may occur within the study area (“subject species”) (**Appendix A**). Likelihood of occurrences for threatened species, endangered populations and communities in the study area were then made based on location of database records, the likely presence or absence of suitable habitat on the subject site, and knowledge of the species’ ecology. A list of potentially “affected species” was then identified as those that were defined as “yes”, “likely” or having “potential” to occur in the study area.

Five terms for the likelihood of occurrence of species are used in this report, defined as follows:

- “yes” = the species was or has been observed in the study area
- “likely” = a medium to high probability that a species uses the study area
- “potential” = suitable habitat for a species occurs in the study area, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the study area, and
- “no” = habitat in the study area and in its vicinity is unsuitable for the species.

Note, that assessments for the likelihood of occurrence were made both prior to field survey and following field survey. The pre-survey assessments were performed to determine which species were “affected species”, and hence determine which sorts of habitat to look for during field survey. The post-survey assessments to determine “final affected species” were made after observing the available habitat in the study area and are depicted in **Appendix A**.

3.2 Field survey

The site inspection for the ecological constraints assessment was conducted on 4 March 2016 by ecologists Matthew Dowle and Andrew Palmer-Brodie.

The site inspection was conducted to:

- Determine area and extent and condition of any vegetation communities especially the presence of any threatened ecological communities.
- Assess the suitability of habitat (especially for threatened species).
- Observe and record significant flora and fauna, particularly threatened and migratory species and other incidental fauna observations.
- Observe and record current disturbance and threats e.g. weeds.
- Identify potential impacts of the proposed rezoning upon flora and fauna habitat
- Identify any mitigation, avoidance or improvement opportunities to inform any subsequent Conservation Management Plan.

The random meander method (Cropper 1993) was used to confirm the boundaries of vegetation communities and species assemblages within the study area. Where the boundaries of vegetation communities differed from existing vegetation mapping, these were modified on hard copy maps and marked with a hand-held GPS.

Vegetation communities and their condition were assessed using standardized Biobanking methodology (4 plots: **Figure 3**). This methodology was recommended by the Office of Environment & Heritage (correspondence dated 16/11/15 to Department of Planning & Environment). Plots consisted of a full floristic survey within a 20 x 20 m plot, and habitat assessment within a 50 x 20 m plot. Data from the plot surveys can be used for credit calculations.

Two infra-red cameras were deployed throughout the study area to target Rosenberg's Goanna's. Cameras were left for 12 nights before collection and data analysis (**Figure 3**).

The presence of threatened flora and fauna identified as having the potential to occur in the study area was determined primarily through a habitat assessment. Where threatened species or important habitat features were observed, such as hollow-bearing trees, their locations were marked using a hand-held GPS and where required an estimated population count conducted. However, the locations of all important habitat features (e.g. rock outcrops, significant logs and location of all winter flowering eucalypts) observed were not recorded, but rather a qualitative assessment was conducted for each feature. Opportunistic sightings of fauna present within the study area were recorded.

3.2.1 Survey limitations

The site inspection was conducted outside of the optimal survey period for some flora and fauna. Thus, it is possible that flora and fauna species that may occur in the study area were not recorded due to the life cycle and behaviour of species and seasonal considerations. Targeted surveys may need to be undertaken across different seasons to adequately capture the diversity of flora and fauna that could be present in the study area. Since this was not possible, habitat assessments were undertaken to predict the likely presence of species. Considering the preliminary stage of the planning process, habitat available on site, the condition of the vegetation and the proposed impacts, the survey effort was deemed satisfactory for the purposes of this report.

In recognition of the survey limitations a conservative approach was taken in identifying species that could potentially occur in the study area (that is, species were assessed to have the potential to be present even if the potential for this was low).

3.3 Constraints analysis

An ecological constraints analysis was conducted to define areas of higher conservation significance and guide development planning. Three categories were used to represent the relative ecological constraints across the site. These areas were categorised based on mapped vegetation communities and their legislative status, records of threatened flora, records of threatened fauna species, likelihood analysis of potential threatened fauna species and data recorded during field survey.



4 Results - existing environment

4.1 Landscape context and land use

The study area is located adjacent to the suburb of Karabar, approximately 2 km south of Queanbeyan. The study area is located immediately to the west of an established urban area (zoned E4 – Environmental living). Disturbance, possibly in part related to the adjacent urban land use and recreational activities such as walking, motor and mountain bike riding and the walking of domestic animals, has impacted on the ecological values of the study area.

The study area occurs across two soil landscapes with lower elevations being in the Queanbeyan unit grading into the Campbell unit (soil variant *cab*) in the higher elevations. Limitations related to these soil landscapes include shallow depth, infertility, acidity and potential for erosion. The underlying geology of these soil landscape units includes Ordovician metasediments in lower parts of the landscape with Silurian volcanics and sediments of the Canberra Block in higher elevations.

4.2 Database and literature review

The vegetation within the study area and on adjacent land is characterised by dry sclerophyll forest communities dominated by *Eucalyptus macrorhyncha* (Red Stringybark) and *E. polyanthemos* (Red Box) with a shrubby mid story of *Kunzea ericoides* (KMA 2004). This vegetation does not form part of a threatened ecological community. Furthermore, according to KMA (2004), the site has been historically disturbed and is traversed by a number of tracks and trails.

The literature review determined that two threatened ecological communities occur within the locality:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland)
- Natural temperate Grassland of the Southern Tablelands of NSW and the ACT.

However, based on previous studies undertaken for the site (KMA 2004) and a review of aerial imagery, the site was considered not to support Natural Temperate Grassland, and was highly unlikely to support Box-Gum Woodland, as it lacks the characteristic species of that community.

The initial likelihood of occurrence assessment (prior site inspection) identified 19 fauna species and five flora species which have potential (or higher) to occur within the study area. The majority of the fauna species which have the potential to occur are highly mobile bird species, which are likely to utilise a range of resources across the landscape and would unlikely be restricted to the study area. However, it is noted that the study area may provide foraging or breeding habitat for some of these species.

The data audit also identified that the adjacent Mount Jerrabomberra Reserve is known to provide suitable habitat and contain known records for threatened species listed under the TSC and EPBC Acts:

- *Rutidosia leptorrhynchoidea* (Button Wrinkle-Wort) – TSC and EPBC listed
- *Varanus rosenbergi* (Rosenberg's Monitor) – TSC Act listed.
- *Daphoenositta chrysoptera* (Varied Sittella) – TSC Act listed
- *Petroica boodang* (Scarlet Robin) – TSC Act listed
- *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) – EPBC Act listed.
- *Rhipidura rufifrons* (Rufous Fantail) – EPBC Act Migratory species.

The KMA (2004) ecological assessment for the site identified *Leucochrysum albicans* within the study area. *Leucochrysum albicans* var. *tricolor* is listed as endangered under the EPBC Act. This species was listed under the EPBC Act in 2000, however, KMA (2004) did not identify that the species was of conservation significance. While the 2004 study did not identify this record as of conservation significance, it is considered likely that the species recorded by KMA (2004) is the listed matter (*Leucochrysum albicans* var. *tricolor*) given the geographic location of the record and the presence of known populations of the species within other areas of similar vegetation in the locality (ELA 2011).

A map showing threatened flora and fauna records within the locality is provided in **Figure 2**.



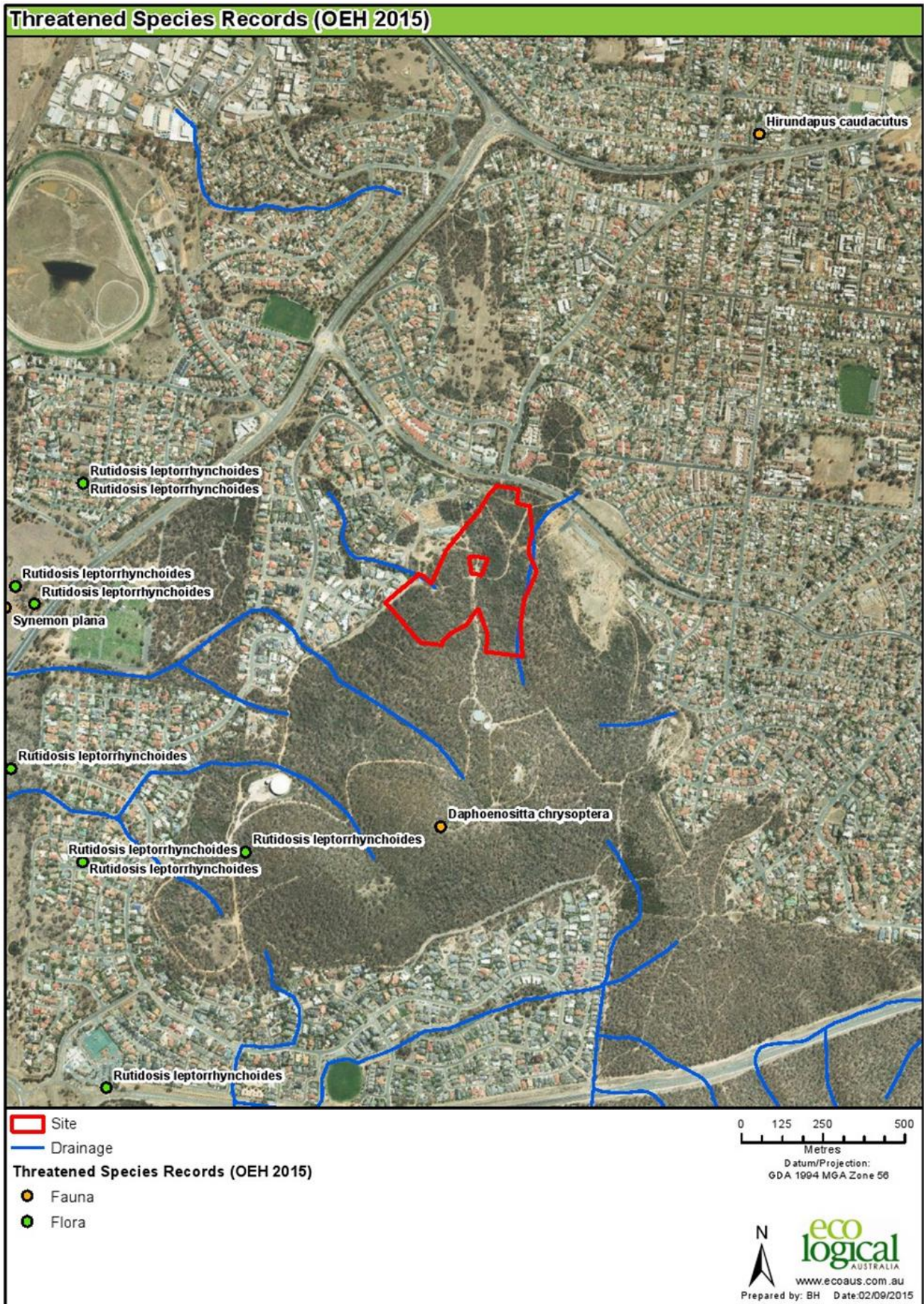


Figure 2: Threatened species records in the locality

4.3 Field survey

4.3.1 Vegetation communities

The vegetation within the study area and on adjacent land is characterised by dry sclerophyll forest communities dominated by *Eucalyptus macrorhyncha* (Red Stringybark) and *E. polyanthemus* (Red Box) with a shrubby mid story of regrowth *Kunzea ericoides* and *Acacia* species. The understorey is often sparse and dominated by tussock grasses such as *Rytidosperma pallida* (Silver-top Wallaby Grass). Dry Forests typically occur on shallower soils and steeper slopes than those that support grassy woodlands. This vegetation does not form part of a threatened ecological community.

The vegetation present is likely to equate to the Western Tablelands Dry Forest of Tozer et al. (2006) and the revised Biometric Vegetation Type, the Red Stringybark - Red Box - Long-leaved Box - Scribbly Gum shrub - tussock grass open forest of the southern section of the NSW South Western Slopes Bioregion, or the Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest on skeletal hills of the tablelands, South Eastern Highlands. The vegetation comprises part of the Southern Tableland Dry Sclerophyll Forests vegetation community and Dry Sclerophyll Forests (Shrubby subformation) vegetation formation of Keith (2006).

The majority of the site represents areas of previous disturbance, either by clearing or fire, and is traversed by a number of tracks and trails. The shrubby understorey varies in density and species composition as a result. The patchy understorey includes a diverse range of sclerophyll shrub species, the most common of which are *Kunzea ericoides*, *Acacia genistifolia* (Early Wattle), *Brachyloma daphnoides* (Daphne Heath), Urn-heath *Melichrus urceolatus*, *Monotoca scoparia*, *Leucopogon fletcheri*, and *Bursaria spinosa* subsp. *lasiophylla* (Blackthorn), and *Lomandra* spp. (Mat-rush).

The groundcover in areas with limited *Kunzea ericoides* was dominated by native grasses and forbs, the most common of which are *Rytidosperma pallida*, *Aristida* spp. (Wiregrass), *Austrodanthonia* spp. (Wallaby Grass), *Themeda australis* (Kangaroo Grass), *Austrostipa* spp. (Speargrass), *Dichelachne* sp. (Plume Grass), *Gonocarpus tetragynus* (Common Raspwort), *Dianella revoluta* (Blue Flax-Lily), *Lomandra filiformis* (Wattle Mat-rush), *Lepidosperma laterale* (Variable Swordsedge), *Wahlenbergia* sp. (Australian Bluebell), and *Goodenia hederacea* (Ivy Goodenia).

The site also lacks old growth trees likely to contain hollows. No hollow-bearing trees were observed during the site visit. The ground layer varies in composition and reflects the mid storey composition. For example, areas containing dense thickets of *Kunzea ericoides* (Burgan) lacked ground layer diversity, whereas, areas with a relatively sparse mid storey presented typical dry sclerophyll forest ground layers (mosaic of leaf litter, rocks and native grasses and forbs).



Plate 1: Red Stringybark – Red Box vegetation community with dense mid-storey in the study area



Plate 2: Red Stringybark – Red Box vegetation community with sparse mid-storey in the study area

4.3.2 Flora and threatened flora

Fifty-six native and 16 exotic species were recorded during the site visit (**Appendix B**). One threatened flora species, *Leucochrysum albicans* var. *tricolor* (Hoary Sunray), listed as endangered under the EPBC Act, was recorded along the northern boundary of the study area at three locations (**Plate 3**). Although no population count was conducted, an estimated 150-200 individuals were observed. The majority were young plants, with mature individuals making up approximately 25% of the population. All individuals were observed along the track edge or within five metres of the track (**Figure 3**).

The diversity and abundance of exotic species was considered low, and individuals were generally confined to the track edges. Of the exotic species present, two are listed as Class 4 noxious weeds within the Queanbeyan LGA.



Plate 3: Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) – non-mature individual

4.3.3 Threatened fauna and potential habitat

No threatened fauna were recorded during the site inspection. However, suitable foraging habitat for a number of threatened fauna species exists within the study area.

The site has the potential to provide habitat for Rosenberg's Goanna (*Varanus rosenbergi*), and foraging habitat for Microchiropteran bats and woodland birds. The proposed development footprint contains a small number of termite mounds (seven) which could be utilised by the Goanna. However, the proximity of the site to existing urban areas, the low frequency of termite mounds and the presence of dogs (recorded both in the field and on remote camera) makes the site less suitable for the species.

Although no threatened fauna were recorded during the site inspection, threatened woodland birds and Microchiropteran bats were recorded in the adjacent Mouth Jerrabomberra Reserve during previous surveys (ELA 2011), including Gang-gang Cockatoo (*Callocephalon fimbriatum*), Scarlet Robin (*Petroica boodang*), Varied Sittella (*Daphoenositta chrysoptera*), Rufous Fantail (*Rhipidura rufifrons*), Eastern Bentwing Bat (*Miniopterus (schreibersii) orianae oceansis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*) and Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*).



Figure 3: Ecological values within the study area

5 Bushfire

Any development application for subdivision on the subject land is required to be assessed under 100B of the Rural Fires Act 1997 and requires compliance with the NSW Rural Fire Service document Planning for Bush Fire Protection 2006 (PBP). PBP outlines bushfire protection measures that new development on bushfire prone land must address including asset protection zones, access requirements, water supply, and construction.

Bushfire is an important consideration for development of the subject land and compliance with PBP is required for a development application to be supported by Queanbeyan City Council and the NSW Rural Fire Service. This constraints advice is provided in accordance with PBP.

It should be noted that no provision has been made for the impact associated with the implementation of the 10/50 rule in association with the proposed development. This is considered appropriate as the amendments and updates to the Code of Practice, subsequent to the Johnson v Hornsby Shire Council case (2014 NSWLEC 1215), mean that the 10/50 rule cannot override Development Consent conditions. Specifically:

Clearing under this 10/50 code cannot be inconsistent with:

- Any condition of development consent or approval under the Environment Planning and Assessment Act 1979 that identifies and requires the retention and management of vegetation for conservation purposes.
- Any Biobanking Agreement entered into under Part 7A of the Threatened Species Conservation Act 1995.
- Any instrument under Section 88B of the Conveyancing Act 1919 that identifies and requires retention and management of vegetation for conservation purposes.

5.1 Bushfire hazard assessment

5.1.1 Vegetation

The predominant vegetation class has been determined within the subject land and for a distance of at least 140 m on adjoining land using desktop analysis, a review of background information and field survey.

Vegetation within the site predominantly represents disturbed dry sclerophyll forest, and an assumption has been made that this will be removed as a result of development. The bushfire hazard, therefore, occurs on land adjoining the proposed development area.

As outlined in Section 4 vegetation on adjacent land is characterised by dry sclerophyll forest communities dominated by *Eucalyptus macrorhyncha* and *E. polyanthemos* with a shrubby mid story of *Kunzea ericoides*. The mid-storey density varies across the site, as a result of previous disturbances. Based on the site inspection and a review of broader aerial photography, the vegetation is considered to be 'forest' in accordance with PBP.

5.1.2 Slope

The slope that would most significantly influence fire behaviour was determined over a distance of 100 m within the vegetated areas. This assessment was made by analysing 2 m contour intervals. Slopes vary within the vegetated areas with the steepest slopes within proximity of water courses and Mount Jerrabomberra. Slopes within the subject land range from 0-10°.

5.1.3 Asset protection zones (APZ)

Table A2.4 of PBP has been used to determine the width of required Asset Protection Zone (APZ) for the subject land. The APZ requirements of PBP vary across the site and are shown in **Table 2** and **Figure 4**.

These APZs are based on an assessment of the vegetation and slope. APZs are shown predominantly outside the proposed development / subject site (**Figure 4**). Where these APZs fall outside the proposed development site but within the subject land, they shall be maintained in accordance with a plan of management as part of the CMP. The location of the APZs also takes into consideration the drainage lines of the site, and avoids incursion into the riparian buffers (10 m for a first order stream) for those streams on the eastern side of the area.

The APZs have also been sited to avoid high ecological value land which coincides with the location of the threatened flora species identified on the northern boundary, (*Leucochrysum albicans* var. *tricolor* [Hoary Sunray] listed as endangered under the EPBC Act). This effectively moves the APZ in this location further into the developable area to avoid potentially inconsistencies between conservation land management objectives and fire hazard reduction land management activities.

5.1.4 Construction standards

The building construction standard is based on the determination of the Bushfire Attack Level (BAL) in accordance with Method 1 of Australian Standard AS 3959-2009 'Construction of buildings in bushfire-prone areas' (Standards Australia 2009). The BAL is based on the identified vegetation type, effective slope, and APZ managed separation distance between the development and the bushfire hazard.

Using AS3959, separation distances (APZ) have also been identified in BAL-29 construction.

Table 2: Threat assessment and asset protection zones

Direction	Slope ¹	Vegetation ²	PBP required APZ ³	APZ for BAL-29 ⁴
North east	>0-5° downslope	Forest	25 m	32 m
East	>5-10° downslope	Forest	35 m	39 m
South	Upslope	Forest	20 m	25 m
All other directions	Managed land			

¹ Slope most significantly influencing the fire behaviour of the site having regard to vegetation found. Slope classes are according to PBP.

² Predominant vegetation is identified, according to PBP and "Where a mix of vegetation types exist the type providing the greater hazard is said to be predominate".

³ Assessment according to PBP.

⁴ Assessment according to AS3959.

5.1.5 Access and utility requirements

PBP requires an access design that enables safe evacuation away from an area whilst facilitating adequate emergency and operational response to the area requiring protection. The following sections present the bushfire planning requirements for access in bushfire prone land.

Perimeter roads

All bushland interface areas containing an APZ for a significant bushfire hazard should feature perimeter public road widths and design to allow safe access for fire fighters while residents are evacuating an area. The design details (PBP acceptable solutions) of public perimeter roads are listed within Section 4.1.3 of PBP, and include a requirement for at least one alternative access road where a dwelling or group of dwellings are located more than 200 meters from a public through road. Preliminary design advice indicates that it is unlikely that any dwelling will be located greater than 200 meters from Southbar Road. The design

requirements as specified in the PBP will be incorporated into considerations for the layout of the proposed development.

5.1.6 Water supply and other utilities

Water supply and hydrants

If future lots are to be serviced by reticulated water infrastructure suitable for firefighting purposes the furthest point from any future dwellings to a hydrant is to be less than 90 m (with a tanker parked in-line) in accordance with AS 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning (Standards Australia 2005). The reticulated water supply is to comply with the following acceptable solutions within Section 4.1.3 of PBP:

- Reticulated water supply to use a ring main system for areas with perimeter roads
- Fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005
- Hydrants are not located within any road carriageway
- All above ground water and gas service pipes external to the building are metal, including and up to any taps
- The PBP provisions of parking on public roads are met.

Electrical and gas supplies

In accordance with PBP, electricity should be underground wherever practicable. Where overhead electrical transmission lines are installed:

- Lines are to be installed with short pole spacing, unless crossing gullies
- No part of a tree should be closer to a powerline than the distance specified in Vegetation Safety Clearances issued by Energy Australia (NS179, April 2002).

Any gas services are to be installed and maintained in accordance with AS/NZS 1596-2008 The storage and handling of LP gas (Standards Australia 2008).

The design requirements as specified in the PBP will be incorporated into the design of infrastructure to support the proposed development.

5.2 Limitations

The assessment was intended as a landscape approach for this rezoning stage. As such, all assumptions and exclusions based on this assessment should be confirmed prior to the finalisation of a lot layout and development application.

It is important to note that the APZ calculations quoted in this assessment are indicative only and have been determined at a landscape scale. This level of detail is suitable for a rezoning assessment where the aim is to demonstrate whether a parcel of land can accommodate the bushfire hazard, the expected APZ and future development. The final APZ dimensions for any future subdivision or development depends on the accuracy of a slope assessment undertaken at a site-specific level. The APZ dimensions quoted in this assessment should not be relied on to approve a future subdivision; they may be used as a guide only.

It has also been assumed that no Special Fire Protection Purpose developments are proposed (e.g. schools, child care centre, tourist accommodation, and retirement village). If any of these development types are proposed, then an increased APZ will be required.

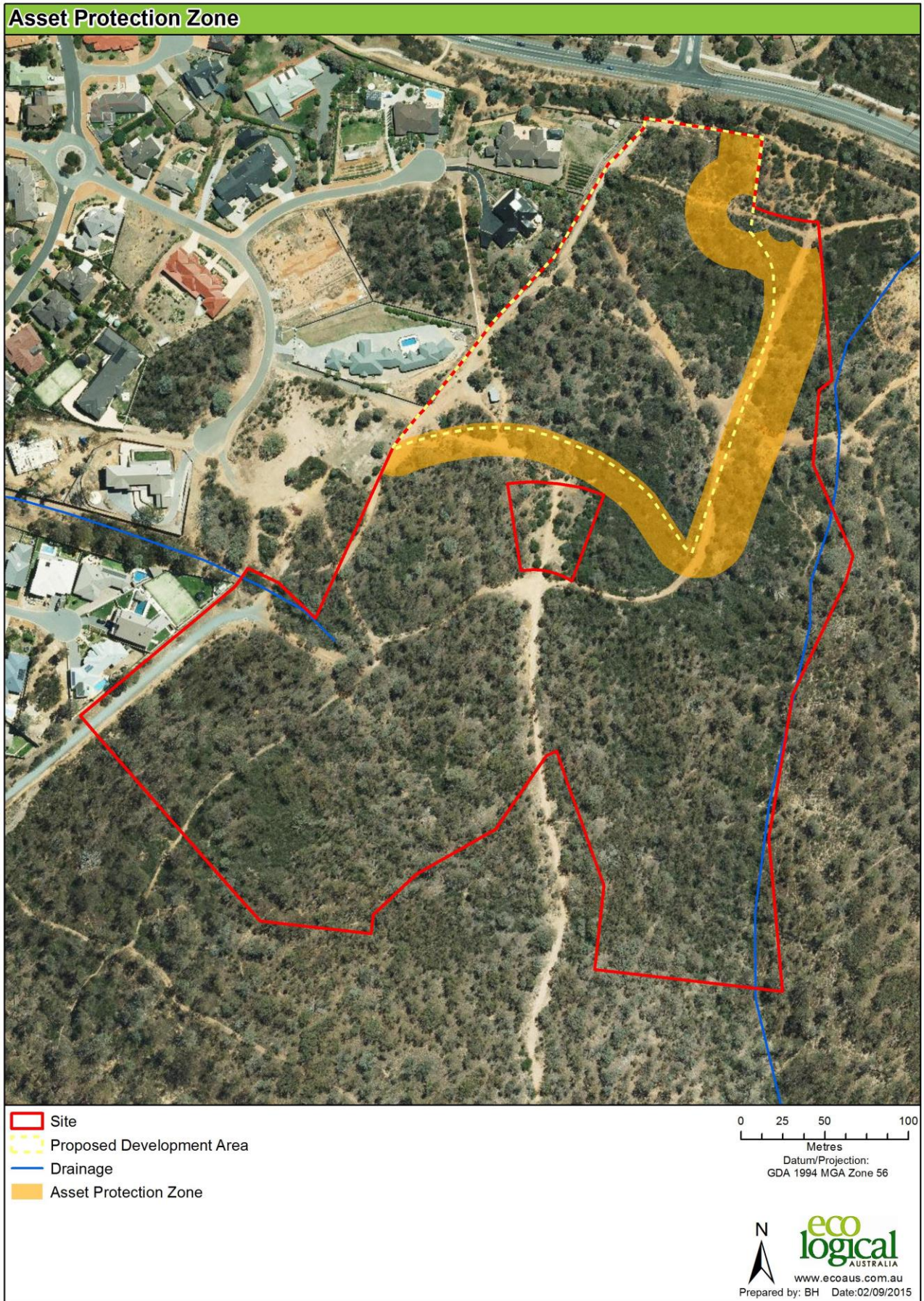


Figure 4: Bushfire asset protection zone (APZ)

6 Aboriginal cultural heritage

6.1 Introduction

This section comprises a search of the Aboriginal Heritage Information Management System (AHIMS), a database of registered Aboriginal objects and places in NSW maintained by the OEH, a predictive model for the region and recommended further assessment. No consultation with Aboriginal stakeholders has been undertaken at this preliminary stage of the planning process.

Aboriginal objects and places are afforded protection under the *National Parks and Wildlife Act 1974* (NSW) regardless if they are listed on the AHIMS database or not. Strict penalties apply for harm to an Aboriginal object or place without a defence under the Act.

6.2 AHIMS search

An AHIMS search was conducted by David Workman (Knight Frank Planning) on 12 November 2015 for the area defined as Lot 180, DP 8708 including a buffer area of 1000 metres. This search revealed no Aboriginal sites recorded in or near the location or any Aboriginal places having been declared in or near the above location. It is expected that another AHIMS search would be undertaken as part of a full Due Diligence assessment should the development proceed to full design stage and the location and extent of works be known.

Aboriginal archaeological context – regional and study area overview Aboriginal occupation and known indigenous cultural heritages sites within the surrounding landscapes of the Molongo and Queanbeyan Rivers and valleys is well established and is well reported in the cultural heritage consulting reports generated from large urban developments with the ACT and surrounding districts (Biosis 2010; Cultural Heritage Management Australia 2015; Grinbergs 2008; Kuskie 1989; Lewis 1984; Navin Officer 2007; 2013; Patton 1984, 1986; Saunders 2009; Smith 1975).

Aboriginal occupation as recording at European contact noted that the Canberra area was occupied by three tribes, the *Wolgal* (sometimes referred to as *Walgalu*), the *Ngunnawal* and the *Ngarigo* (Howitt 1904; Tindale 1974). These tribes have often been grouped similarly within a socio-economic context specific to the southern tablelands and uplands, where occupation was postulated to be based upon large scale, well organised movement of groups in the summer months to the highlands for the exploitation of Bogong moths (*Agrotis infusa*) (Flood 1973;1980). These large scale seasonal resource exploitation events by the tribes of the region also permitted intertribal gatherings and included social, ceremonial and exchange activities. Flood hypothesised that this pattern of resource exploitation and large scale movement of peoples could be supported by the archaeological record (Flood 1980:168-169). This archaeological signature would consist of;

- Small seasonal summer camps above the snowline (1525 m) characterised by small artefact scatters (two to twenty artefacts), unmodified river pebbles and ground edge hatchet heads, used for moth grinding and processing;
- Small to medium sized seasonal summer camps situated below snowline (1500 m – 1200 m) characterised by used for moth collecting
- Larger campsites below 1200 m in montane valleys, at the foot of mountain peaks occupied throughout the year. These sites should be located within 1 km of water, 2-3 km² in size with more than 1500 artefacts. An example of such a site would be Pialligo (An archaeological site adjacent to the Molonglo River which contained > 4000 artefacts cf. Saunders 1989). Flood also

acknowledged the existence of medium sized lowland camps associated with major water courses such as the Molonglo and Murrumbidgee Rivers.

The occupation model presented by Flood has been hotly debated in the archaeological literature. Recent studies have questioned the reliance upon and the dominance of the resource exploitation of Bogong moths, and the occupation model resultant from the Bogong moth hypothesis (Bowdler 1981). Studies such as Grinsbergs (1992) research in the Lower Snowy River region concluded that the spatial diversity and artefact assemblages of recorded sites indicated diverse economic resource strategies of the inhabitants. This conclusion was further supported by a detailed analysis and review of archaeological sites within the Brindabella Valley and Southern Highlands more generally (Argue 1995). Argue also concluded that the year round high resource availability of the low altitude valleys within the Southern Highlands would provide a conducive environment for occupation by family groups and that the archaeological sites demonstrated a full range of occupation activities (Argue 1995:35).

Regionally focussed studies in closer proximity to the study area support the counter hypothesis of a year round resource rich highly utilised and occupied lowlands landscape, especially areas that contain major water sources – such as the Molonglo River and surrounding valleys. Recent heritage reviews have been conducted for the Molonglo and Majura Valleys (AASC 2006; Navin Officer 2007), both of which are dissected by the Molonglo River. These reviews summarised all the archaeological work that had been undertaken in the areas to date. Both reviews reported that previous archaeological surveys had consistently recorded artefact scatters at lower elevations, on level well drained ground, adjacent to major creek lines. Steep terrain located away from water courses yielded the lowest artefact densities (Biosis 2010:12; Navin Officer 2007:9). Subsequently land formations assumed to be the most archaeologically sensitive are riparian zones and mid to lower valley floor contexts (Navin Officer 2007:9). Additionally, in the Canberra region high site and artefact frequencies have also been correlated with the geographic occurrence of specific resources particularly, stone procurement outcrop locations (Access Archaeology 1990; Heffernan and Klaver 1995; Kuskie 1992a, 1992b).

A large number of archaeological assessments including pedestrian survey and sub surface testing have been undertaken approximately 3 km to the north of the Mount Jerrabomberra Nature Reserve for the developments at Oaks Estate and the areas including the old Canberra Abattoir, commonly referred to as the Pialligo-Airport-Oaks Estate areas (Navin Officer 2013; (NOHC 1994). All of these studies have recorded the presence of Aboriginal sites, with the Canberra Abattoir test excavations in 2008 - 2009 unearthing 2785 stone artefacts (Biosis 2009). Navin Officer (2013) concluded in their assessments that the high number of sites located along the Molonglo river corridor, and at the confluence of the Molonglo and Queanbeyan rivers demonstrates that the area would have been a resource rich area prior to European settlement. It would have been a travel route and a camping location with a reliable source of water and food. The extensive artefact scatters at both Pialligo and the Jerrabomberra wetlands support this conclusion.

While the study area – The Mount Jerrabomberra Nature Reserve – is not a riparian corridor it is within close proximity to the Molonglo (located 3.5km to the north) and Queanbeyan Rivers (located 2km to the west) identifies the area as having archaeological potential. Additionally, the Mount Jerrabomberra Plan of Management (2004) recounts early historic sources confirming that Mount Jerrabomberra had spiritual significance of Mount Jerrabomberra to the Ngunnawal people (2004:15). Therefore, it is more than likely that Aboriginal people visited Mount Jerrabomberra regularly in the past and that archaeological signatures of these activities exist.

6.3 Previous assessment

When the Mount Jerrabomberra Plan of Management (2004) was produced in 2004 no systematic investigation of the Aboriginal archaeology of Mount Jerrabomberra had ever been undertaken. However, it

was noted in the Plan that indigenous heritage assessments undertaken as part of impact assessment studies for the development of the urban areas of Jerrabomberra had resulted in the recording of 21 Aboriginal heritage sites. All of these sites were either isolated finds or scatters of stone tools. The cultural heritage assessment undertaken as part of the Plan concluded that it is likely that Aboriginal cultural heritage sites are present within the Mount Jerrabomberra Nature Reserve.

Additionally, the Plan noted the potential for European heritage to also be present in the study area. The reserve area was once part of the Jerrabomberra property originally owned by John Palmer, and thus may contain relics and archaeological deposits associated with the past 170 years of European occupation of this region.

6.4 Further assessment required

A due diligence assessment consistent with the 'Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales' (DECCW 2010) should be undertaken for the study area in conjunction with subsequent stages of the planning process. The purpose would be to determine if Aboriginal objects or places are present within the study area that would require avoidance by the proposed development works. If avoidance of objects is not achievable, further assessment, management and approvals may be required, such as an Aboriginal Cultural Heritage Assessment to support an Aboriginal Heritage Impact Permit (AHIP) application under the *National Parks & Wildlife Act 1974* (NSW). The assessment should include a pedestrian survey with consultation and involvement with the Ngunnawal community.

In addition, a preliminary historic heritage assessment should be undertaken for the study area. This should include a search of heritage registers (State Heritage Register, State Heritage Inventory, Australian Heritage Database), a review of available archives and any background reports and a site inspection to determine if 'relics' are present or likely that may require further assessment, avoidance or approval under the *Heritage Act 1977* (NSW).

7 Ecological constraints assessment

7.1 Constraints analysis

With an ecological constraints assessment, vegetation mapping is usually combined with any site inspection data (such as on the potential for ecological recovery of sites), and threatened species information. Other data, such as riparian zones, or areas identified for ecological connectivity, may also be combined into an ecological constraints assessment to determine the relative level of ecological value or constraint at a site.

Three categories of conservation significance were used to represent the relative ecological constraints across the site; high ecological value, moderate ecological value and low ecological value. Although this process uses vegetation mapping as a basis for spatial analysis it is considered that the potential values of the area as fauna habitat is adequately considered through:

- Generation of a fauna species likelihood table (**Appendix A**)
- Assessment of potential habitat values related to potential species.

The ecological constraints of the site are shown in **Figure 5** and represent areas of priority conservation.

Ecological assessment and constraints mapping was based on:

- Mapped vegetation communities and their legislative status
- Records of threatened flora species
- Records of threatened fauna species
- Likelihood analysis of potential threatened fauna species
- Data recorded during field survey.

7.1.1 High ecological value

Areas of high ecological value are mapped within the study area due to the following characteristics:

- Records of threatened flora species, namely the endangered *Leucochrysum albicans* var. *tricolor* plus an indicative buffer forming a 10 metre radius.
- No threatened ecological community was recorded, and therefore did not contribute to this category.

7.1.2 Moderate ecological value

Areas of moderate ecological value are mapped within the study area due to the following characteristics:

- Remnant non-listed native vegetation of any condition, namely dry sclerophyll forest communities dominated by *Eucalyptus macrorhyncha* (Red Stringybark) and *E. polyanthemos* (Red Box). This vegetation community provides suitable habitat for a range of fauna species.
- Habitat elements which could be relevant to threatened species, e.g. termite mounds used by Rosenberg's Monitor.
- Vegetation or habitat likely to contribute to local or regional wildlife corridors.
- Areas mapped as high conservation value under local or state planning documents.

7.1.3 Low ecological value

Areas of low ecological value are mapped within the study area due to the following characteristics:

- All other areas, namely tracks and trails. These areas do not represent a native ecological value and only contribute very little to potential habitat.

7.2 Wildlife connectivity and Biolinks

7.2.1 Local planning documents

The vegetation within the study area is currently zoned E2 Environmental Conservation under the Queanbeyan LEP 2012, and as 'Biodiversity', representing a high conservation value on the Terrestrial Biodiversity Map under the same LEP. As such, it is subject to the provision under Clause 7.3 of the LEP. It is however noted that part of the residential area to the west of the study area is also mapped on this Biodiversity layer which reflects that the layer is broad-scale mapping which in places may not accurately reflect the on the ground conservation values..

The objective of Clause 7.3 is generally to maintain terrestrial biodiversity by protecting native fauna and flora, protecting ecological processes and encouraging the conservation and recovery of native biodiversity. Before determining a development application for development on these lands, the consent authority must consider potential adverse impacts associated to native biodiversity values within these lands and only grant consent where significant adverse environmental impact can be avoided, minimised or mitigated.

The vegetation associated with Mount Jerrabomberra Reserve has also been identified as a regional Biolink in the Mt Jerrabomberra Plan of Management (2004) and BES (2008) report. These reports have informed the Queanbeyan LEP and noted the following for this area (respectively):

- *"Mount Jerrabomberra forms part of a bushland corridor that allows for the movement of birds, insects and larger mammals between nearby and adjacent natural areas. The main linkages include the narrow section of bushland between North Terrace and Jerrabomberra and between South Queanbeyan and Jerrabomberra".*
- *The remnant vegetation along the Barracks Creek linking the Queanbeyan Escarpment, Queanbeyan River Corridor and contiguous vegetation to the south with remnant vegetation and associated habitats in the Mount Jerrabomberra and Jerrabomberra Creek corridor.*

The proposed area for development represents the northern extremity of the remnant vegetation described as associated habitat in the Mount Jerrabomberra and Jerrabomberra Creek corridor. This area is linked by contiguous vegetation to the Queanbeyan Escarpment, Queanbeyan River Corridor, Jerrabomberra Creek Corridor and Barracks Creek. Whilst the area proposed for development and E4 zoning does form part of the linked areas of remnant vegetation described in the Mt Jerrabomberra Plan of Management (2004) and BES (2008) report, it does not form part of the main linkages for the corridor, these being those between North Terrace and Jerrabomberra or South Queanbeyan and Jerrabomberra and along Barracks Creek, (refer **Figure 6**).

The potential for improved habitat value and ecological function afforded by the development and implementation of a properly resourced Conservation Management Plan, particularly for the areas proposed to remain zoned as E2, also needs to be considered in assessing potential impact to the ability of the area to contribute to a regional Biolink.

7.2.2 Regional planning documents

The re-zoning proposal needs to demonstrate consistency with the Sydney Canberra Corridor Regional Strategy, which states that *"Councils will ensure new urban development and rural residential development is directed away from land assessed as being high conservation value. As such, the proposal should at a minimum identify how the re-zoning provides for the maintenance of the high conservation values at the site, and how these will be maintained within a local and regional context.*

The Conservation Management Plan proposed in association with the development will include specific measures to maintain and where possible improve the conservation values of the area. Similar measures to maintain conservation values will be incorporated into the design and management of the area proposed for development.

7.3 Bushfire considerations

The APZs are required to be the distances specified in Table 2 (Section 5). The establishment of the APZs will require the clearing of all understorey vegetation within these setbacks and the thinning of canopy trees to avoid continuity of vegetation (horizontally and vertically) to reduce fire spread and radiant heat to below ignition thresholds. The management and maintenance of the APZs will be outlined in a Bushfire Plan or within the Conservation Management Plan (Section 7.2 below).

The current vegetation of the site is representative of a recently burnt, or disturbed form of a typical dry sclerophyll forest. Such that, the mid and ground layers are more densely vegetated / wooded than would be observed in a pristine version of the community. Thus, the clearing of the understorey for the APZs is likely to be more extensive for this proposal than in a typical undisturbed form of the community.

In addition, whilst the thinning of canopy trees will reduce the density of the overstorey within the site, the removal of trees will be selective to achieve the required canopy cover. Such that trees containing higher ecological values will be maintained (e.g. any trees with hollows, those in good condition, winter flowering species, etc.). The nature of this selective thinning and APZ establishment seeks to maintain the connectivity function of the vegetation, and will be compatible with the Conservation Management Plan.

7.4 Other considerations

Other considerations for the planning proposal includes Section 117 Direction 2.1 Environmental Protection Zones, given the site has been identified as supporting high conservation value vegetation, and is currently zoned E2 Environmental Conservation.

Directions have been issued by the Minister for Planning under section 117(2) of EP&A Act, and requires the planning authority to consider that:

- A planning proposal must include provisions that facilitate the protection and conservation of environmentally sensitive areas.
- A planning proposal that applies to land within an environmental protection zone in a LEP must not reduce the environmental protection standards that apply to the land.

It is noted that Section 117 Direction 2.1 allows planning proposals, such as re-zoning to be inconsistent with the Direction, following:

(6) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

(a). justified by a strategy which:

- i. gives consideration to the objectives of this direction,*
- ii. identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and*
- iii. is approved by the Director-General of the Department of Planning, or*

(b) justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or

(c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or

(d) is of minor significance.

The Conservation Management Plan for the area will include the specific provisions to protect and conserve environmentally sensitive areas within the site. These provisions will need to be viewed in conjunction with measures incorporated into the design and management of the area proposed for development and E4 zoning which are intended to specifically protect and conserve elements of the site which contribute to environment values.

7.5 Discussion on outcomes

The site primarily covers areas of moderate ecological constraint, with a small section representing a high ecological constraint (Hoary Sunray). Fauna with a potential, likely or recorded occurrence in the locality are highly mobile and may require specific habitat features to be present. It is likely these species are associated with the mapped vegetation communities within the study area. Therefore, potential constraints in relation to fauna have primarily been assigned based on the vegetation mapping.

The proposed rezoning and any resulting development have the potential to reduce the functionality of the contiguous vegetation in the area as part of a wildlife corridor. However, these impacts may be partially offset through the implementation of a comprehensive Conservation Management Plan, which can be properly resourced through the provision of funds from the community title /community association arrangements proposed as an option for the governance structure for the development. Detailed measures to address the potential impact of the development on the efficacy of the area as part of a wildlife corridor will be developed in consultation with Agency staff and other relevant experts as part of production of the Conservation Management Plan.

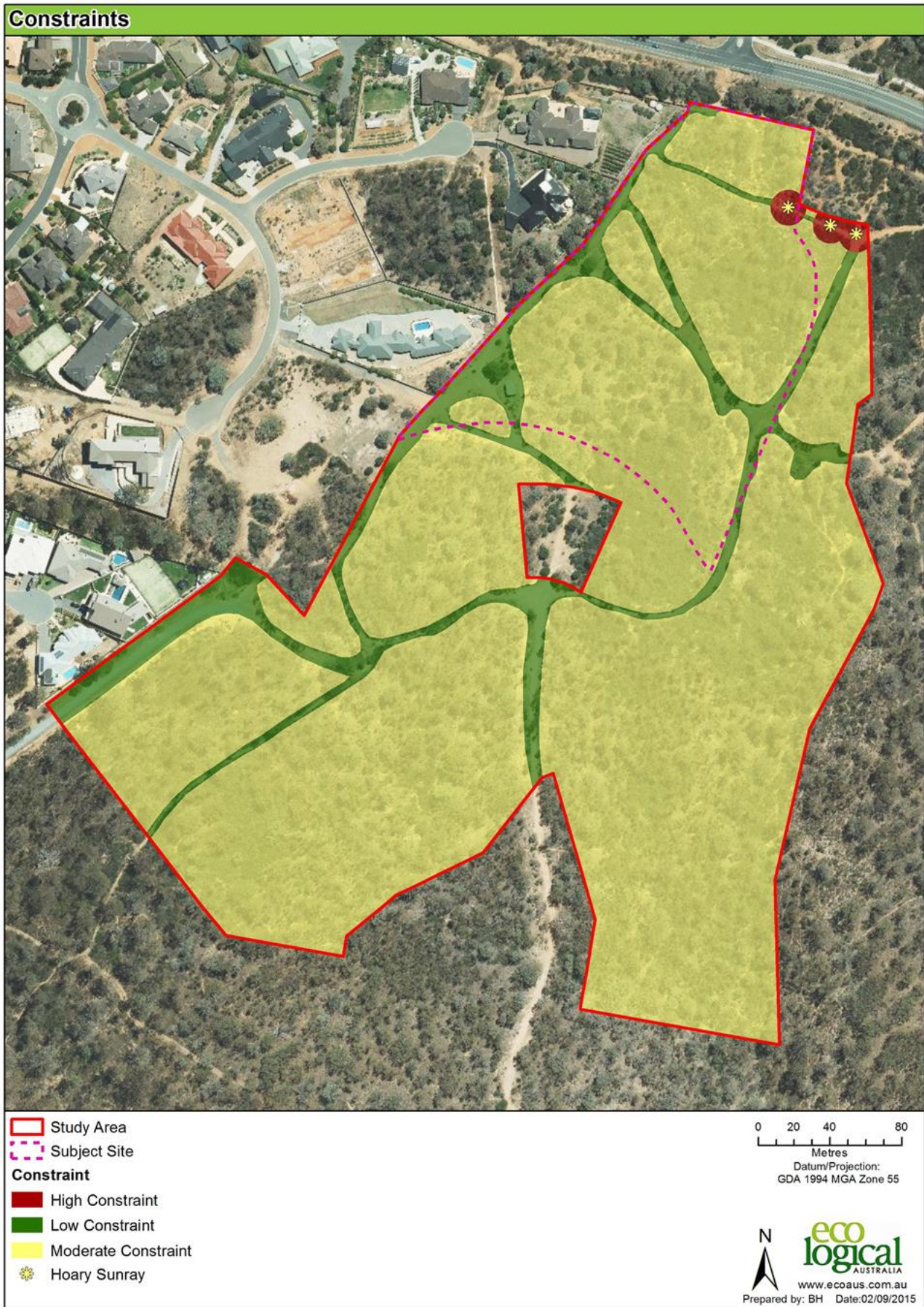


Figure 5: Ecological constraints within the study area

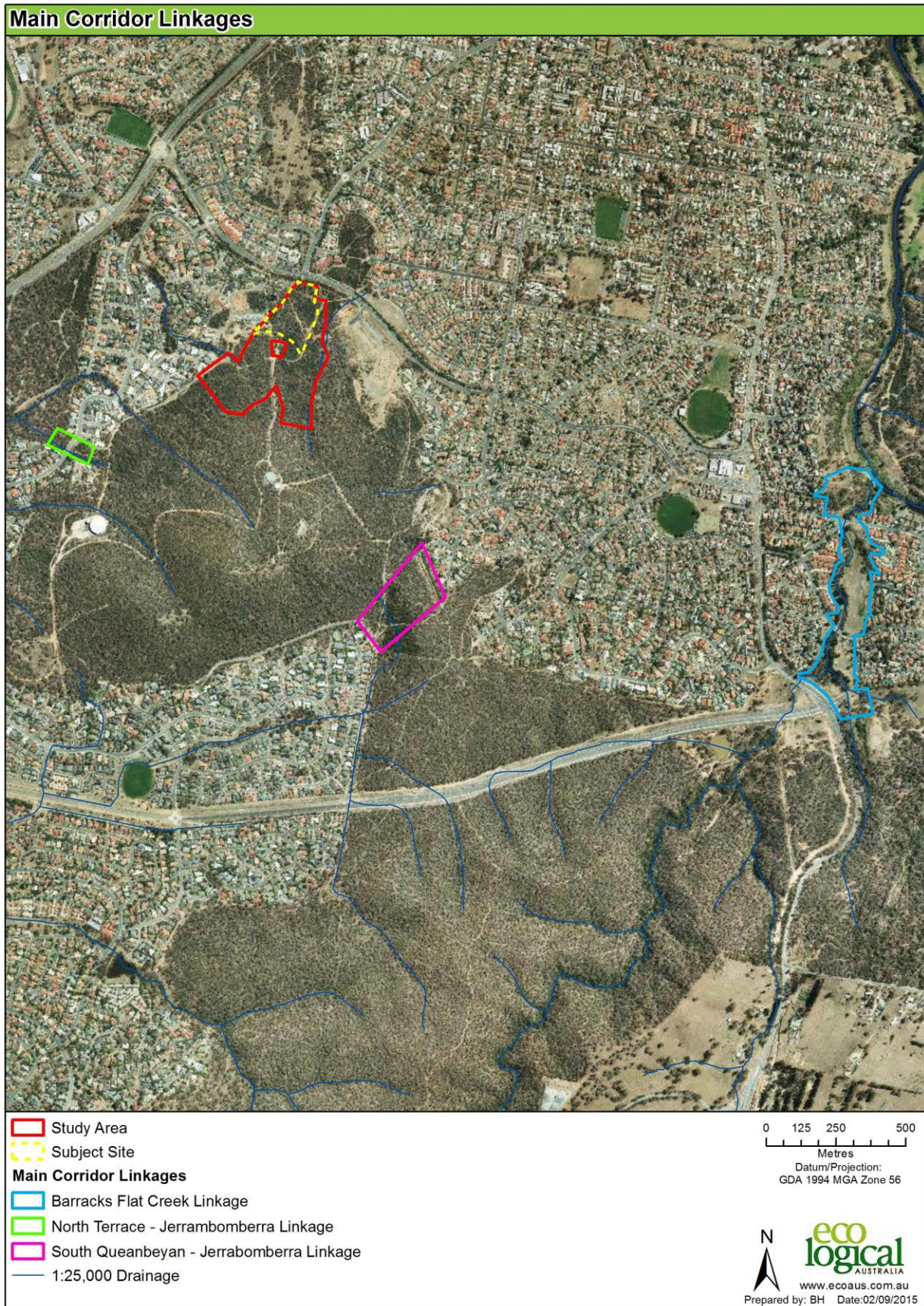


Figure 6: Main Regional Biolinks

8 Recommendations

8.1 Zoning outcomes and recommendations

It is noted the current E2 (Environment Conservation) zoning with mandatory zone objectives focussing on protecting land with high conservation value, applies to lands determined by this study to be of moderate ecological value including small areas of low ecological value.

The areas of the site represented by a moderate or low ecological constraint should be the focus for any development within the proposed E4 (Environmental Living) zone, with areas of high ecological constraint set aside for conservation and/or protection under E2 (Environmental Conservation) zoning.

It is understood that the functionality of the vegetation in relation to biodiversity values will be reduced in the area to be developed, however it is considered that an E4 zoning will facilitate the minimisation of these impacts.

A Conservation Management Plan should be developed in conjunction with any planning proposal, which stipulates specific measures for the enhancement and conservation of native biodiversity values within both the E4 and E2 lands. It is considered that the development and implementation of a Conservation Management Plan has the potential to deliver significant beneficial outcomes in the areas to be managed primarily for conservation and potentially a net environmental benefit.

Fundamental to the delivery of any potential environmental benefits is the ability to resource and implement the management activities identified in the Conservation Management Plan. In respect of the proposed development there are two obvious governance models which could facilitate the resourcing and implementation of the Conservation Management Plan:

- Community Title/Community Association:
 - Conservation reserve remains as freehold land under “community title”
 - Community Association of residents contribute to the funding requirements of the Conservation Management Plan.
 - Community Association manages the implementation of the Conservation Management Plan.
- Managed by Council:
 - Conservation reserve is dedicated to Council for management in accordance with the Conservation Management Plan and in conjunction with Council’s management of adjoining reserve areas.
 - Development funds the implementation of initial capital intensive works to improve the ecological value and manageability of the reserve area prior to dedication to Council.
 - Medium to long term management of the reserve remains consistent with the Conservation Management Plan and Council’s management goals for the broader Jerrabomberra reserve network.

It is considered that both options are preferable to a Torrens title arrangement which does not engender the development of collective priorities for the management of an area nor facilitate the collective funding of such arrangements.

It is noted that one threatened flora species (Hoary Sunray) listed as endangered under the EPBC Act, was recorded along the northern boundary of the study area and identified as a high constraint. It is possible that this species is more wide spread than observed during the site inspection, including outside the study area, and population numbers are likely to vary from season to season.

Whilst no threatened fauna were recorded during the site inspection, the site has the potential to provide habitat for some threatened fauna including, Rosenberg's Goanna, Microchiropteran bats and woodland birds. The Conservation Management Plan should include specific measures to mitigate potential impacts to threatened species which are likely or known to occur including the preservation of essential elements of habitat relevant to these species that occur onsite.

An assessment of impacts to threatened species, namely those identified above as having a likely or known occurrence in the study area, will need to be considered at the Development Application stage in relation to State (7-part test) and Commonwealth (Significance Assessment) legislation.

The site has been identified in local and regional planning documents and studies as containing high conservation values and being part of a regional Biolink. Although this study has concluded that much of the area is of moderate ecological value the Conservation Management Plan will still need to consider the values identified in previous reports and stipulate the specific measures required to maintain and enhance these including the conservation of native biodiversity values within both the E4 and E2 lands and the efficacy of the site as part of a regional Biolink.

8.2 Mitigation measures

Broad recommendations and mitigation measures for the study area have been provided below, with the intention they be incorporated into the Conservation Management Plan where appropriate, for implementation as part of any proposed development.

Recommendations include:

- Avoid impacts to the Hoary Sunray, and design the development footprint accordingly.
- Consider the retention of Hoary Sunray in the E2 zoning.
- Provide protection measures for the existing Hoary Sunray, such as perimeter fencing particularly during construction works.
- Consider opportunities to retain vegetation within the E4 (Environmental Living) zone.
- Development footprints should minimise impacts to native vegetation and be commiserate to the environs of Mount Jerrabomberra Reserve.
- Consider the use of E2 (Environmental Conservation) zoning for areas of high ecological constraint, and link to other areas proposed to be retained as E2.
- Develop a Conservation Management Plan for the study area to identify:
 - Values of the area and how these link into a regional context
 - How these values will be protected, maintained and enhanced
 - Roles and responsibilities including governance, land tenure and resourcing
 - How the delivery of CMP outcomes will be measured, monitored and evaluated
 - Need or opportunities for further research on the site.

8.3 Conservation Management Plan Framework

The Conservation Management Plan (CMP) will ensure the environmental, heritage, aesthetic, recreational and other values of the area are protected, maintained and where possible enhanced in association with the development.

In developing the CMP it is important to consider how it will be supported and implemented. It is proposed that the CMP cover both E2 and E4 zoned lands. Whilst the majority of CMP measures will relate to land in the E2 zone there will important elements of managing E4 land that will contribute to the overall conservation effort for the area.

Examples of management activities on E4 lands to be included in the CMP may include:

- retaining significant remnant vegetation including hollow bearing habitat trees
- maintaining and managing APZs for fuel reduction and ecological benefit
- planting endemic native trees and shrubs in domestic areas
- managing domestic animals to limit native fauna impacts
- restrictions on plant species to be grown in domestic gardens.

How the CMP is best implemented depends on the preferred option for managing the areas that will retain E2 zoning. If these are managed as community common areas then the resident owners will be responsible for implementing the CMP. This would need to be facilitated through the formation of a community association or similar and could further be supported through the formation of a technical committee which could include external experts. The association would also be the vehicle through which funding would be administered to resource CMP implementation. The advantages to this model are local funding, ownership and control is retained, whilst disadvantages include lack of capacity in terms of technical knowledge, equipment and time to properly implement the CMP.

The alternative model involves the dedication of areas to be retained in E2 zoning to Council care and control. In this instance the CMP could still be the guiding document for management however the role and responsibilities implementing the plan would rest with Council. The advantages of this model include professional staff with equipment, safe work practices and supported by strong technical knowledge with potential disadvantages being loss of ownership and control, resources being allocated against community wishes and higher overhead costs.

The governance model and how it operates would be described in the CMP with clear roles, responsibilities and accountabilities for all parties. The other strategic level considerations in the CMP include:

- What is the purpose of the CMP
 - Environmental, recreational, heritage, aesthetic and regional goals and outcomes to be delivered by the CMP
 - Governance and legislative context for the CMP
 - Who is responsible for developing and implementing the CMP
 - Where does the CMP apply
- What are the values to be protected, maintained or enhanced by the CMP
 - Flora, fauna, biodiversity
 - Aboriginal & non-Aboriginal heritage
 - Recreational and aesthetic
 - Carbon
 - Regional linkages and connectivity
- How will conflicting priorities be managed
 - Board / Community Association
 - Technical/scientific Panel
 - Local Government/Agency experts
- What impact will the development have on these values
 - Immediate/Short term during construction phase
 - Medium term during commissioning and CMP implementation phase
 - Long term during maintenance/management and monitoring phase
- What impact will other changes have on these values
 - Climate change
 - Adjacent and future development and land use change
- What actions are required to deliver CMP goals in the context of impacts and changes, including
 - Weed management and feral animal control

- Access management (vehicle, human and domestic animals) including fencing/signage
- Integrated use of fire for hazard reduction and ecological outcomes
- Vegetation management including revegetation / strategic thinning
- Infrastructure construction/maintenance including walking, riding, vehicle and bushfire trails
- Soil and water management including temporary and permanent sediment and erosion control measures
- Improving regional connectivity and linkages
- Community education programs and activities
- What is an appropriate plan of action, identifying
 - Immediate/Short term actions required before and during construction phase
 - Medium term actions required during commissioning and implementation of the CMP
 - Long term actions required during the maintenance/management and monitoring phase
 - Roles and responsibilities for implementing actions
 - Estimated costs associated with implementing actions
- How will success be measured
 - Monitoring and reporting program
 - Mid-term and final CMP evaluation
 - Developing the next CMP
- What additional knowledge and information is required to better inform the CMP
 - Research opportunities
 - Community monitoring programs
 - Accessing new and innovative science and information.

9 Conclusion

Eco Logical Australia Pty Ltd (ELA) undertook an assessment of the study area to identify ecological and bushfire constraints for the proposed rezoning of North Terrace from its current status as E2 (Environmental Conservation) to E4 (Environmental Living), to support a potential residential development.

The study determined the vegetation within the study area to be characterised by a dry sclerophyll forest community dominated by *Eucalyptus macrorhyncha* (Red Stringybark) and *E. polyanthemos* (Red Box). It has a shrubby mid story primarily of regrowth *Kunzea ericoides* (Burgan) and *Acacia* species. This vegetation does not form part of a threatened ecological community. The ecological values of the site have been impacted by disturbance which may be in part due to the proximity to the adjacent urban land use.

One threatened flora species, *Leucochrysum albicans* var. *tricolor* (Hoary Sunray), listed as endangered under the EPBC Act, was recorded along the northern boundary of the study area. Although no population count was conducted, an estimated 150-200 individuals were observed, with mature individuals making up approximately only 25% of the population. All individuals were observed along the track.

No threatened fauna were recorded during the site inspection. However, the site has the potential to provide habitat for Rosenberg's Goanna (*Varanus rosenbergi*), some Microchiropteran bats and woodland birds. The Gang-gang Cockatoo (*Callocephalon fimbriatum*), Scarlet Robin (*Petroica boodang*), Varied Sittella (*Daphoenositta chrysoptera*), Eastern Bentwing Bat (*Miniopterus (schreibersii) orianae oceansis*), Eastern Falsistrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*) and Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) were recorded in the adjacent Mouth Jerrabomberra Reserve during previous surveys (ELA 2011).

The APZ constraints presented in this report is provided in accordance with PBP and varies for each boundary from 20 m in the south to 35 m in the east. The APZ widths are based on an assessment of the vegetation and slope and are shown predominantly internal to the subject site. APZs are located to maintain buffer distances and separations and avoid conflicting land management objectives. The establishment of the APZs will be designed to maintain the biodiversity values of the site where possible, and the maintenance of the setbacks outlined in the Conservation Management Plan.

The study recognised that vegetation associated with Mount Jerrabomberra Reserve has been identified as a regional Biolink in the Mt Jerrabomberra Plan of Management (2004) and BES (2008) report but further noted that whilst the study area forms part of the linked areas it does not form part of the main linkages for the corridor as described in the documents, these being those between North Terrace and Jerrabomberra or South Queanbeyan and Jerrabomberra and along Barracks Creek.

The constraints analysis determined the majority of the area to be of moderate ecological value and constraint, with a small section of high ecological value and constraint (Hoary Sunray). Notwithstanding the majority of the area being determined to be of moderate ecological value the study noted the current E2 (Environmental Conservation) zoning which has a general focus of protecting areas of high ecological value. The areas of moderate or low ecological constraint should be the areas targeted for any development, with areas of high ecological constraint set aside for conservation and/or protection.

The study considers that sensitive residential development confined to areas of moderate or low ecological constraints is consistent with an E4 (Environmental Living) zone. The proposal to retain the non-developed lands in E2 (Environmental Conservation) zone, notwithstanding the moderate ecological values determined by this study, will provide the highest opportunity to protect the ecological values of the area in conjunction with development. The level of protection afforded by the E2 zoning will be further supported by the

implementation of a Conservation Management Plan which can assist in addressing potential impacts associated with the urban interface and landuse issues.

The Conservation Management Plan (CMP) framework identifies what management actions may be required to protect, maintain and enhance the values of the study area. These can include measures to address the impacts commonly experienced in conservation areas with an urban interface. It is important to consider the CMP in conjunction with the governance arrangements for the development which could provide a potential source of funding to implement the plan. This provides much greater certainty that the beneficial environmental and other outcomes espoused in the CMP will be delivered.

The study concluded that a properly resourced Conservation Management Plan together with a protective E2 zoning has the potential to deliver a net environmental benefit to the area.

An assessment of impacts to threatened species, namely those identified as having a likely or known occurrence in the study area, will need to be considered at the Development Application stage in relation to State (7-part test) and Commonwealth (Significance Assessment) legislation. However, it is noted that some threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, assessments of significance for these species are likely to be unnecessary as only marginal foraging habitat is present (no breeding habitat), and any impacts would likely be considered negligible. Furthermore, a development would be unlikely to isolate or fragment habitat for these highly mobile species or modify the potential habitat to the extent that it would place a viable local population at risk of extinction.

References

- Australian Government Department of the Environment (DotE) 2014. The EPBC Act Significant impact guidelines 1.1 – Matters of National Environmental Significance.
- Alistair Grinbergs Heritage Solutions 2008. Gas Fired Power Station & Data Centre at Hume ACT · Aboriginal Cultural Heritage Assessment. Report to CBRE Pty Ltd.
- Argue D. 1995. Aboriginal occupation of the Southern Highlands: Was it seasonal? *Australian Archaeology* 41: 30-36.
- Australian Archaeological Survey Consultants. 2006. Molonglo Valley Heritage Review. Report to ACT Planning and Land Authority.
- Biosis Research 2008 'Archaeological Re-assessment, Block 182, Jerrabomberra, ACT: Fyshwick East development on the site of the former Canberra Abattoirs. Report to Parsons Brinckerhoff.
- Biosis Research 2009 Archaeological Excavation: Block 2223, Jerrabomberra, ACT: Fyshwick East Development on the former Canberra Abattoir site. Report for Parson Brinckerhoff.
- Biosis Research 2010. Molonglo Stage 2: Detailed Heritage Assessment – Aboriginal and Historical Heritage. Report for ACT Planning and Land Authority.
- Bowdler S. 1981 Hunters in the Highlands: Aboriginal Adaptations in the Eastern Australian Uplands. *Archaeology in Oceania* 16:99-111.
- Cultural Heritage Management Australia 2015. Bungendore East subdivision Proposal - Desktop Review and Assessment of Cultural Heritage Potential. Report to SMEC.
- Department of Primary Industries (DPI) 2008. *Threatened Species Assessment Guidelines: The assessment of significance*.
- Department of the Environment (DotE) 2016a. *Protected Matters Search Tool* [online]. Available: <http://www.environment.gov.au/epbc/protect/index.html> (Accessed: February 2016).
- Department of the Environment (DotE) 2016b. Species Profile and Threats Database. Available <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.
- Eco Logical Australia, 2011, Flora and Fauna assessment – Curtis Estate Prepared for CB Richard Ellis.
- Flood J. 1973. The moth-hunters -investigations towards a prehistory of the south-eastern highlands of Australia. PhD thesis Australian National University (unpublished). Canberra.
- Flood J. 1980 .The Moth Hunters: Aboriginal Prehistory of the Australian Alps. Australian Institute of Aboriginal Studies, Canberra.
- Grinbergs A. 1992. The Myth Hunters – Investigations Towards a Revised Prehistory of the Highlands of South Eastern Australia. Bachelor of Arts Honours thesis. Department of Archaeology & Anthropology Australian National University Canberra.
- Howitt A. W. 1904. The Native Tribes of South-East Australia. Macmillan, London.

Jenkins, B.R. 2000. *Soil Landscapes of the Canberra 1:100 000 Sheet*. Department of Land and Water Conservation, Sydney.

Kevin Mills and Associates (KMA), 2004, Preliminary flora and fauna assessment, North Terrace, Southbar Road, City of Queanbeyan, Prepared for Don Fox Planning Pty Ltd.

Lewis D. 1984. Jerrabomberra Park Development Queanbeyan Archaeological Sites Survey. Report to David Hogg Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 1994 Conservation Management Plan for the Harcourt Hill Scarred Trees: GAR2, GAR3, GAR4 and GAR5, Nicholls, ACT. Report to ACTEW. Navin Officer 2007. ACT Eastern Broadacre Planning Study - Cultural Heritage Component Desktop Study. Report to MacroPlan Australia.

Navin Officer Heritage Consultants (NOHC) 2013. Oaks Estate Master Plan Aboriginal Cultural Heritage Assessment. A Report to Environment and Sustainable Development Directorate, Canberra.

Office of Environment and Heritage (OEH). 2013. *The Native vegetation of the Sydney Metropolitan Area. Volume 1: Technical Report*. Version 2.0. Office of Environment and Heritage, Department of Premier and Cabinet, Sydney.

Office of Environment and Heritage (OEH). 2016a. *Threatened Species Database* (5 km radius search). OEH Sydney, NSW. (Data viewed February 2016).

Office of Environment and Heritage (OEH). 2016b. *Threatened Species Profiles* <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>.

Patton R. 1984. An Archaeological survey of South Tuggeranong ACT ANUTECH: Canberra. Report to NCDC.

Planning for People, 2004, Mount Jerrabomberra Plan of Management, Prepared for Queanbeyan City Council.

Appendix A Likelihood assessment

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the field survey and professional judgement. The terms for likelihood of occurrence are defined below:

- “yes” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the study area, and
- “no” = habitat on site and in the vicinity is unsuitable for the species.

An assessment of significance was conducted for threatened species or ecological communities that were recorded within the study area or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the study area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, an assessment of significance in reference to State or Commonwealth legislation was not considered necessary

Note, that assessments for the likelihood of occurrence were made both prior to field survey and following field survey. The pre-survey assessments were performed to determine which species were “affected species”, and hence determine which sorts of habitat to look for during field survey. The post-survey assessments to determine “final affected species” were made after observing the available habitat in the study area and are depicted in the table below.

The information provided in the habitat association column of the table below has been obtained from the NSW Threatened Species Profile (OEH 2016b) and Commonwealth Species Profile and Threats Database (DotE 2016b).

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
Flora						
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E	V	Currently known from two disjunct areas; one population near Braidwood on the Southern Tablelands and three populations in the Wyong area on the Central Coast.	Grassy sclerophyll woodland on clay loam or sandy soils, or low woodland with stony soil.	Unlikely
<i>Lepidium hyssopifolium</i>	Aromatic Peppercress	E	E	In NSW, occurs near Bathurst, Bungendore, and Crookwell. May also be extant near Armidale.	Woodland with a grassy understorey and grassland.	Unlikely
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray		E	In NSW it occurs on the Southern Tablelands and adjacent areas in an area roughly bounded by Albury, Bega and Goulburn.	Grassland, woodland and forest, generally on relatively heavy soils.	Known. Observed during the site inspection.
<i>Pomaderris pallida</i>	Pale Pomaderris	V	V	In NSW, recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park.	Shrub communities surrounded by <i>Eucalyptus mannifera</i> (Brittle Gum) and <i>E. macrohyncha</i> (Red Stringybark) or <i>Callitris</i> woodland.	Potential. Potential habitat present. No observed during site inspection.

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	E	E	Four sites in NSW: at Boorowa, Captains Flat, Ilford and Delegate. Also experimentally introduced at Bowring Cemetery NSW.	Natural Temperate Grassland, grassy woodland, and Box-Gum woodland.	No
<i>Rutidosia leptorrhynchoidea</i>	Button Wrinklewort	E	E	In NSW, populations occur at Goulburn, the Canberra - Queanbeyan area and at Michelago.	Box-Gum Woodland, secondary derived grassland or in Natural Temperate Grassland, usually on shallow, stony red-brown clay loams.	Unlikely
<i>Swainsona recta</i>	Small Purple-pea	E	E	Queanbeyan and Wellington-Mudgee areas. Historically also recorded at Carcoar, Culcairn and Wagga Wagga.	Grassland, open woodland and open forests dominated by <i>Eucalyptus blakelyi</i> (Blakely's Red Gum), <i>E. melliodora</i> (Yellow Box), <i>E. rubida</i> (Candlebark Gum) and <i>E. gonicalyx</i> (Long-leaf Box).	Unlikely
<i>Swainsona sericea</i>	Silky Swainson-pea	V		In NSW, recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. Also an isolated record from the far north-west of NSW.	Natural Temperate Grassland and <i>Eucalyptus pauciflora</i> (Snow Gum) Woodland on the Monaro, and Box-Gum Woodland in the Southern Tablelands and South West Slopes.	Unlikely
<i>Thesium australe</i>	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands.	Grassland on coastal headlands or grassland and grassy woodland away from the coast.	No

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
Fauna						
<i>Anthochaera phrygia</i>	Regent Honeyeater	E	E	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions.	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).	Potential
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V	V	In NSW, only known from the Central and Southern Tablelands, and the South Western Slopes.	Sloping, open woodland areas with predominantly native grassy groundlayers, rocky outcrops or scattered, partially-buried rocks.	Unlikely
<i>Apus pacificus</i>	Fork-tailed Swift		C,J,K, Mar	Recorded in all regions of NSW.	Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Potential
<i>Ardea alba</i>	Great Egret		C, J, Mar	Widespread, occurring across all states/territories. Also a vagrant on Lord Howe and Norfolk Island.	Swamps and marshes, grasslands, margins of rivers and lakes, salt pans, estuarine mudflats and other wetland habitats.	No
<i>Ardea ibis</i>	Cattle Egret		C,J, Mar	Widespread and common across NSW.	Grasslands, wooded lands and terrestrial wetlands.	No

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Found over most of NSW except for the far north-west.	Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (bullrushes) and <i>Eleocharis</i> spp. (spikerushes).	No
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V		In NSW, distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. Isolated records known from as far north as Coffs Harbour and as far west as Mudgee.	Tall mountain forests and woodlands in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.	Likely. Recorded within Mt Jerrabomberra Reserve (ELA 2008)
<i>Chthonicola sagittata</i>	Speckled Warbler	V		From south-eastern Qld, the eastern half of NSW and into Victoria, as far west as the Grampians, mostly on hills and tablelands of the Great Dividing Range and rarely on coast.	<i>Eucalyptus</i> -dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.	Potential. Suitable habitat present and known within locality
<i>Circus assimilis</i>	Spotted Harrier	V		Found throughout the Australian mainland, except in densely forested or wooded habitats, and rarely in Tasmania.	Grassy open woodland, inland riparian woodland, grassland, shrub steppe, agricultural land and edges of inland wetlands.	Unlikely
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V		From eastern through central NSW, west to Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell.	Eucalypt woodlands and dry open forest.	Potential. Suitable habitat present and known within locality

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Distribution in NSW is nearly continuous from the coast to the far west.	Inhabits eucalypt forests and woodlands, mallee and <i>Acacia</i> woodland.	Likely. Recorded within Mt Jerrabomberra Reserve (ELA 2008)
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld.	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Unlikely
<i>Delma impar</i>	Striped Legless Lizard	V	V	In NSW, occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina.	Natural Temperate Grassland, secondary and modified grassland, open Box-Gum Woodland.	No
<i>Epthianura albifrons</i>	White-fronted Chat	V		Occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state.	Saltmarsh vegetation, open grasslands and sometimes low shrubs bordering wetland areas.	Unlikely
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		South-east coast and ranges of Australia, from southern Qld to Victoria and Tasmania. In NSW, records extend to the western slopes of the Great Dividing Range.	Tall (greater than 20 m) moist habitats.	Likely. Recorded within Mt Jerrabomberra Reserve (ELA 2008)
<i>Gallinago hardwickii</i>	Latham's Snipe		C,J,R, Mar	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW.	Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	No

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Grantiella picta</i>	Painted Honeyeater	V		Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas.	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Unlikely
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		C	Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia.	Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Unlikely
<i>Hieraaetus morphnoides</i>	Little Eagle	V		Throughout the Australian mainland, with the exception of the most densely-forested parts of the Dividing Range escarpment.	Open eucalypt forest, woodland or open woodland, including sheoak or <i>Acacia</i> woodlands and riparian woodlands of interior NSW.	Unlikely
<i>Hirundapus caudacutus</i>	White-throated Needletail		C,J,K	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide.	Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Unlikely
<i>Lathamus discolor</i>	Swift Parrot	E	E	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes.	Box-ironbark forests and woodlands.	Unlikely

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Limosa lapponica</i>	Bar-tailed Godwit		C,J,K	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also numerous scattered inland records.	Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region.	Marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas.	No
<i>Litoria castanea</i>	Yellow-spotted Tree frog	E	E	A single known population occurs on the Southern Tablelands of NSW.	Large permanent ponds or slow-flowing streams with plenty of emergent vegetation such as bulrushes.	No
<i>Litoria raniformis</i>	Southern Bell Frog	E	V	In NSW, only known to exist in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few recent unconfirmed records have also been made in the Murray Irrigation Area.	Permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. Also found in irrigated rice crops.	No

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Melanodryas cucullata</i>	Hooded Robin (south-eastern form)	V		Found throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> .	Open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	Potential. Suitable habitat present and known within locality
<i>Merops ornatus</i>	Rainbow Bee-eater		J	Distributed across much of mainland Australia, including NSW.	Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	Unlikely
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V		In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga.	Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	Likely. Recorded within Mt Jerrabomberra Reserve (ELA 2008)
<i>Monarcha melanopsis</i>	Black-faced Monarch		Bonn, Mar	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland.	Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		Bonn, Mar	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains.	Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Myotis macropus</i>	Southern Myotis	V		In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers.	Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	Unlikely
<i>Petroica boodang</i>	Scarlet Robin	V		In NSW, it occurs from the coast to the inland slopes.	Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	Likely. Recorded within Mt Jerrabomberra Reserve (ELA 2008)
<i>Petroica phoenicea</i>	Flame Robin	V		In NSW, breeds in upland areas, and in winter many birds move to the inland slopes and plains, or occasionally to coastal areas. Likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands.	Breeds in upland tall moist eucalypt forests and woodlands. In winter uses dry forests, open woodlands, heathlands, pastures and native grasslands. Occasionally occurs in temperate rainforest, herbfields, heathlands, shrublands and sedgeland at high altitudes.	Unlikely
<i>Phascolarctos cinereus</i>	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands.	Eucalypt woodlands and forests.	Unlikely
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	In NSW, occurs on inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems.	Box-gum woodland, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Unlikely

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Rhipidura rufifrons</i>	Rufous Fantail		Bonn, Mar	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW.	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Likely. Known to occur within the locality
<i>Rostratula australis</i>	Australian Painted Snipe	E	E, Mar	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	Swamps, dams and nearby marshy areas.	No
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		There are scattered records of this species across the New England Tablelands and North West Slopes. Rare visitor in late summer and autumn to south-western NSW.	Almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies.	Likely. Recorded within Mt Jerrabomberra Reserve (ELA 2008)
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW it is widespread on the New England Tablelands.	Woodland, moist and dry eucalypt forest and rainforest. Usually roosts in tree hollows but has also been found in buildings.	Potential. Recorded as a probable detection within Mt Jerrabomberra Reserve (ELA 2008). Not typically occurring in area

Scientific Name	Common Name	TSC Act	EPBC Act	Distribution	Habitat	Likelihood of occurrence
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Widely distributed in NSW, mainly recorded in the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina, and less commonly found in coastal areas and further inland.	Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	Potential. Suitable habitat present.
<i>Tympanocryptis pinguicollis</i>	Grassland Earless Dragon	E	E	The only populations now known are in the ACT and adjacent NSW at Queanbeyan, and on the Monaro Basalt Plains between Cooma and south-west of Nimmitabel.	Restricted to a small number of Natural Temperate Grassland sites dominated by <i>Notodanthonia</i> spp. (wallaby grasses), <i>Austrostipa</i> spp. (spear grasses), <i>Poa</i> Tussock (<i>Poa sieberiana</i>), <i>Bothriochloa macra</i> (Red Grass), and occasionally <i>Themeda australis</i> (Kangaroo Grass).	No
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		In NSW, found on the Sydney Sandstone in Wollemi National Park, in the Goulburn and ACT regions and near Cooma in the south. Also recorded from the South West Slopes near Khancoban and Tooma River.	Heath, open forest and woodland.	Potential. Suitable habitat present including termite mounds. However, all of the five records within the locality are over 15 years old.

Appendix B – Species lists

Table 3: Flora detected in the study area during the field survey

Species name	Common name	Native / Exotic	Status
<i>Acacia baileyana</i>	Cootamundra Wattle	Exotic	-
<i>Acacia genistifolia</i>	Early Wattle	Native	-
<i>Acacia mearnsii</i>	Black Wattle	Native	-
<i>Acacia pycnantha</i>	Australian Golden Wattle	Native	-
<i>Agapanthus</i> sp.	African Lily	Exotic	-
<i>Amyema miquelii</i>	-	Native	-
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Exotic	-
<i>Aristida ramosa</i>	Purple Wiregrass	Native	-
<i>Astroloma humifusum</i>	Native Cranberry	Native	-
<i>Austrostipa densiflora</i>	-	Native	-
<i>Austrostipa scabra</i>	Speargrass	Native	-
<i>Avena barbata</i>	Bearded Oats	Exotic	-
<i>Brachyloma daphnoides</i>	Daphne Heath	Native	-
<i>Bursaria spinosa</i>	Blackthorn	Native	-
<i>Callistemon</i> sp.	-	Native	-
<i>Carex</i> sp.	-	Native	-
<i>Cassinia quinquefaria</i>	-	Native	-
<i>Cassytha glabella</i>	-	Native	-
<i>Centaureum erythraea</i>	Common Centaury	Exotic	-
<i>Cheilanthes sieberi</i>	Poison Rock Fern	Native	-
<i>Chloris truncata</i>	Windmill Grass	Native	-
<i>Cirsium vulgare</i>	Spear Thistle	Exotic	-
<i>Conyza</i> sp.	-	Exotic	-
<i>Cryptandra amara</i>	Bitter Cryptandra	Native	-
<i>Dactylis glomerata</i>	Cocksfoot	Exotic	-
<i>Derwentia perfoliata</i>	-	Native	-
<i>Dianella revoluta</i>	Blueberry Lily	Native	-
<i>Dichelachne</i> sp.	-	Native	-
<i>Einadia nutans</i>	Climbing Saltbush	Native	-

Species name	Common name	Native / Exotic	Status
<i>Einadia hastata</i>	Berry Saltbush	Native	-
<i>Elymus scaber</i>	-	Native	-
<i>Eragrostis curvula</i>	African Lovegrass	Exotic	Noxious Class 4
<i>Eucalyptus macrorhyncha</i>	Red Stringybark	Native	-
<i>Eucalyptus polyanthemos</i>	Red Box	Native	-
<i>Eucalyptus rossii</i>	Inland Scribbly Gum	Native	
<i>Euchiton sphaericus</i>	-	Native	-
<i>Exocarpos cupressiformis</i>	Cherry Ballart	Native	-
<i>Gonocarpus tetragynus</i>	-	Native	-
<i>Goodenia hederacea</i>	Forest Goodenia	Native	-
<i>Hirschfeldia incana</i>	Hairy Brassica	Exotic	-
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Native	-
<i>Hypericum perforatum</i>	St. Johns Wort	Exotic	Noxious Class 4
<i>Hypochaeris radicata</i>	Catsear	Exotic	-
<i>Juncus</i> sp.	-	Native	-
<i>Kunzea ericoides</i>	Burgan	Native	-
<i>Lepidosperma laterale</i>	-	Native	-
<i>Leptospermum multicaule</i>	Silver Tea-tree	Native	-
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	Native	Endangered (EPBC Act)
<i>Leucopogon fletcheri</i>	-	Native	-
<i>Lomandra filiformis</i>	Wattle Mat-rush	Native	-
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Native	-
<i>Lomandra multiflora</i>	Many-flowered Mat-rush	Native	-
<i>Melichrus urceolatus</i>	Urn-heath	Native	-
<i>Microlaena stipoides</i>	Weeping Grass	Native	-
<i>Monotoca scorpioides</i>		Native	-
<i>Panicum effusum</i>	Hairy Panic	Native	-
<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort	Exotic	-
<i>Phyllanthus hirtellus</i>	Thyme Spurge	Native	-
<i>Poa labillardieri</i>		Native	-
<i>Poa sieberiana</i>	Snowgrass	Native	-
<i>Portulaca oleracea</i>	Pigweed	Exotic	-

Species name	Common name	Native / Exotic	Status
<i>Rytidosperma pallidum</i>	Silvertop Wallaby Grass	Native	-
<i>Rytidosperma racemosum</i>	-	Native	-
<i>Salvia verbenaca</i>	Vervain	Exotic	-
<i>Senecio quadridentatus</i>	Cotton Fireweed	Native	-
<i>Setaria parviflora</i>	-	Exotic	-
<i>Solanum</i> sp.	-	Native	-
<i>Stypandra glauca</i>	Nodding Blue Lily	Native	-
<i>Themeda triandra</i>	Kangaroo Grass	Native	-
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	Native	-
<i>Vittadinia muelleri</i>	-	Native	-
<i>Wahlenbergia</i> sp.	-	Native	-
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Native	-

Table 4: Fauna detected in the study area during the field survey

Species name	Common name	Native / Introduced	Threatened status
<i>Canis lupus</i>	Domestic dog	Introduced	-
<i>Cormobates leucophaeus</i>	White-throated Tree Creeper	Native	-
<i>Corvus coronoides</i>	Australia Raven	Native	-
<i>Cracticus tibicen</i>	Australian Magpie	Native	-
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	Native	-
<i>Pardalotus punctatus</i>	Spotted Pardalote	Native	-
<i>Pardalotus striatus</i>	Striated Pardalote	Native	-
<i>Phaps chalcoptera</i>	Common Bronzewing	Native	-
<i>Pseudocheirus peregrinus</i>	Ringtail Possum	Native	-
<i>Vulpes vulpes</i>	Fox*	Introduced	-

*Fox scat observed

Appendix C – Agency comments

Table 5: Key agency comments and the location of responses in the report

Agency	Issue/comment	Response location	Comment
NSW Rural Fire Service	Minimising the interface to the bush fire hazard as per PBP (2006)	Sect 5 pp13	Detailed planning not yet complete
	APZ's encroaching on riparian buffer	Sect 5.1.3 pp13 Figure 4 pp16	-
	APZ's should be located in the zone to be rezoned for residential development	Sect 5.1.3 pp13 Figure 4 pp16	-
	Locating APZ's within the area to be developed may impact viability of the proposal	No response	Outside scope
	Access requirements as per PBP (2006)	Sect 5.1.5 pp14	-
	Water requirements as per PBP (2006)	Sect 5.1.6 pp14	-
	Incompatibility between “eco-friendly, low impact style housing” and APZ vegetation modification required	No response	Outside scope
	Potential impact of BAL 29 APZ widths on environmental values	Sect 6.3 pp18 Sect 5.1.3 pp13 Sect 5.1.4 pp14	-
	High Conservation Value Vegetation – mapped as HCV on <i>QLEP 2012</i> , value confirmed in QLGA Biodiversity Study (BES 2008) and via OEH inspection	Sect 6.1.1 pp17 Sect 6.2.1 pp17 Figure 3 pp12	-
	Threatened species habitat	Figure 2 pp8 4.3.2 pp11 4.3.3 pp11	-
Office of Environment & Heritage	Regional Biolink and Habitat Corridor Values	Sect 6.2 pp17	-
	Sydney Canberra Corridor Regional Study	Sect 6.2.2 pp18	-
	S117 Direction 2.1 Environment Protection Zones	Sect 6.4 pp19	-
	Aboriginal cultural heritage values	N/A	Outside scope
	Issues/comments raised during meeting with OEH and Dept. of Planning & Environment on 16 May 2016		
	Moderate conservation level needs to be justified	Sect 3.3, pp 5 Sect 7.1, pp 20 Sect 7.5, pp 23	
	Speckled Warbler has potential to utilise the site	Appendix A, pp 38	

Agency	Issue/comment	Response location	Comment
	Consideration of threatened woodland bird in the report	Sect 4.3.3, pp 11 Sect 8.1, pp 27 Sect 9, pp 30	
	Rosenbergs monitor should be considered in more detail for this site	Sect 4.2, pp 6 Sect 4.3.3, pp 11 Sect 8.1, pp 27 Sect 9, pp 30	
	Species which are presumed to occur in the vegetation type should be addressed	Appendix A & B, pp 34-48	
	Impact of the 10-50 rule needs to be addressed	Sect 5, pp13	
	Mechanism to be used to provide for ongoing management	Sect 8.1, pp 26	Options are provided in Report
	OEH considers that the Conservation management plan may not deliver the required outcomes to adequately offset the development impact.	Sect 9, pp 31	Report supports potential for net environmental benefit
	There appears to be no clear mechanism to ensure long term management funding for the site to actively manage the site in perpetuity. Active management with in perpetuity on title protection is the preferred method of OEHL to protect such areas, which is why Biobanking is the preferred method	Sect 8.1, pp 26	Options are provided in Report, resolution as to preferred/adopted option is outside scope of the Report
	Main Regional Biolinks identified in the report should be provided as a map	Figure 6, pp25	
	Aboriginal Heritage should be mentioned in the Report	Sect 6, pp 17-19	

NB: Responses may be covered in multiple sections and reiterated in recommendations and conclusion



HEAD OFFICE

Suite 2, Level 3
668-672 Old Princes Highway
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

CANBERRA

Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

COFFS HARBOUR

35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

PERTH

Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 02 9542 5622

DARWIN

16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601
F 08 8941 1220

SYDNEY

Suite 1, Level 1
101 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9542 5622

NEWCASTLE

Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

ARMIDALE

92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

WOLLONGONG

Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 4268 4361

BRISBANE

Suite 1 Level 3
471 Adelaide Street
Brisbane QLD 4000
T 07 3503 7191
F 07 3854 0310

HUSKISSON

Unit 1 51 Owen Street
Huskisson NSW 2540
T 02 4201 2264
F 02 4443 6655

NAROOMA

5/20 Cauty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

MUDGEES

Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1230
F 02 6372 9230

GOSFORD

Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1220
F 02 4322 2897

1300 646 131
www.ecoaus.com.au