FLORA AND FAUNA ASSESSMENT

FOR A PROPOSED DEVELOPMENT AT

45-65 GREENACRE DRIVE, TAHMOOR (LOT 11, DP: 825465)

WOLLONDILLY SHIRE COUNCIL

LOCAL GOVERNMENT AREA

Job number: 2281

Anderson Environmental Pty Ltd 87 164 830 728
Ph: 1300 302 507 Fax: (02) 8580 4731
Office: 35B, 1 Maitland Place Baulkham Hills 2153
Postal: PO BOX 690 Springwood 2777
www.andenviro.com.au

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Version	Date drafted	Drafted by
1	08/06/2018	Bo Davidson
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1	12/06/2018	Jason Anderson
Approved by	**Date**	
Jason Anderson (Director)	12/06/2018	

ECOLOGICAL CONSULTANTS ASSOCIATION OF NSW
CERTIFIED PRACTISING ECOLOGICAL CONSULTANT
REGISTERED NUMBER: 5

ECA ECOLOGICAL CONSULTANTS ASSOCIATION of NSW Inc
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Executive Summary

Introduction

This report describes the results of a Flora and Fauna Assessment (FFA) conducted to inform a development proposal at number 45-65 Greenacre Drive, Tahmoor (lot 11, DP: 825465) in the Wollondilly Shire Council Local Government Area (LGA), hereafter referred to as the subject site. The proposed development would create a new residential estate which would occupy the entirety of the subject site.

The subject site is a rectangular, approximately 2.3ha lot located near the end of Greenacre Drive (north) on the western side of roadway. It is currently vacant, supporting no significant infrastructure with the exception of boundary fencing. The subject site is largely cleared, with a small stand of acacias in the south-east corner and several mature eucalypts in the north-west. The remainder of the subject site consists of cleared grasslands with numerous old log dumps. The subject site and surrounding locality has a gentle southerly aspect, draining towards the Bargo River, located approximately 560m to the south. The subject site contains one small artificial waterbody (farm dam) in the south-east corner.

Methodology

Prior to the site survey a range of secondary resources were consulted. These included vegetation mapping resources, the NSW Office of Environment and Heritage (OEH) database, the Commonwealth Protected Matters Search Tool (PMST) as well as the relevant legislative documents including the Wollondilly Shire Development Control Plan (DCP) 2016 and Local Environmental Plan (LEP) 2011.

Surveys were conducted on the 04/06/2018 by one ecologist from Anderson Environmental. Surveys consisted of a random meander survey throughout the entire subject site to identify resident flora and fauna, their habitats, present vegetation assemblages and important faunal and floral microhabitat features. Surveys also included three vegetation plots to assess flora diversity and likely vegetation communities. Fauna surveys consisted of detail habitat searches of microhabitats (native vegetation, leaf litter, fallen timber etc.) as well as a census of habitat trees within the subject site. The vegetation of the subject site was also assessed against State Environmental Planning Policy 44: Koala Habitat Protection (SEPP44), which applies to the Wollondilly Shire Council LGA.

Conditions were partly overcast and cool during surveys. Prolonged dry weather prior to survey resulted in sub-optimal flora survey conditions.

Results

The survey identified the presence of one TEC on the subject site:

- Cumberland Plain Woodland (CPW) in the Sydney Basin Bioregion – listed as a Critically Endangered Ecological Community (CEEC) under the *Threatened Species Conservation Act 1995* (TSC Act) and the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Due to the small size and level of survey conducted within areas of remnant native vegetation,

no threatened flora species or populations are considered likely to be present.

The subject site supports limited key fauna habitat features, with a single hollow-bearing tree, numerous log dumps and a small waterbody present. The following species were considered likely based on the available habitat and local occurrence records (from the OEH Bionet Atlas) to occur and would lose potential important habitat as a result of the proposed development:

- Cumberland Plain Land Snail (*Meridolum corneovirens*) – listed as endangered under the TSC Act;
- Eastern Freetail Bat (*Mormopterus norfolkensis*) - listed as vulnerable under the TSC Act;
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) – listed as vulnerable under the TSC Act;
- Koala (*Phascolarctos cinereus*) – listed as vulnerable under the TSC Act and EPBC Act; and
- Little Bentwing Bat (*Miniopterus australis*) – listed as vulnerable under the TSC Act.

Two empty shells of the Cumberland Plain Land Snail were found during recent site surveys by Anderson Environmental on a lot to the south-east, indicating that this species utilises the habitat of the immediate locality. This species is also known from numerous local occurrence records from the OEH Bionet Atlas database. The single hollow-bearing tree provides potential roosting and breeding resources for native hollow-dependent birds and mammals. However, few threatened fauna species are considered likely to utilise this resource. The tree is relatively exposed and is relatively isolated from stands of native forest on adjacent lots. The waterbody is small and lacks aquatic and significant riparian vegetation. It is not considered to comprise important habitat for local aquatic fauna.

The woodlands of the subject site contain a known Koala food tree species (*Eucalyptus tereticornis* (Forest Red Gum)) with a density greater than 15% of the canopy coverage, therefore this vegetation is considered to meet the definition of potential Koala habitat under SEPP44. Although not detected on the subject site during surveys, this species is known from 14 contemporary records from the locality (within 10km) in the NSW Bionet Atlas. This meets the attributes of recent sightings and historical records of a population under the SEPP44 definition. Based on this assessment, the subject site is considered to meet the definition of core Koala habitat under SEPP44.

However, the present trees are considered unlikely to be utilised regularly by this species due to their relative isolation from nearby stands of native forest. These trees are approximately 80m from the nearest significant stands of native forest on adjacent lands. Koalas would need to cross open ground with a present population of known domestic predators (dogs) to access these resources.

Impact assessment

The proposed development would require the removal of all CPW from the subject site as well as the waterbody, log dumps and the hollow-bearing tree. This would represent the removal of a small portion of native woodland from the local area and would not fragment or isolate habitat in the locality for any threatened species or population identified and no species is considered dependent on the resources of the subject site for their long-term survival. Removal of the

waterbody, log dumps and the hollow-bearing tree is not considered to represent a significant loss of habitat for threatened fauna. Similar habitat is not limited within the local area.

No significant impact on any TEC, species or population is anticipated as a result of the proposed development. Consequently, further assessment through a Species Impact Statement (SIS) (NSW) or a referral to the federal Minister of the Environment (federal) is not considered necessary.

The TEC to be removed by the proposed development will require compensation. As it is not practical to offset this impact onsite; offsetting offsite through the NSW Biodiversity Offset Scheme (BOS) is considered the most practical compensation method. If offsetting through the (BOS) is pursued, a formal credit report through the OEH will be required. Although the Wollondilly Shire LGA is listed as an interim designated area and therefore not subject to the *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM) until 25/08/2018, offsetting through the new BOS is recommended as this system is replacing the former Biobanking offsets scheme.

If Council is satisfied that the subject site constitutes core Koala habitat, a plan of management as per **Part 3** of SEPP44 must be drafted prior to development consent. At the time of writing, Wollondilly Shire Council has not drafted a Koala Management Plan for the LGA. Consequently, if Council is satisfied that the subject site constitutes core Koala habitat, a plan of management as per **Part 3** of SEPP44 must be drafted prior to development consent. As per **Part 3** of SEPP44, such a plan may be prepared by any person but must be approved by Council and the Director-General of National Parks and Wildlife before it can take effect. However, the present trees are considered unlikely to be utilised regularly by this species due to their relative isolation from nearby stands of native forest. Koalas would need to cross open ground with a present population of known domestic predators (dogs) to access these resources.

The proposed development was not assessed to require referral to the federal Minister of the Environment for this species based on the methodology detailed in the 'EPBC Act Referral Guidelines for the Vulnerable Koala', as the habitat on the subject site was assessed as having an overall habitat value score of <5.

The existing native vegetation in the east and south of the subject site is mapped as Sensitive Land (biodiversity) under the Wollondilly Shire Council LEP 2011. Based on the assessment detailed in this report, the proposed development is not considered to constitute a significant impact on the TEC in the locality and the removal of this vegetation would not isolate or fragment any other area of native vegetation on adjacent lands. The removal of TEC is proposed to be compensated for through the NSW BOS and impacts on areas of adjacent retained native bushland can be minimised using appropriate design and development operation controls (sediment controls etc.). Based on this assessment, the proposed development is considered compliant with **Point c** (mitigate) of **Part 7.2** (**4**) of the LEP 2011.

Appropriate design, control and site management measures will be required during all phases of development to minimise the impact on areas of adjacent native vegetation. The removal of the hollow-bearing tree is to be supervised by a suitably trained and equipped wildlife handler. The hollow-sections of the tree (including any that may not be visible from

the ground) are to be removed using soft-felling procedures (lowered) or thoroughly inspected prior to felling to determine that no resident faunae are present.

Conclusions

This FFA conducted to support a proposed development at number 45-65 Greenacre Drive, Tahmoor determined that there is unlikely to be a significant impact on any TEC or threatened species or population as a result of the proposed development. Consequently, further assessment through a SIS (NSW) or a referral to the federal Minister of the Environment (federal) is not considered necessary for any TEC, threatened species or population.

The subject site was assessed to contain a small stand of the TEC CPW and habitat for several threatened species known to occur in the locality from contemporary occurrence records from the OEH Bionet Atlas database.

Although no significant impact on the Koala is anticipated as a result of the proposed development, the native vegetation on the subject site was assessed as conforming to the definition of core Koala habitat under SEPP44. However, due to the relative isolation of present habitat, this species is considered unlikely to be regularly utilising the subject site. If Council is satisfied that the subject site constitutes core Koala habitat, a plan of management as per **Part 3** of SEPP44 must be drafted prior to development consent.

The proposed development would occupy the entire subject site and therefore onsite retention or compensation for the removal of TEC cannot be achieved. Therefore, offsetting for the small amount of TEC to be removed through the NSW BOS is considered necessary.

An appropriately experienced and qualified wildlife handler will need to be present during the removal of the hollow-bearing tree and appropriate protocols for the removal of this hollow are to be observed.

Glossary of Acronyms

BC Act – *Biodiversity Conservation Act 2016*

CEEC – Critically Endangered Ecological Community

DoE – Department of the Environment

EEC – Endangered Ecological Community

EPA Act – *Environmental Planning and Assessment Act 1979*

EPBC Act – *Environment Protection and Biodiversity Conservation Act 1999*

FFA – Flora and Fauna Assessment

FM Act – *Fisheries Management Act 1994*

LGA – Local Government Area

NSW – New South Wales

NSW NPWS – New South Wales National Parks and Wildlife Service

NPW Act – *National Parks and Wildlife Act 1974*

OEH – Office of Environment and Heritage

SIS – Species Impact Statement

TEC – Threatened Ecological Community

TSC Act – *Threatened Species Conservation Act 1995*

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1. INTRODUCTION

1.1 BACKGROUND

Anderson Environmental Pty Ltd was engaged to conduct a Flora and Fauna Assessment (FFA) for a proposed subdivision at number 45-65 Greenacre Drive, Tahmoor (lot 11, DP: 825465) in the Wollondilly Shire Council Local Government Area (LGA), hereafter referred to as the subject site. The subject site is proposed to be developed to support a new residential subdivision. The proposed site plan is provided in **Appendix 7**.

This report assesses the potential direct and indirect impacts of the proposed development on the ecological values of the subject site and makes recommendations for appropriate compensation for any impacts and appropriate management strategies.

1.2 SITE DESCRIPTION

1.2.1 Location

The subject site occurs at number 45-65 Greenacre Drive, Tahmoor. **Figure 1.1** below shows the location of the subject site and its local context.

The subject site is zoned R2 – Low Density Residential under the Wollondilly Local Environmental Plan 2011 (LEP). Native vegetation in the east and south of the subject site is mapped as 'Sensitive Land' under the LEP (Natural Resources – Biodiversity Map – Sheet NRB_008H). No other constraints under the LEP are mapped as occurring within the subject site.

1.2.2 Physical Environment

The subject site is a rectangular, approximately 2.3ha lot located near the end of Greenacre Drive (north) on the western side of roadway. It is currently vacant, supporting no significant infrastructure with the exception of boundary fencing. The subject site is largely cleared, with a small stand of acacias in the south-east corner and several mature eucalypts in the north-west. The remainder of the subject site consists of cleared grasslands with numerous old log dumps. Analysis of historical aerial imagery through the Google Earth historical imagery tool indicated that the majority of the site was cleared in 2016.

The subject site and surrounding locality has a gentle southerly aspect, draining towards the Bargo River, located approximately 560m to the south. The subject site contains one small artificial waterbody (farm dam) in the south-east corner.

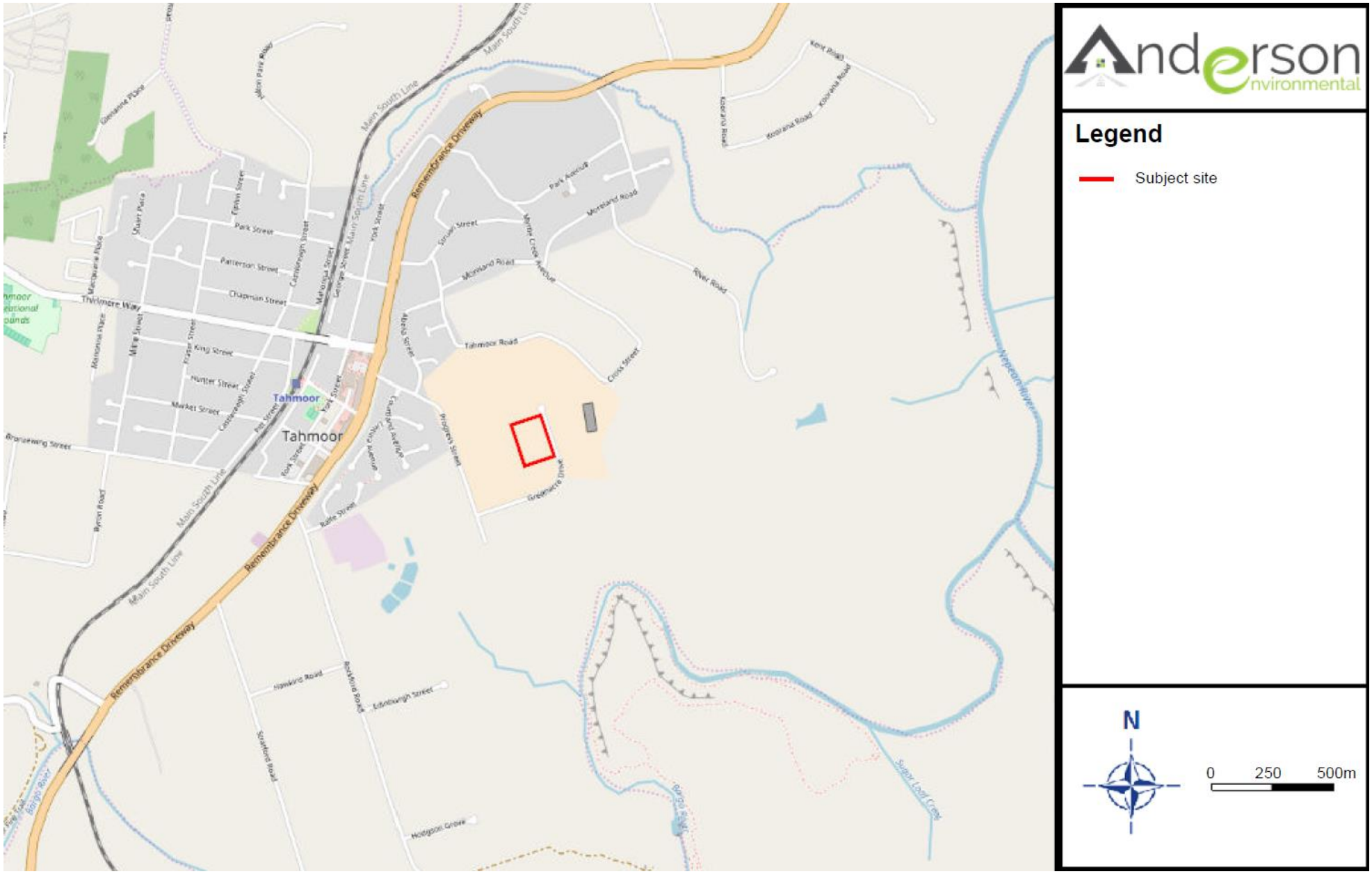

Figure 1.1: Location of the subject site showing local context

1.3 LEGISLATIVE REQUIREMENTS

This study and report was undertaken with reference to the requirements of the NSW *Environmental Planning and Assessment Act 1979* (EPA Act), the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The TSC Act has been repealed and replaced by the *Biodiversity Conservation Act 2016* (BC Act) as of 25/08/2017. However, under the Biodiversity Conservation (Savings and Transitional) Regulation 2017, The Wollondilly Shire LGA is listed as an interim designated area. Applications for development consent (excluding state significant development) may be submitted under the repealed legislation for a period of 12 months from the new act coming into force. Consequently, the proposed development has been assessed under the previous legislation.

This assessment also considered the requirements of the Wollondilly Shire Council Development Control Plan (DCP) 2016 and the LEP 2011. Reference was also made to the *Fisheries Management Act 1994* (FM Act), the *National Parks and Wildlife Act 1974* (NPW Act) and the State Environmental Planning Policy 44 (SEPP44) - Koala Habitat Protection. The site was also assessed in relation to the 'improve or maintain principals' adopted by most local councils.

1.4 LIMITATIONS

No survey can detect all species at any one point in time however allowances were made for species which may occur based on known current research and habitat preferences. The survey recorded species as they were encountered, and the survey aimed to detect threatened species or Threatened Ecological Communities (TECs) as listed under state and federal legislation. The survey focussed on the identification of the vegetation communities and any threatened flora or potential habitat for threatened flora. No attempt was made to record every single species on the site and not all specimens are visible in all seasons. Surveys for fauna entailed detailed habitat searches.

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All figures in this report (with the exception of the site plan in the appendices) are to be considered indicative. Anderson Environmental accepts no responsibility for decisions taken on the ground based on these figures.

2. METHODOLOGY

The assessment of the subject site was carried out between 10:00 and 16:00 on 04/06/2018. The assessment was carried out by Bo Davidson (M. Environment 2013). Bo Davidson has five years' experience conducting flora and fauna assessment throughout the Greater Sydney, New England and South Coast regions.

Weather conditions were partly overcast and cool during the survey, see **Table 2.1** below.

Table 2.1: Weather conditions on date of survey

Date	Minimum temperature (*C)	Maximum temperature (*C)	Rainfall (mm)
04/06/2018	8.0	18.0	0.0

Source: Australian Bureau of Meteorology, Camden Airport weather station

Due to prolonged dry conditions and the time of survey (early winter), the majority of the ground stratum vegetation was dry and/or dormant. This rendered identification of grasses without remnant seed heads difficult and the majority of annual flora species would not have been present above ground during the survey period.

2.1 DESKTOP STUDY

Prior to the commencement of field surveys an extensive desktop study was conducted.

The desktop study consulted a variety of secondary sources, comprising:

- The NSW Office of Environment (OEH) Bionet Atlas database;
- The federal Protected Matters Search Tool (PMST);
- Vegetation mapping from OEH and the NPWS;
- Aerial imagery of the subject site and local area;
- Relevant State Environmental Planning Policies (SEPPs); and
- The NSW scientific determinations for threatened species and TECs.

This background research was used to inform the following field surveys. It assisted in the identification of areas of potential TECs on the subject site, potential microhabitats (creeklines, waterbodies etc.) as well as threatened species known to occur in the local area which could be present on the subject site.

2.2 FLORA

2.2.1 Methodology

The survey involved two assessment techniques; a random meander survey and three vegetation plots.

The random meander encompassed the entire subject site with a greater emphasis on key microhabitat features (native vegetation, rock outcroppings etc.). This survey included targeted searches for endangered species, populations and communities known to occur within the LGA and within 10km, as identified in the desktop study. Landscape features were also recorded for greater ecological context.

Three 20x50m vegetation plots within the subject site were surveyed to assess the accuracy of the vegetation mapping consulted during the desktop study. The plots were surveyed using methodology from the Office of Environmental and Heritage (OEH) Biodiversity Assessment Method (BAM). Data comprising species diversity and Foliage Projective Cover (FPC) for all strata as well as important habitat data (leaf litter cover, number of habitat-bearing trees, total length of fallen logs etc.) were recorded.

Figure 2.1 below shows the location of the vegetation plots.

2.2.2 Taxonomy and References

Taxonomy is from Harden (1990 – 1993, 2000 and 2002) and from any recent updates from the Royal Botanic Gardens (RBG), Sydney. The main references in this assessment included; NSW National Parks and Wildlife Service (NPWS) (1997), Robinson, L (1997), Fairley, A and Moore, P (1995), Threatened Species Profiles compiled by NSW NPWS and from field and research experience.

2.3 FAUNA

2.3.1 Methodology

The methodology for the survey involved searching subject site for any evidence of threatened fauna species or potential habitat in terms of sheltering/foraging/breeding for any threatened fauna. The methodology for these surveys encompassed the following.

- Opportunistic Observations – Opportunistic observations of fauna species through visual sighting or auditory confirmation, while searching for potential habitat was conducted throughout the survey areas;
- Habitat Analysis – Assessments of potential habitat for threatened species was undertaken. This included an assessment of the condition of the habitat once found; and
- Searches for Indirect Evidence of Fauna Species – This included searching for glider chews, scratches on eucalypts, diggings, borrowings, scats, tracks, searches for owl pellets, owl whitewash, and identification of any specific habitat components for threatened fauna. Logs were turned over in search of reptiles then replaced in their original positions. Similarly, thick understory and dense thickets were also investigated for ground dwelling fauna and small bush birds.

Areas or items of significant fauna habitat value (rock outcrops, caves and crevices, waterbodies and creeklines, habitat-bearing trees etc.) were noted, locations recorded using a GPS device and representative photos taken where relevant. For habitat-bearing trees the following additional data was collected:

- Tree species;
- Height in meters;
- Diameter at Breast Height (DBH) in millimetres;
- Number of hollows present;
- Size class of hollows (S=5-15cm, M=15-25cm and L=25+cm); and
- Other notable observations (presence of fauna or signs of inhabitation etc.).

2.3.1.1 State Environmental Planning Policy 44 – Koala Habitat Protection

SEPP44 applies to the Wollondilly Shire LGA. As required under the SEPP, analysis of the tree species present on the subject site was undertaken to determine whether the site conformed to potential Koala (*Phascolarctos cinereus*) habitat, as defined in SEPP44.

Potential Koala habitat is defined by vegetation where listed feed tree species constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. The feed tree species listed in **Schedule 2** of SEPP44 are shown in **Table 2.2** below.

Table 2.2: Koala feed tree species

Scientific Name	Common Name
Eucalyptus albens	White Box
Eucalyptus camaldulensis	River Red Gum
Eucalyptus haemastoma	Broad-leaved Scribbly Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus populnea	Poplar Box
Eucalyptus. punctata	Grey Gum
Eucalyptus robusta	Swamp Mahogany
Eucalyptus signata	Scribbly Gum
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus viminalis	Ribbon Gum

Under SEPP44 areas conforming to potential Koala habitat require additional survey and analysis of locality records to determine the presence (or likely presence) of Koalas, and therefore whether the site conforms to core Koala habitat, as defined in the SEPP. Under the SEPP core Koala habitat is defined as:

> *An area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population*

During surveys inspections for living Koalas in the canopy was conducted throughout the remnant woodland areas as well as for scats and claw marks on large eucalypts. This survey conformed to the 'Strip Transects' diurnal survey technique as defined in **Table 2** (**Page 23**) of the Australian Government EPBC Act Referral Guidelines for the Vulnerable Koala (Australian Government 2014). This technique is appropriate for small sites.

2.3.2 Taxonomy and References

Taxonomy is from the following sources; Mammals (Churchill, 2009 and Strahan, 1995), Reptiles and Amphibians (Cogger, 1994), and Birds (Simpson and Day 1993). The main references utilised for this assessment included; Strahan, R (1995), Cogger, H (1994), Simpson and Day (1993), State Forests of NSW (1995), Robinson M (1995), Threatened Species Profiles compiled by NSW NPWS and from field and research experience of the authors.

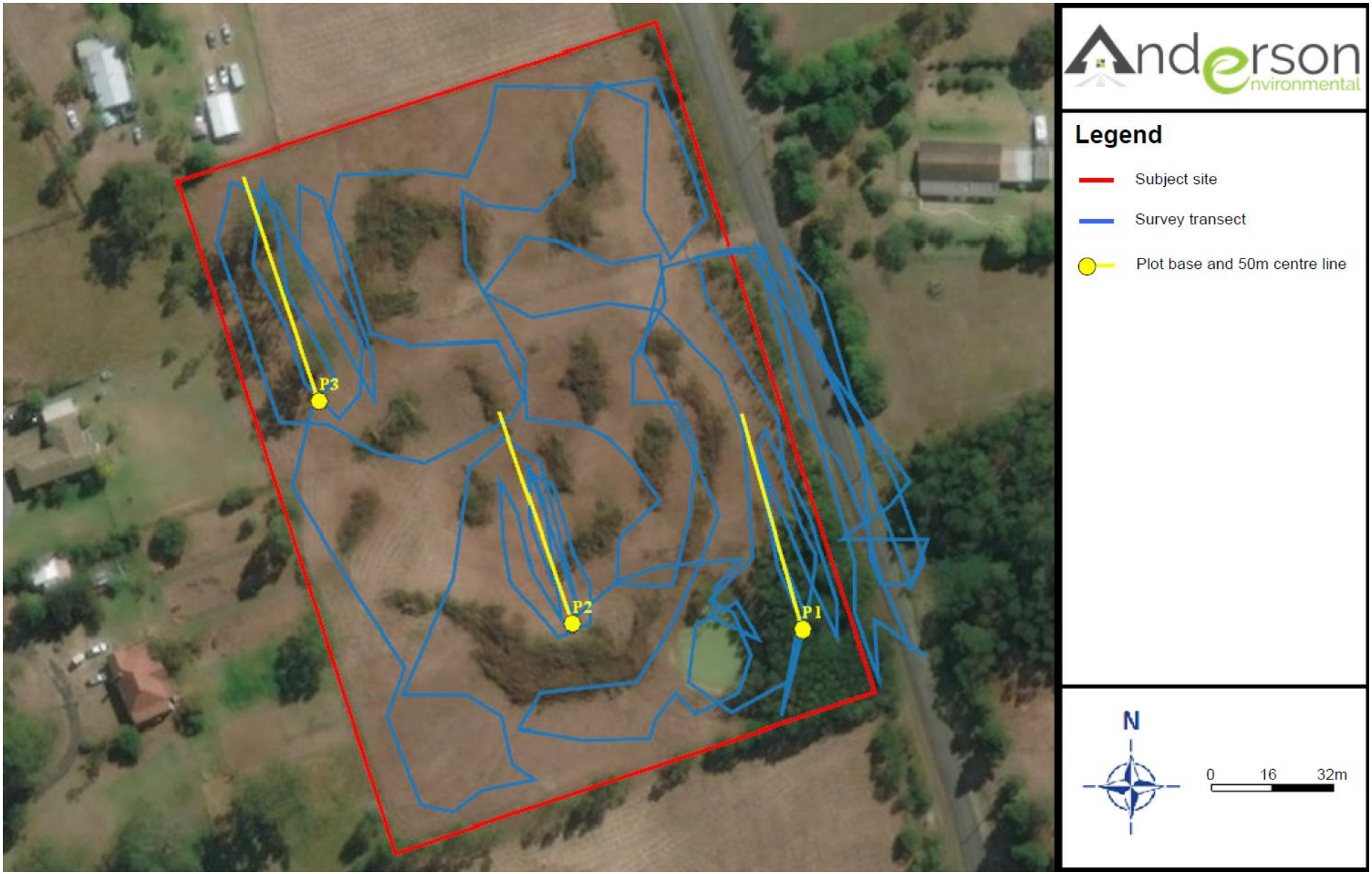

Figure 2.1: Survey effort

3. RESULTS

3.1 FLORA

The full list of flora species recorded is provided in **Appendix 3**. As discussed above, the subject site is largely composed of recently cleared lands dominated by exotic grasses and weeds with numerous log dumps. Remnant native vegetation is largely restricted to acacia-dominated regrowth in the south-east corner and three large *Eucalyptus tereticornis* (Forest Red Gum) in the north-west corner. Low regenerating native woodlands are also present in the south-west corner. The native vegetation is overall highly disturbed with occurrences throughout lacking one or more strata and a high presence of exotic weeds throughout, see **Photograph 3.1**, **Photograph 3.2**, **Photograph 3.3** and **Photograph 3.4** below.

Photograph 3.1: Cleared exotic grasslands and log dumps

Photograph 3.2: Acacia regrowth in the south-east corner of the subject site

Photograph 3.3: Remaining mature eucalypts in the north-west corner of the subject site

Photograph 3.4: Low regenerating native woodlands in the south-west corner of the subject site

The subject site is located within the Cumberland sub-region of the Sydney Basin bioregion under the Interim Biogeographic Regionalisation for Australia (IBRA) and within the Cumberland Mitchell Landscape.

3.1.1 *Vegetation Communities*

As discussed in **Section 2.1** vegetation mapping from the OEH and NPWS databases were consulted during the desktop study. These two mapping resources identified the vegetation of the subject site as Shale Sandstone Transition Forest (SSTF) – High Sandstone Influence; this community is listed as critically endangered under the TSC Act and EPBC Act. Although indicative SSTF species were observed in the locality, the native vegetation on the subject site was assessed as conforming more closely to Cumberland Plain Woodland (CPW). Comparison with the approved representative species lists under the scientific determination listings for both communities concluded that the overall species diversity was slightly more closely aligned to CPW (nine listed CPW species compared to eight listed SSTF species) (see the vegetation plot data in **Appendix 4**). The subject site also lacked stringybark eucalypt species, typical of SSTF occurrences. CPW is also listed as critically endangered under the TSC Act and EPBC Act.

Assessed against the OEH recognised Plant Community Types (PCT) database, the vegetation on the subject site conforms most strongly to the PCT 'Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT ID: 850)'. This is a recognised PCT under the CPW TEC classification.

Vegetation mapping for the subject site is shown in **Figure 3.1**, based on the OEH mapping and survey data collected by Anderson Environmental. This identified two vegetation communities on the subject site; CPW and exotic grasslands. These communities are discussed in more detail below. **Figure 3.2** provides locality vegetation mapping from OEH as well as recorded threatened flora data records from within an assessment buffer of 1 500m from the borders of the subject site. These maps also show the location of Cumberland Plain priority conservation lands in the locality, a portion of which are located approximately 240m to the south of the

subject site.

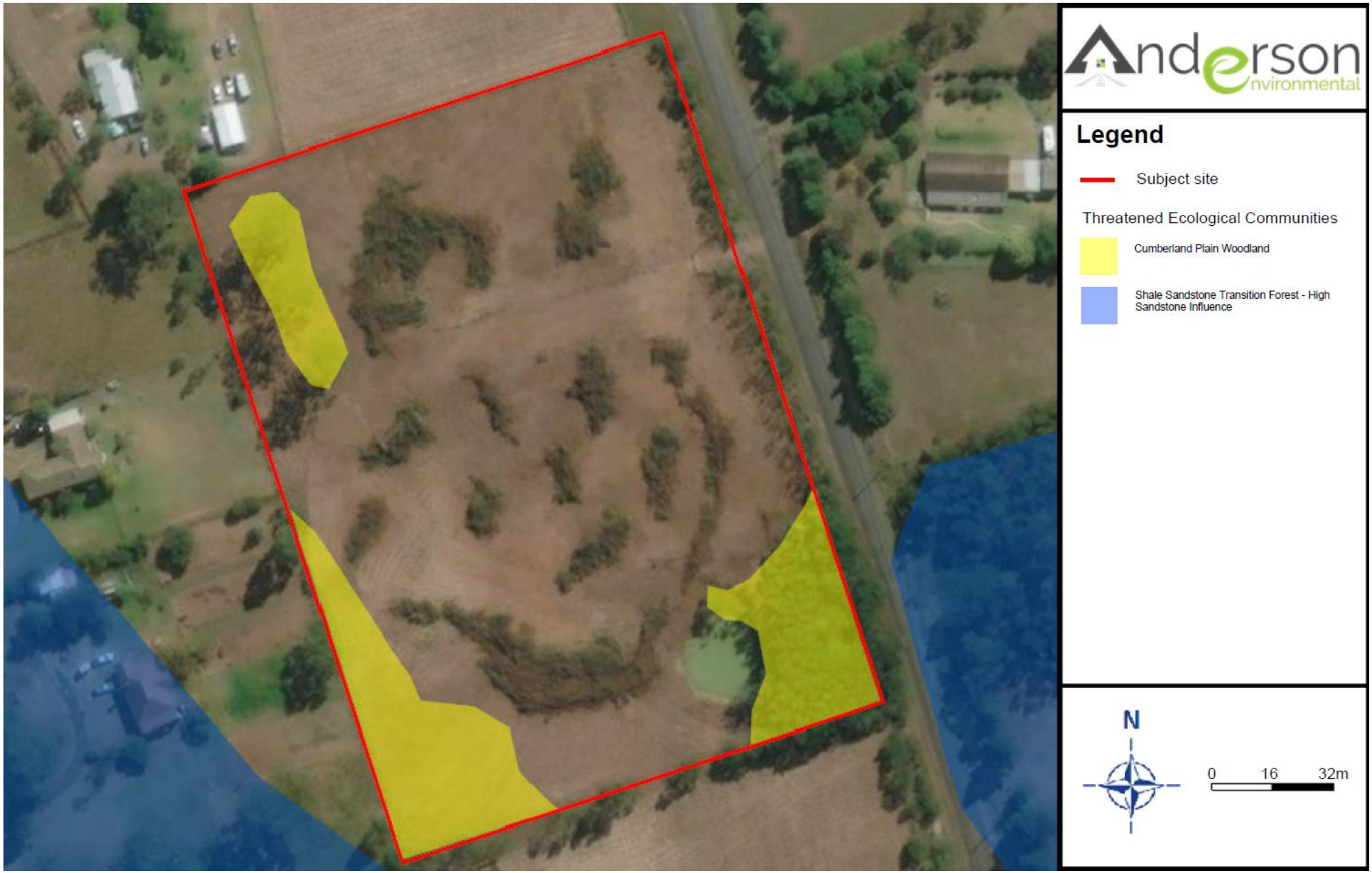

Figure 3.1: Subject site vegetation mapping

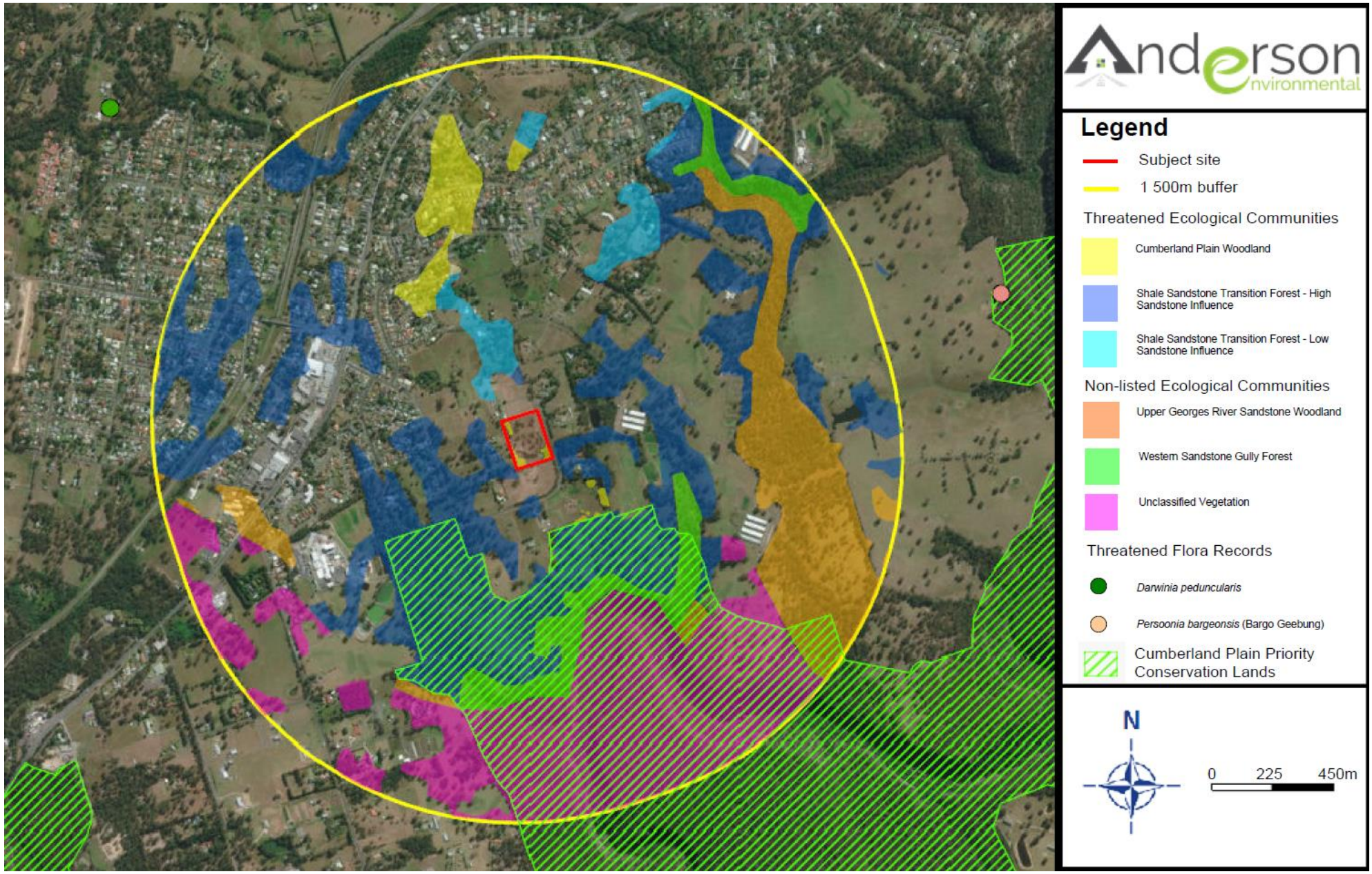

Figure 3.2: Locality vegetation mapping and location of threatened flora

Table 3.1 below provides the legislative status and approximate area occupied by these three communities in the subject site.

Table 3.1: Estimated area occupied by vegetation communities

Community	Status TSC Act	Status EPBC Act	Approximate area within the subject site (ha)	Approximate area within the assessment buffer (ha)
Exotic grasslands*	Not listed	Not listed	1.93	376.5
Cumberland Plain Woodland	Critically Endangered	Critically Endangered	0.37	15.0
Total			2.3	391.5

**On the locality scale this community includes urban areas and exotic woody vegetation*

3.1.2 Vegetation Analysis (Significance and Heritage)

3.1.2.1 Exotic grasslands

This community occurred across the majority of the subject site. It was characterised by cleared open areas dominated by exotic pasture grasses such as *Eragrostis curvula* (African Love Grass), *Paspalum dilatatum* (Paspalum), *Pennisetum clandestinum* (Kikuyu Grass) and *Phalaris aquatica* (Harding Grass) as well as soft weeds including *Conyza bonariensis* (Flaxleaf Fleabane) and *Verbena ssp.* (Purpletops). Significant populations of native *Cynodon dactylon* (Couch Grass) were also present in some locations. Large stands of *Rubus fruticosus* aggregate (Blackberry) were present throughout this area. Scattered native shrubs such as *Acacia parramattensis* (Parramatta Wattle) and *Callistemon linearis* (Narrow-leaved Bottlebrush) were also observed.

The scattered log dumps were observed to contain predominantly acacia logs with several large eucalypt logs also observed as well as logs of exotic species such as *Pinus radiata* (Radiata Pine). Based on the contents of these logs dumps and analysis of aerial photos the subject site is assumed to have resembled remaining vegetation in the south-east corner prior to clearing works in 2016.

Exotic grasslands provide limited floral and faunal habitat. They provide grazing resources for native species such as the Common Wallaroo (*Macropus robustus robustus*) and seed resources for small woodland and forest edge birds such as the Red-browed Finch (*Neochmia temporalis*). The dense *R. fruticosus* stands also provide refuge and breeding resources for other small native birds, including the Superb Fairy-wren (*Malurus cyaneus*). The log dumps also provide sheltering and refuge locations for native species such as the Common Wallaroo and Swamp Wallaby (*Wallabia bicolor*) as well as the exotic Brown Rat (*Rattus norvegicus*) and European Rabbit (*Oryctolagus cuniculus*). All of the above species were observed on the subject site habitat during surveys.

3.1.2.2 Cumberland Plain Woodland

The community description below is taken from the OEH threatened species profiles.

The dominant canopy trees of Cumberland Plain Woodland are *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), and it is common to find abundant grasses such as *Themeda australis* (Kangaroo Grass) and *Microlaena stipoides* var. *stipoides* (Weeping Meadow Grass).

Occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, was extensive across the Cumberland Plain, western Sydney. Today, only 9 percent of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain. Good examples can be seen at Scheyville National Park and Mulgoa Nature Reserve.

Typically occurs on heavy clay soils derived from Wianamatta Shale. Well adapted to drought and fire, and the understorey plants often rely on underground tubers or profuse annual seed production to survive adverse conditions.

This community is present throughout the remaining stands of native vegetation on the subject site, with the highest condition remnants located in the north-west corner. This area exhibits mature examples of one characteristic canopy species (*E. tereticornis*) as well as a sparse native shrub and ground strata (*Acacia implexa* (Lightwood), *Glycine clandestina* (Twining Glycine) and *Juncus usitatis* (Common Rush)). Native vegetation in the south-east and south-west corners are in a more depauperate state, with no mature native trees and large populations of exotic weeds (mainly in the south-east).

An assessment of the potential impacts of the proposed development on this TEC under the EPBC Act and TSC Act is provided in **Appendix 2**.

3.1.3 Threatened flora

No threatened flora species were detected on the subject site during surveys. Based on data from the OEH Bionet Atlas a total of 15 threatened species have been recorded within 10km of the subject site, with the nearest occurring approximately 1.7km to the east (*Persoonia bargoensis* (Bargo Geebung) – listed as endangered under the TSC Act and vulnerable under the EPBC Act).

Surveys were conducted during an appropriate season for most of the threatened flora species known from the locality. Due to the small size and degraded condition of the subject site as well as the level of survey effort, none of these species are considered likely to be present on the subject site. The potential impact of the proposed development on all threatened flora known to occur in the Wollondilly Shire Council LGA are assessed in the species assessment table, found in **Appendix 6**.

3.2 FAUNA

3.2.1 Fauna Habitat

The subject site contains limited habitat for native fauna. The most important habitat features of the subject site comprise:

- One habitat tree;
- Waterbody; and
- Several log dumps.

The location of the waterbody and habitat tree on the subject site is shown in **Figure 3.3** below. The log dumps are also clearly visible in this image.

The wider locality includes numerous fauna habitat features, including the Bargo River, numerous creeks and drainage lines, waterbodies and large areas of native vegetation. Cliff lines along the Bargo River to the south also provide shelter and breeding resources for species such as cave-dwelling bats, reptiles and terrestrial marsupials. The location of these features and threatened fauna records from the locality are provided in **Figure 3.4** below.

Figure 3.3: Significant fauna habitat on the subject site

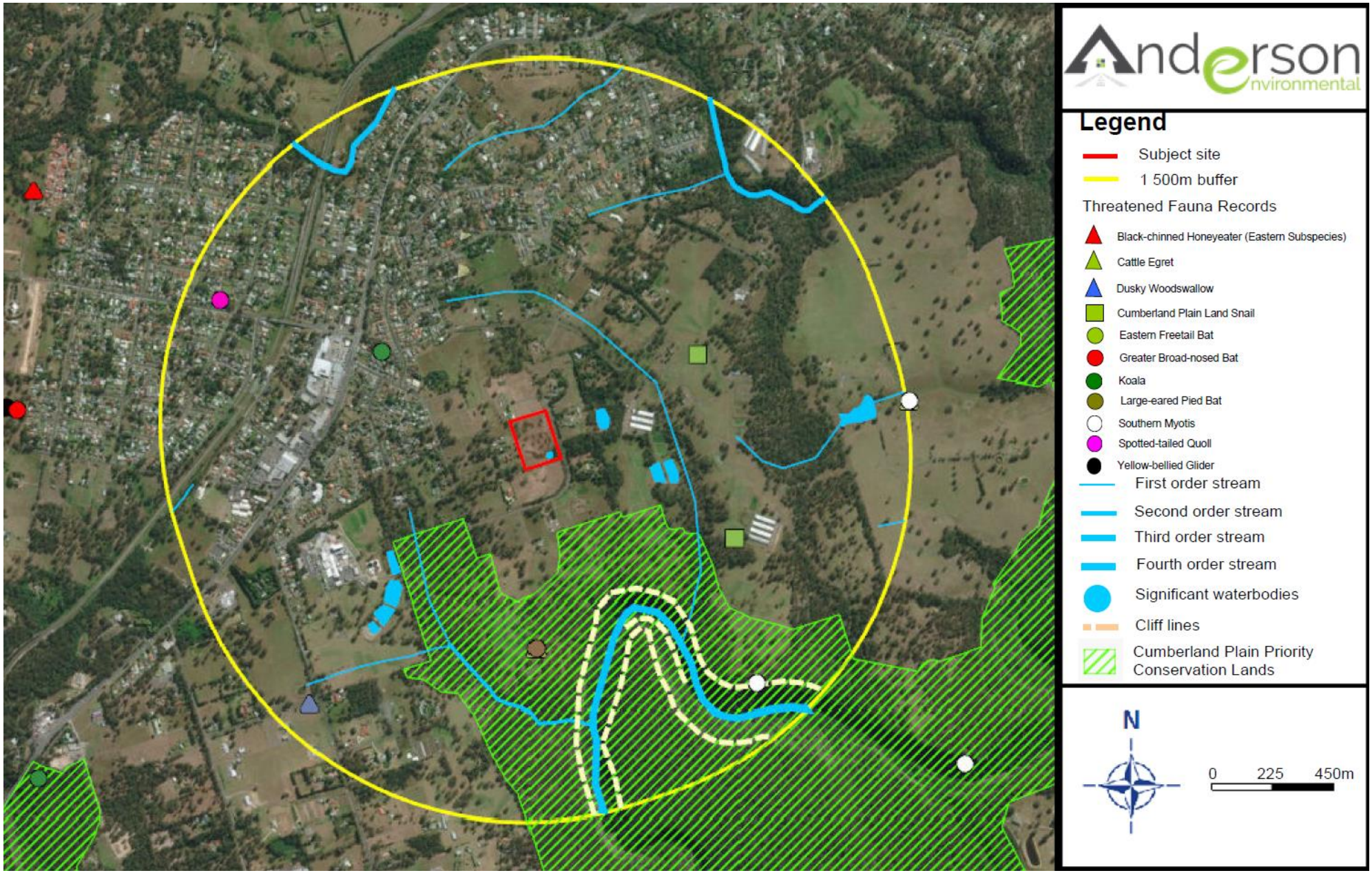

Figure 3.4: Significant fauna habitat in the local area and location of threatened fauna records

A single habitat tree was observed in one the remnant eucalypts in the north-west corner of the subject site. The details of this tree are provided in **Table 3.2** below.

Table 3.2: Habitat tree data

Tree number	Scientific name	Common name	Height (m)	DBH (mm)*	Number of hollows	Hollow class**	Notes
1	*Eucalyptus tereticornis*	Forest Red Gum	19	800	1	L	At main trunk cleft near to ground

**Diameter at Breast Height (140cm above ground level)*
***S=5-15cm, M=16-25cm, L=26+cm*

This hollow represents a potential roosting and breeding resource for local hollow-dependent birds and mammals, see **Photograph 3.5** below.

Photograph 3.5: Hollow in habitat tree

3.2.2 Amphibians

The subject site supported one small waterbody in the south-east corner. At the time of survey this waterbody contained significant standing water, but no riparian or aquatic vegetation was present, see **Photograph 3.6** below. No amphibians were observed or heard calling during surveys; however, due to the prolonged dry period prior to survey, conditions were not considered suitable for detection.

Photograph 3.6: Waterbody in the south-east corner of the subject site

No threatened amphibians are known from occurrence records in the locality and none are considered likely to occur on the subject site. An assessment of the potential impact of the proposed development on all threatened amphibian species known to occur in the Wollondilly Shire Council LGA is provided in **Appendix 6**.

3.2.3 Birds

The subject site provides foraging, breeding and roosting resources for a variety of native bird species. Numerous common woodland and forest edge birds including the Australian Raven (*Corvus coronoides*), Magpie Lark (*Grallina cyanoleuca*), Noisy Miner (*Manorina melanocephala*) and the Superb Fairy-wren were observed or heard calling during surveys.

The single hollow-bearing tree provides potential breeding resources for hollow-dependent native birds such as cockatoos, owls and parrots. However, this hollow is quite exposed and would therefore likely be utilised by more disturbance tolerant species such as the non-threatened Sulphur-crested Cockatoo (*Cacatua galerita*) or exotic Common Myna (*Acridotheres tristis*). No evidence of the presence of large woodland bird species such as significant areas of whitewash under trees or regurgitated pellets were observed. This hollow is not considered likely to be utilised by threatened hollow-dependent bird species known to occur in the locality.

The banks of the small waterbody were marked with numerous bird tracks, indicating that this resource is utilised by resident populations of native waterfowl. A single waterfowl species, the White-necked Heron (*Ardea pacifica*) was observed on the banks of this waterbody during surveys.

The numerous log dumps on the subject site provide refuge for native birds, with several native species observed roosting or foraging in these dumps during surveys. However, dense vegetation and thickets are not limited in the locality.

A single listed species, the Welcome Swallow (*Hirundo neoxena*) was observed during surveys. This species is listed as 'Marine' under the EPBC Act. Marine species fall under the protection of 'Commonwealth Marine Areas' as defined in **Section 24** of the EPBC Act. As the subject site is not located within a Commonwealth Marine Area, assessment of the impact of the proposed development on this species is not required as part of this FFA.

An assessment of the potential impact of the proposed development on all threatened bird species known to occur in the Wollondilly Shire Council LGA is provided in **Appendix 6**.

3.2.4 Invertebrates

One threatened invertebrate is considered likely to occur on the subject site, the Cumberland Plain Land Snail (*Meridolum corneovirens*), which is listed as endangered under the TSC Act. Although not documented on the subject site, two empty shells were located at the base of a mature eucalypt on a nearby site during recent surveys by Anderson Environmental within 250m of the subject site (Anderson Environmental 2018). The subject site contains suitable woodland habitat on the Cumberland Plain and the species is also known from numerous contemporary records in the locality.

Consequently, the potential impacts of the proposed development on this species are assessed in **Appendix 2**. The impact of the proposed development on all threatened invertebrate species known to occur in the Wollondilly Shire Council LGA is assessed in **Appendix 6**.

3.2.5 Mammals

The subject site contains foraging, refuge and breeding habitat for native mammals in the form of native woodlands, grasslands and hollow-bearing trees. Two native mammal species were observed during the survey, the Common Wallaroo (*Macropus robustus robustus*) and the Swamp Wallaby (*Wallabia bicolor*). Numerous feral and domestic exotic mammal species were also observed or inferred from signs (scats, diggings etc.) including the Domestic Sheep (*Ovis aries*), European Rabbit (*Oryctolagus cuniculus*) and Feral Goat (*Capra aegagrus hircus*).

The subject site is considered to contain important habitat features for the following threatened fauna known to occur in the locality, in the form of remnant native eucalypts and/or the hollow-bearing tree:

- Eastern Freetail Bat (*Mormopterus norfolkensis*) – listed as vulnerable under the TSC Act;
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) – listed as vulnerable under the TSC Act;
- Koala (*Phascolarctos cinereus*) – listed as vulnerable under the TSC Act and EPBC Act; and
- Little Bentwing Bat (*Miniopterus australis*) – listed as vulnerable under the TSC Act.

All of these species are known from contemporary records in the locality, with the nearest (a Koala record) approximately 500m to the north-west of the subject site (2012).

Consequently, the potential impact of the proposed development on these species has been assessed under the TSC Act and/or EPBC Act in **Appendix 2**. Other hollow-dependent threatened mammal species known to occur in the locality (possums and gliders) are considered unlikely to utilise the hollow present due to its exposure, lack of connecting canopy vegetation (approximately 80m to the nearest significant stand of native forest) and the observed terrestrial exotic predator present (dogs on nearby properties). Microbat species are considered to have potential to utilise this hollow as they are not susceptible to terrestrial predators and due to their aerial habitat are not as limited as other species by a lack of connecting habitat. The Southern Myotis (*Myotis macropus*) – listed as vulnerable under the TSC Act is also known from the locality and utilises tree hollows for roosting. However, this species has a preference for riparian vegetation which is not present on the subject site.

The numerous log dumps on the subject site provide refuge for native mammals, with macropods observed to be resting within these resources during surveys. The waterbody was also observed to be regularly used by native macropods as a water source. However, these resources are not limited in the locality.

The impact of the proposed development on all threatened mammal species known to occur in the Wollondilly Shire Council LGA is assessed in **Appendix 6**.

3.2.5.1 Koala (Phascolarctos cinereus)

No individual Koalas or identifiable scats or claw marks were detected during survey.

Eucalyptus tereticornis was the only eucalypt species identified on the subject site and the only tree species present as mature canopy individuals. As detailed in **Table 2.2** this is a primary feed tree species for the Koala under **Schedule 2** of SEPP44. Consequently, the woodlands of the subject site are considered to meet the SEPP44 definition for potential Koala habitat (**Part 1** (**4**) - Definitions) '*areas of native vegetation where the trees of the types listed in **Schedule 2** constitute at least 15% of the total number of trees in the upper or lower strata of the tree component*'. Remaining vegetation on the subject site is either too young to support Koala browsing or composed of non-feed tree species (acacia thicket in the south-east corner).

The present trees in the north-west corner are considered unlikely to be regularly utilised by this species due to their relative isolation from nearby stands of native forest. As detailed above, these trees are approximately 80m from the nearest significant stands of native forest. Koalas would need to cross open ground with a present population of known domestic predators (dogs) to access these resources.

Under SEPP44, an area meeting the potential Koala habitat definition is then required to be assessed under the core Koala habitat definition '*an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population*'.

Although not detected on the subject site during surveys, this species is known from 14 contemporary records from the locality (within 10km) in the NSW Bionet Atlas database (time period 1994-2017). The nearest of which is from southern Tahmoor, approximately 500m to the north-west of the subject site (from 2012) and the most recent (from 2017) from Tickle

Drive on the north side of Tahmoor, approximately 2.2km to the north-west the subject site. This appears to meet the attributes of recent sightings and historical records of a population under the SEPP44 definition. Based on this assessment, the subject site is considered to meet the definition of core Koala habitat. However, as described above the resources on the subject site are considered unlikely to be regularly used by this species.

Consequently, the potential impacts of the proposed development on this species is assessed under the TSC Act and EPBC Act in **Appendix 2**.

3.2.6 Reptiles

Suitable reptile habitat is present on the subject site in the form of trees with loose bark, fallen timber and leaf litter. Small skinks were observed during inspections of leaf litter and fallen timber, however positive identification was not possible. Species were likely from the *Ctenotus* and *Lampropholis* genera.

No threatened reptiles are known from local occurrence records and none are considered likely to be present on the subject site. The impact of the proposed development on all threatened reptile species known to occur in the Wollondilly Shire Council LGA is assessed in **Appendix 6**.

4. IMPACT ASSESSMENT

4.1 INTRODUCTION

All developments have an impact on the floral and faunal values of a site. These consist of:

- Primary impacts such as the clearing of vegetation, waterbodies and other habitat features; and
- secondary impacts through mechanisms such as increased surface and sediment runoff, introduction of exotic weed species and diseases, increased disturbances through greater pedestrian and traffic utilisation, increased noise and light pollution and introduction of exotic domestic herbivores (sheep, cattle etc.) and predators (cats and dogs).

These impacts are associated with all phases of a development, from initial construction through to occupancy by new landowners/tenants.

Although all proposed developments have impacts on floral and faunal values, a biodiversity sensitive approach can lead to a substantial decrease the in potential impacts of any development. In addition, a variety of techniques and technologies are available to reduce the potential impacts of a proposed development throughout all stages.

This section provides an assessment of the impacts of the proposed development in its current form (as shown in the site plan in **Appendix 7**) and makes suggestions for an alternative approach to reduce potential impacts or provide suitable compensation for these impacts.

The proposed development would remove all native vegetation and fauna habitat features from, the subject site. This section discusses the potential impacts on the floral and faunal values of this proposal on the subject site and wider locality.

4.2 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT PLAN

4.2.1 Flora

The native vegetation within the subject site is representative of CPW, a listed threatened community under the TSC Act and EPBC Act. As detailed in **Section 3.1.1**, CPW occupies approximately 0.37ha (16%) of the subject site and the occurrence on the subject site comprises approximately 2% of the total occurrence in the locality (within 1 500m of the subject site). This would be the only native vegetation community directly impacted upon by the proposed development with the remainder of the subject site comprising exotic grasslands and weed stands.

Areas of native vegetation downslope of the subject site would be vulnerable to secondary impacts through processes such as increased stormwater runoff, sedimentation from the earthworks for the proposed development and the potential introduction of exotic weeds. However, the Cumberland Plain Priority Conservation lands to the south are separated from the subject site by an intervening topographic low point and hence would be less vulnerable to these impacts. Overland flows from the subject site would discharge to the east across Greenacre Drive.

No threatened flora species were detected on the subject site and none are considered likely to be present.

4.2.2 EPBC Act TEC Condition Thresholds

Although portions of vegetation within subject site contain recognised CPW species under the EPBC Act, such vegetation is required to meet certain condition thresholds to qualify as the recognised TEC under this act. These thresholds are described in a flowchart of key diagnostic features on **Page 11** of the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest A Guide to Identifying and Protecting the Nationally Threatened Ecological Community *Environment Protection and Biodiversity Conservation Act 1999* Policy Statement 3.31 (Australian Government 2010).

Assessment of the stand of woodland within the subject site against these thresholds is as follows:

- Are native tree species present with a minimum projective foliage cover of 10%? – yes;
- Is the patch of the ecological community 0.5ha or greater in size? – yes;
- Of the perennial understory native vegetation cover present, is 50% made up of native species? – no;
    - Is the patch 5ha or greater in size? – yes;
        - Of the perennial understory vegetation cover present, is 30% made up of native species – no.

Based on this assessment, the woodland does not meet the minimum condition requirements for consideration under the EPBC Act (plot data is provided in **Appendix 4** for reference). Consequently, further consideration of this community under the EPBC Act is not required as part of this assessment. Further review through a referral to the federal Minister of the Environment is not considered necessary for this TEC.

4.2.3 Flora Conclusions

The proposed development would result in the removal of approximately 2% of the existing CPW within the local area. No threatened flora species were detected on the subject site and none are considered likely to be present.

The removal of a small amount of TEC from the locality is not considered to represent a significant impact on this community. Consequently, further assessment through a Species Impact Statement (SIS) (NSW) or a referral to the federal Minister of the Environment (federal) is not considered necessary for any TEC, flora species or population. However, the removal of TEC from the subject site is required to be offset through the NSW Biodiversity Offset Scheme (BOS), see **Section 4.3** below.

4.2.4 Fauna

As discussed in **Section 3.2** above the subject site contains limited important fauna habitat resources in the form of native woodlands, numerous log dumps, a small waterbody and one hollow-bearing tree. The proposed development would necessitate the removal of all fauna habitat from the subject site.

The hollow-bearing tree is considered to comprise potential roosting habitat for several threatened microbat species, known to utilise tree hollows. All of these species are known from contemporary occurrence records in the locality. The removal of this tree hollow is not considered to represent a significant impact on these species in the locality; it represents a single, small roosting resource and large areas of native vegetation with mature trees are present in the locality sheds. The proposed development is not considered likely to have a significant impact on these species in the locality. Other arboreal threatened, hollow-using mammal species are considered unlikely to utilise this hollow due to its exposed location and relative isolation from nearby native vegetation.

Two empty shells of the Cumberland Plain Land Snail (*Meridolum corneovirens*) were found during recent site surveys of a nearby lot to the south-east, indicating that this species utilises the habitat of the immediate locality. All suitable habitat on the subject site for this species would be removed by the proposed development. However, this would represent only a small decrease in available habitat for this species and is not considered to represent a significant impact on the locality scale.

The waterbody and log dumps are considered to represent limited fauna habitat value. The waterbody is small and lacks significant riparian and aquatic vegetation. The log dumps are exposed and provide refuge for exotic species. These resources are also not limited in the locality.

4.2.4.1 State Environmental Planning Policy 44 – Koala Habitat Protection

As detailed in **Section 3.2.5.1** above, the subject site is considered to meet the definition of core Koala habitat as defined in SEPP44. Consequently, **Clause 9** of SEPP44 applies:

1. Before a Council may grant consent to a development application for consent to carry out development on land to which this Part applies that it is satisfied is a core Koala habitat, there must be a plan of management prepared in accordance with **Part 3** that applies to the land; and
2. The Council's determination of the development application must not be inconsistent with the plan of management.

At the time of writing, Wollondilly Shire Council has not drafted a Koala Management Plan for the LGA. Consequently, if Council is satisfied that the subject site constitutes core Koala habitat, a plan of management as per **Part 3** of SEPP44 must be drafted prior to development consent. As per **Part 3** of SEPP44, such a plan may be prepared by any person but must be approved by Council and the Director-General of National Parks and Wildlife before it can take effect.

However, as detailed in the section above, although the subject site is considered to meet the definition of core Koala habitat under SEPP44, the species is considered unlikely to be utilising the resources of the subject site. The three mature feed trees in the north-west of the subject site are relatively isolated from nearby native vegetation and any local Koalas would need to cross open ground with a resident domestic dog population to access these trees.

4.2.4.2 EPBC Act Referral Guidelines for the Vulnerable Koala

The Australian government has produced a guideline for assessment of the potential impacts of a development on the Koala and its habitat, which provides habitat condition and impact thresholds for which a referral to the federal Minister of the Environment under the EPBC Act for a proposed development would be required (Australian Government 2014). This document was referenced as part of this assessment.

Table 4 (**Page 27**) of this document provides a Koala habitat assessment tool to determine habitat quality of a site for this species. A total condition score of five is the threshold at which an area is considered to constitute habitat '*critical to the survival of the Koala*'. The assessment for the subject site adapted from **Table 4** is provided in **Table 4.1** below.

Table 4.1: Assessment of the subject site against EPBC Koala habitat assessment tool

Attribute	Score	Coastal*	Subject site assessment	Score
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 2 years	The nearest Koala record in the Bionet atlas database from approximately 500m to the north-west of the subject site is from 2012 (greater than 5 years ago). Another record from 2013 (within five years) is located slightly greater than 2km to the south-west of the subject site	0
	+1 (medium)	Evidence of one or more koalas within 2km of the edge of the impact area within the last 5 years		
	0 (low)	None of the above		
Vegetation composition	+2 (high)	Has forest or woodland with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata	Subject site contains one food tree species (*Eucalyptus tereticornis*)	1
	+1 (medium)	Has forest or woodland with only 1 species of known koala food tree present		
	0 (low)	None of the above		
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 500ha	Subject site has connectivity with forest and woodland vegetation along the Bargo River to the south, which is contiguous with an area greater than 500ha in the wider landscape	2
	+1 (medium)	Area is part of a contiguous landscape < 500ha, but ≥ 300ha		
	0 (low)	None of the above		
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	The local area has relatively low levels of traffic and low speed limits, therefore Koala mortality from vehicle strike is considered low.	1

Attribute	Score	Coastal*	Subject site assessment	Score
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present	Dogs are present in the locality and therefore pose a predation threat to the Koala population	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present		
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1	Interim objectives are as follows: ➢ Protect and conserve large, connected areas of koala habitat, particularly large, connected areas that support koalas that are: • Of sufficient size to be genetically robust/operate as a viable sub-population **OR** • Free of disease or have a very low incidence of disease **OR** • **Breeding.** ➢ Maintain corridors and connective habitat that allow movement of koalas between large areas of habitat. The subject site forms part of large connected areas of Koala habitat which supports a disease-free Koala population. However, the habitat to be removed from the subject site would not significantly reduce available habitat in the locality or remove any important corridor for Koala dispersal across the local landscape	0
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1		
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1		

Attribute	Score	Coastal*	Subject site assessment	Score
Total score				4

**Guideline specifies different attributes for coastal and inland area. As the subject site is located within coastal lands, the inland attributes have been omitted*

Under the guidelines, sites meeting a habitat score of ≥5 are required to be assessed with regards to the potential impact of a proposed development on the population and its habitat and therefore whether a referral is recommended. As shown in **Table 4.1** above, the habitat of the subject site is considered to have a Koala habitat score of 4.

Therefore, based on this assessment process, further assessment through a referral to the Federal Minister of the Environment for the proposed development is not considered necessary for this species. This conclusion is corroborated by the results of the MNES significant impact criteria assessment for this species detailed in **Appendix 2**.

4.2.5 Fauna Conclusions

No threatened fauna species were encountered in the subject site during surveys; however, a variety of threatened fauna species are considered likely to occur based on the availability of suitable habitat and known occurrence records in the locality. The subject site supports limited key fauna habitat features, with a single hollow-bearing tree and a small waterbody lacking aquatic and riparian vegetation. The hollow-bearing trees is considered unlikely to be utilised by any threatened hollow-using fauna species with the exception of microbats, due to its exposed habitat and relative isolation from nearby native vegetation.

Assessment of the subject site and local Koala occurrence records concluded that the habitat present on the subject site appears to meet the definition of core Koala habitat, as defined in SEPP44. However, the present trees are considered unlikely to be utilised by this species due to their relative isolation from nearby stands of native forest. Koalas would need to cross open ground with a present population of known domestic predators (dogs) to access these resources. It is considered unlikely that this species would be using these trees on a regular basis. If Council is satisfied that this habitat does qualify as core Koala habitat, a management plan for this species must be drafted in accordance with **Part 9** of SEPP44 prior to the issuing of development consent.

Assessment through the federal EPBC Act Referral Guidelines for the Vulnerable Koala concluded that habitat critical to the survival of the Koala is not present (as defined in this document), therefore a referral to the federal Minister of the Environment is not required for this species.

The proposed development would remove a small portion of native woodland from the local area. This would not fragment or isolate habitat in the locality for any threatened fauna species identified and no species is considered dependent on the resources of the subject site for their long-term survival. Removal of the single hollow-bearing tree is not considered to represent a significant loss of roosting habitat for threatened tree-dwelling microbats. Large areas of native forest with mature trees capable of supporting hollows are present in the locality.

The waterbody and log dumps are considered to represent limited fauna habitat value. The waterbody is small and lacks significant riparian and aquatic vegetation. The log dumps are

exposed and provide refuge for exotic species. These resources are also not limited in the locality.

Consequently, further assessment through a SIS (NSW) or a referral to the federal Minister of the Environment (federal) is not considered necessary for any threatened fauna species or population.

4.2.6 Wollondilly Local Environmental Plan 2011

As per **Section 1.2.1** above, the existing native vegetation in the east and south of the subject site is mapped as Sensitive Land (Biodiversity) under this instrument, see **Figure 4.1** below. Under **Part 7.2** (**4**) of this instrument:

> *4 Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:*
>
> *a. The development is designed, sited and will be managed to avoid any adverse environmental impact, or*
>
> *b. If that impact cannot be avoided—the development is designed, sited and will be managed to minimise that impact, or*
>
> *c. If that impact cannot be minimised—the development will be managed to mitigate that impact.*

Based on the assessment detailed in this section, the proposed development is not considered to constitute a significant impact on the TEC in the locality and the removal of this vegetation would not isolate or fragment any other area of native vegetation on adjacent lands.

Further, the removal of this TEC is proposed to be compensated for through the NSW BOS and impacts on areas of adjacent retained native bushland can be minimised using appropriate design and development operational controls (sediment barriers etc.). See **Section 4.3** below for further information on these matters.

Based on this assessment, the proposed development is considered compliant with **Point c** (mitigate) of **Part 7.2** (**4**) of the LEP 2011.

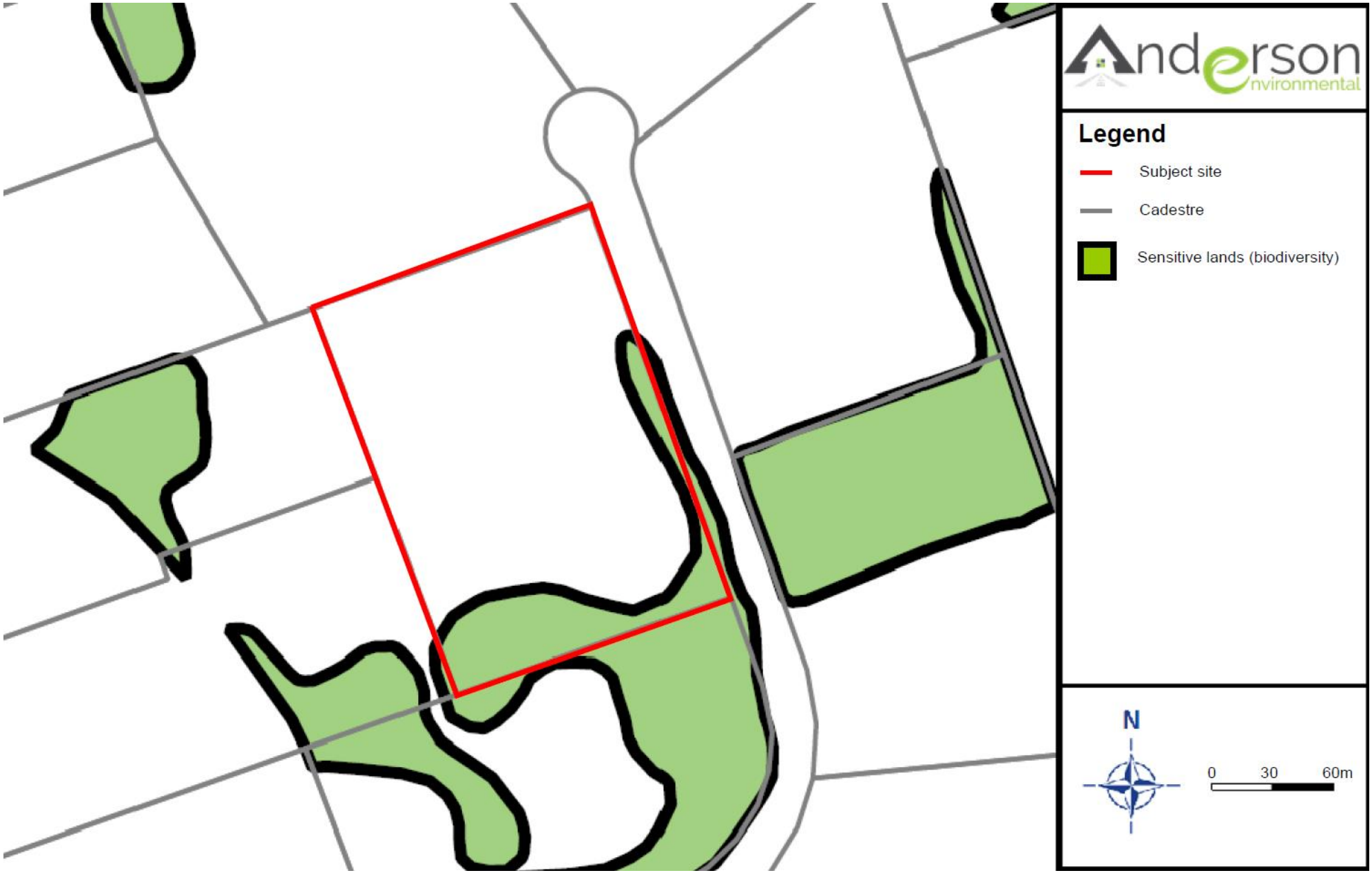

Figure 4.1: Sensitive land (biodiversity) under the Wollondilly LEP 2011 for the subject site

4.3 PROPOSED MITIGATION AND COMPENSATION MEASURES

When assessing the biodiversity impact of a proposed development the consideration of three approaches provides a comprehensive raft of potential options. These three approaches are listed in a descending order of best biodiversity outcomes:

- **Avoid:** modify the proposed development so no significant impact on resident biodiversity values would occur. This is typically impractical but can help guide mitigation measures;
- **Mitigate:** modify the proposed development to reduce the significant impacts on biodiversity values to the maximum extent possible. This is typically achieved through modification of proposed development envelopes to avoid removing native vegetation etc.; and
- **Compensate:** include measures in the proposed development to compensate for the biodiversity values lost. This can be achieved through an on-site offset (such as the proposed association lot) which reserves a portion of the subject site in perpetuity for conservation and rehabilitation purposes. It can also be achieved through an off-site offset under the NSW BOS. This allows for the proponent of a proposed development to purchase biodiversity credits of an equal value to the credit value of the biodiversity assets present on a subject site. These credits will then be used to preserve an area of equivalent biodiversity value off-site.

The proposed development would encompass the entire subject site and therefore would require the removal of all native vegetation. Avoidance and/or mitigation approaches are not feasible under the current development plan (see **Appendix 7**). Compensation is the only practical option to offset the potential impacts of the proposed development. This could only be achieved via an offsite offset through the NSW BOS.

As detailed in **Section 3.1.1** above, The CPW of the subject site conforms most closely to the PCT 'Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion' (PCT ID: 850).

Although the Wollondilly Shire LGA is listed as an interim designated area and therefore not subject to the BC Act and BAM until 25/08/2018, offsetting through the new BOS is recommended as this system is replacing the former Biobanking offsets scheme.

Using data collected from the survey plots (**Appendix 4**) and assessments of the likelihood of occurrence and habitat suitability detailed in this report, an estimate of the required offset credits under the BOS has been calculated through the online BAM Assessment Tool, **Table 4.2** below details the results of this calculation.

Table 4.2: Credit summary from the BAM Assessment Tool for the proposed development

Entity	Scientific name	Common name	PCT ID	Projected impact (ha)	Credit class	Number of biodiversity credits required for offset
Threatened Ecological Community	-	Cumberland Plain Woodland	850	0.3	Ecosystem	4
Threatened fauna	*Meridolum corneovirens*	Cumberland Plain Land Snail	-	0.3	Species	4
	Phascolarctos cinereus	Koala	-	0.3	Species	1*

**Credit requirement is lower for this species than the other listed entities as only a portion of the available habitat is considered suitable*

This is only an estimate through the online tool and does not constitute a formal credit report. If offsetting through the BOS is pursued, a formal credit report through the OEH will be required. See **Appendix 5** for the resulting BAM Assessment Tool credit report, which provides an estimated credit cost.

The removal of the hollow-bearing tree is to be supervised by a suitably trained and equipped wildlife handler. The hollow-sections of the tree (including any that may not be visible from the ground) is to be removed using soft-felling procedures (lowered) or thoroughly inspected prior to felling to determine that no resident faunae are present.

Additional potential impacts affecting the ecological values of the subject site and potential methods of mitigation are:

- Sediment and contaminant exposure caused by development construction. This is a common impact on retained vegetation when it occurs at a lower elevation to the development area; sediment fences and building platforms are the most effective means of preventing sediment migration during rainfall events. These controls are to be correctly installed and periodically inspected and repaired as required;
- Increased surface runoff from greater impermeable surface area following development. This has the potential to introduce sediment, increased nutrient loads and weed seed and propagules into adjacent retained vegetation. This can be ameliorated through appropriate development design which incorporates features such as permeable pavements, water gardens and an integrated stormwater management system which is designed to promote maximum water uptake prior to discharge to lower-lying areas; and
- Greater pedestrian and vehicle traffic increasing the level of disturbance and affecting the quality of adjacent habitat. These impacts are considered limited in the case of the subject site. The subject site is surrounded by already occupied lots and there is limited remnant vegetation on lands immediately abutting.

5 CONCLUSIONS

This report documents the results of an FFA conducted for a proposed development at number 45-65 Greenacre Drive, Tahmoor. The proposed development would be for a new residential estate.

The subject site is largely dominated by exotic grasslands and stands of weeds. A small portion of native vegetation is present in the north-west and south, which was assessed to conform most strongly to the TEC CPW. Due to the small size of the subject site and the level of survey conducted within areas of remnant native vegetation, no threatened flora species or populations are considered likely to be present. However, prolonged dry weather prior to survey resulted in sub-optimal flora survey conditions.

The subject site supports limited key fauna habitat features, with a single hollow-bearing tree, numerous log dumps and a small waterbody lacking significant aquatic and riparian vegetation. The hollow-bearing tree is considered to have potential to be used by threatened native tree-dwelling microbats. Other hollow-dependent threatened faunae are considered unlikely to utilise this habitat due to its relatively isolated habitat and distance to nearby stands of native vegetation. Two empty shells of the threatened Cumberland Plain Land Snail (*Meridolum corneovirens*) were found during site surveys of a lot to the south-east, indicating that this species utilises the habitat of the immediate locality.

SEPP44 – Koala Habitat Protection applies to the subject site. Although not detected on the subject site during surveys the remnant vegetation in the north-west corner of the subject site were assessed to meet the definition of potential Koala habitat under SEPP44 based on the presence of mature *Eucalyptus tereticornis* (a listed feed tree species for the Koala). This species is known from 14 contemporary records from the locality (within 10km) in the NSW Bionet Atlas. This meets the attributes of recent sightings and historical records of a population under the SEPP44 core Koala habitat definition. Based on this assessment, the subject site is considered to meet the definition of core Koala habitat under SEPP44. However, the present trees are considered unlikely to be utilised regularly by this species due to their relative isolation from nearby stands of native forest. Koalas would need to cross open ground with a present population of known domestic predators (dogs) to access these resources. If Council is satisfied that the subject site constitutes core Koala habitat, a plan of management as per **Part 3** of SEPP44 must be drafted prior to development consent.

The proposed development was not assessed to require referral to the federal Minister of the Environment for this species based on the methodology detailed in the 'EPBC Act Referral Guidelines for the Vulnerable Koala'. The habitat of the subject site was assessed as having an overall score of 4 under this methodology. A score of $\geq$5 is required to meet the definition of habitat critical to the survival of the Koala under this guideline.

The proposed development would require the removal of all CPW from the subject site as well as the waterbody, log dumps and the hollow-bearing tree. This would represent the removal of a small portion of native woodland from the local area and would not fragment or isolate habitat in the locality for any threatened species or population identified and no threatened species is considered dependent on the resources of the subject site for their long-term survival. Removal

of the hollow-bearing tree is not considered to represent a significant loss of roosting habitat for threatened tree-dwelling microbats. Large areas of native forest with mature trees capable of supporting hollows are present in the locality. The log dumps are waterbody are not considered limited habitat features in the locality.

No significant impact on any TEC, species or population is anticipated as a result of the proposed development. Consequently, further assessment through a SIS (NSW) or a referral to the federal Minister of the Environment (federal) is not considered necessary for any TEC, threatened species or population.

The TEC to be removed by the proposed development will require compensation. As it is not practical to offset this impact onsite; offsetting offsite through the NSW BOS is considered the most practical compensation method. If offsetting through the BOS is pursued, a formal credit report through the OEH will be required.

Appropriate design, control and site management measures will be required during all phases of development to minimise the impact on areas of adjacent native vegetation. The removal of the hollow-bearing tree is to be supervised by a suitably trained and equipped wildlife handler and the removal of all hollow-bearing features are to observe appropriate soft-felling procedures or hollows are to undergo thorough inspection for resident fauna immediately prior to removal.

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7 APPENDIX 1: DISCLAIMER AND LIMITATION OF LIABILITY

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8 APPENDIX 2: ASSESSMENTS OF SIGNIFICANCE

8.1 FLORA

8.1.1 Commonwealth Legislative Requirements

The *Environment Protection and Biodiversity Conservation Act 1999* lists Matters of National Environmental Significance (MNES) and provides administrative guidelines provided under the Act, for the assessment of these matters.

No listed floral MNES is considered likely to occur on the subject site. The one MNES identified (CPW), did not meet the condition thresholds for this community under the assessment guidelines, see **Section 4.2.2** of the above report.

No impact on any floral MNES is considered likely as a result of the proposed development.

8.1.2 NSW Legislative Requirements

Under **Section 5A** of the *Environmental Planning and Assessment Act 1979* (EPA Act) a Seven Part Test is required to determine "whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats" listed on **Schedule 1** or **Schedule 2** of the *Threatened Species Conservation Act 1995* (TSC Act), and consequently, whether a Species Impact Statement (SIS) is required.

8.1.2.1 Cumberland Plain Woodland in the Sydney Basin Bioregion

This community is listed as critically endangered under the TSC Act.

The dominant canopy trees of Cumberland Plain Woodland are *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), and it is common to find abundant grasses such as *Themeda australis* (Kangaroo Grass) and *Microlaena stipoides var. stipoides* (Weeping Meadow Grass). Contains many more species and other references should be consulted to identify these.

Occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, was extensive across the Cumberland Plain, western Sydney. Today, only 9 percent of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain. Good examples can be seen at Scheyville National Park and Mulgoa Nature Reserve.

Typically occurs on heavy clay soils derived from Wianamatta Shale. Well adapted to drought and fire, and the understorey plants often rely on underground tubers or profuse annual seed production to survive adverse conditions.

This community is present as several mature trees in the north-west and by regenerating remnants in the south of the subject site. The proposed development would result in the removal of the entirety of this occurrence.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;

Not applicable to a TEC.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction;

Not applicable to a TEC.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The subject site contains small stands of variable condition CPW, all of which would be removed by the proposed development. This represents a small portion of the total occurrence of CPW in the locality. The proposed development is not considered likely to place the local occurrence of this TEC at risk of extinction.

The total extent of CPW on the subject site would be removed by the proposed development. Similar vegetation is present on adjacent lands, which would not be directly impacted by the proposed development. The nearby native vegetation also supports significant weed populations and other signs of disturbance which are not considered likely to be significantly exacerbated by secondary impacts of the proposed development.

No significant impact on this community as a result of the proposed development is considered likely.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed; and

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii)the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development would remove the entire occurrence of this TEC from the subject site. However, this level of impact is not considered significant on the locality scale.

The TEC on the subject site has connectivity with similar native vegetation offsite to the west and east. The removal of this TEC from the subject site would not significantly increase fragmentation across the landscape. Vegetation on adjacent lots would retain a similar level of connectivity through vegetation to the north and south following development.

The CPW within the subject site represents a small occurrence in the locality which does not form part of a significant local habitat corridor and its removal is not considered a significant impact on vegetation cover or habitat contiguity on the locality scale. This portion on the subject site is not considered highly important to the long-term survival of this community in the local area.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);

No critical habitat for this TEC is listed under the TSC Act. The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under **Part 3**" of the Act. No critical habitat for this TEC would be impacted by the proposed development.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and

The Cumberland Plain Recovery Plan is relevant to this TEC. The objectives of this plan are as follows:

1. To build a protected area network, comprising public and private lands, focused on the priority conservation lands;
2. To deliver best practice management for threatened species, populations and ecological communities across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with conservation;
3. To develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program; and
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened species, populations and ecological communities, and thereby improve capacity to manage these in a strategic and effective manner.

The subject site does not occur within any priority conservation lands, as shown on **Page IV** of the plan. However, priority lands are present on land to the south of the subject site, along the Bargo River. The portions of these lands directly south of the subject site are separated by a topographic low point and therefore would not be particularly vulnerable to surface runoff from the subject site. These lands also support significant weed populations and the proposed development is not considered likely to exacerbate weed diversity and population densities on these lands.

The proposed development is not considered to be consistent with the objectives of this plan. The proposed development would remove portions of this TEC from the locality. However, the small amount of clearing required for the proposed development is not considered a significant reduction of this community in the locality and no significant isolation or fragmentation of native vegetation would occur as a result of the proposed development on the locality scale.

The 'Threat Abatement Plan for Disease in Natural Ecosystems Caused by *Phytophthora cinnamomi*' is relevant to this TEC. Developments can introduce this pathogen through unclean soil in fill or through infected plants.

The proposed development has the potential to introduce the pathogen through future works. However, with appropriate sediment and stormwater controls this risk can be minimised and is considered unlikely to impact on the retained portions of this TEC on adjacent lands.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development has the potential to contribute to the following KTPs on the subject site, relevant to this TEC:

- Clearing of native vegetation;
- Infection of native plants by *Phytophthora cinnamomi*;
- Loss of hollow-bearing trees; and
- Removal of dead wood and trees.

The proposed development would remove native vegetation, dead wood and trees and one hollow-bearing tree from the subject site. However, the level of impact is not considered significant on the locality scale and these habitat resources are not limited on adjacent lands.

The proposed development has the potential to introduce the *Phytophthora cinnamomi* pathogen through future works. However, with appropriate sediment and stormwater controls this risk can be minimised and is considered unlikely to impact on the retained portions of this TEC on adjacent lands.

The proposed development is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

The proposed development would remove a small portion of this TEC from the locality. The level of proposed clearing is not considered to represent a significant reduction of this TEC on the locality scale. Large areas of similar vegetation are present on adjacent lands which would not be directly affected by the proposed development.

The small amount of TEC to be removed is proposed to be offset through the NSW BOS, which would contribute to the long-term rehabilitation of this TEC.

8.1.3 Flora Conclusions

It was found that there is unlikely to be a significant impact on any threatened flora species, populations or TECs as a result to the proposed development. As such further assessment through a SIS (NSW) and/or a referral to the federal Minister for the Environment (federal) is not considered necessary. The proposed development complies with the 'improve or maintain principles' adopted by most councils in relation to biodiversity values.

8.2 FAUNA

8.2.1 Commonwealth Legislative Requirements

The *Environment Protection and Biodiversity Conservation Act 1999* lists Matters of National Environmental Significance (MNES) and provides administrative guidelines provided under the Act, for the assessment of these matters.

8.2.1.1 Koala (Phascolarctos cinereus)

This species is listed as vulnerable under the EPBC Act.

The Koala is an arboreal marsupial with fur ranging from grey to brown above and is white below. It has large furry ears, a prominent black nose and no tail. It spends most of its time in trees and has long, sharp claws, adapted for climbing. Adult males weigh 6 - 12 kg and adult females weigh 5 - 8 kg. During breeding, males advertise with loud snarling coughs and bellows.

The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW, it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands.

The Koala inhabits eucalypt woodlands and forests. It feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.

This species was not detected on the subject site during surveys; however, it is known from 14 contemporary records from within 10km of the subject site and suitable feed trees are present, which would be removed by the proposed development.

(a) Lead to a long-term decrease in the size of an important population of a species;

This species was not encountered on the subject site; however, it is known from contemporary records from within 10km and the subject site contains suitable feed tree species in the form of *Eucalyptus tereticornis*. The Wollondilly Shire LGA is known to support an important population of this species.

The available CPW habitat on the subject site would be removed by the proposed development. However, this is not considered to represent a significant reduction in available habitat for this species in the locality.

Removal of this habitat would not significantly fragment or isolate habitat for this species or significantly reduce mobility for this species across the local area.

(b) Reduce the area of occupancy of an important population;

The proposed development would reduce the available habitat for this species in the locality. However, this is not considered a significant reduction on the locality scale.

(c) Fragment an existing important population into two or more populations;

The available habitat on the subject site for this species does not have significant connectivity with similar native vegetation offsite. Members of this species would need to come to the ground to access these trees. The removal of this vegetation from the subject site would not significantly increase fragmentation across the landscape.

The proposed development is not considered likely to fragment available habitat for this species on the locality scale.

(d) Adversely affect habitat critical to the survival of a species;

The habitat of the subject site for this species is not considered critical habitat for this species in the local area, based on definitions under the EPBC Act Referral Guidelines for the Vulnerable Koala.

The proposed development is considered unlikely to adversely affect habitat critical to the survival of this species.

(e) Disrupt the breeding cycle of an important population;

An important population of this species is known to occur in the local area and suitable habitat is present on the subject site. The proposed development would remove all suitable habitat for this species from the subject site; however, this impact is not considered significant on the locality scale. This removal would also not significantly increase habitat fragmentation in the local area for this species.

The proposed development is considered unlikely to disrupt the breeding cycle of an important population of this species.

(f) Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The proposed development would remove all suitable habitat for this species from the subject site; however, this impact is not considered significant on the locality scale. This removal would also not significantly increase habitat fragmentation in the local area for this species. Potential secondary impacts on retained suitable habitat on adjacent lands as a result of the proposed development are not considered likely to significantly affect habitat utility for this species on the locality scale.

The proposed development is not considered likely to affect habitat for this species in the locality to the extent that the species is likely to decline.

(g) Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

The local area already supports a population of domestic dogs. As the proposed development would be for a residential estate, introduction of additional dogs is likely. However, this is unlikely to significantly exacerbate predation pressure in the locality.

(h) Introduce disease that may cause the species to decline; or

The proposed development does not include activities which could introduce potential diseases for this species onto the subject site such as relocation of potentially infected host fauna.

(i) Interfere substantially with the recovery of the species.

The proposed development would remove all suitable habitat for this species from the subject site. However, this impact is not considered significant on the locality scale. The proposed development would not significantly fragment or isolate any habitat for this species.

The proposed development is not considered likely to interfere substantially with the recovery of this species.

Conclusion

The proposed development would remove all suitable habitat for this species from the subject site; however, this impact is not considered significant on the locality scale. This removal would also not significantly increase habitat fragmentation in the local area for this species. Potential secondary impacts on retained suitable habitat on adjacent lands as a result of the subject site is not considered likely to significantly affect habitat utility for this species on the locality scale.

Assessed against the methodology in the 'EPBC Act Referral Guidelines for the Vulnerable Koala', the habitat on the subject site is not considered to constitute habitat critical to the species' survival.

No significant impact on this species is considered likely as a result of the proposed development.

8.2.2 NSW Legislative Requirements

Under **Section 5A** of the *Environmental Planning and Assessment Act 1979* (EPA Act) a Seven Part Test is Required to determine "whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats" listed on **Schedule 1** or **Schedule 2** of the *Threatened Species Conservation Act 1995* (TSC Act), and consequently, whether a Species Impact Statement (SIS) is required.

8.2.2.1 Cumberland Plain Land Snail (Meridolum corneovirens)

This species is listed as endangered under the TSC Act.

Superficially similar to the familiar exotic Garden Snail (*Helix aspera*). It differs most obviously in its 25 - 30 mm diameter shell. While this shell may be almost any shade of brown, it is always uniform in colour, while that of *Helix* consists of dark patches on a pale background. A green or yellow tinge may be present. The Cumberland Land Snail also has a more flattened shell that is very thin and fragile, compared with the thick shell of the Garden Snail.

The underside of the shell, especially in living individuals, tends to have a glossy appearance and is semitransparent, enabling the observer to see the animal colour and some internal organs. The upper side of the shell has a coarse wrinkly appearance. In adult shells the edge of the aperture is reflected, forming a slight lip. This is typically white in colour. However, the feature is absent in both juvenile and sub-adult individuals. The juveniles have a more angular shell and tend to have an open area in the central part of the underside of the shell, known as the umbilicus. Generally, in adults the umbilicus is closed or partially covered. Sometimes there is a reddish-brown patch around the umbilical area.

Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. Known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns.

Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities.

This species was encountered in the immediate locality of the subject site in the form of two empty shells and suitable habitat is present on the subject site in the form of CPW. It is also known from 10 local records, with one located less than 600m to the north-east of the subject site (from 2014).

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;

This species was encountered in the immediate locality and it is known from numerous contemporary records from within 10km. The subject site contains suitable CPW vegetation. A viable local population is considered present.

The available CPW habitat on the subject site would be removed by the proposed development. However, this is not considered to represent a significant reduction in available habitat for this species in the locality. Removal of this habitat would not significantly fragment or isolate habitat for this species.

The proposed development is not considered likely to place the local population of this species at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction;

No threatened population of this species is listed under the TSC Act.

Not applicable to a threatened species.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to a threatened species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed; and

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development would remove all suitable habitat for this species from the subject site. However, this level of impact is not considered significant on the locality scale.

The available habitat on the subject site for this species has limited connectivity with similar native vegetation offsite. The removal of this vegetation from the subject site would not significantly increase fragmentation across the landscape.

The CPW within the subject site represents a small occurrence in the locality which does not form part of a significant local habitat corridor and its removal is not considered a significant impact on vegetation cover or habitat contiguity on the locality scale. This habitat is not considered highly important to the long-term survival of this species in the local area.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);

No critical habitat for this species is listed under the TSC Act. The TSC Act defines "critical habitat" as "habitat declared to be critical habitat under **Part 3**" of the Act. No critical habitat for this species would be impacted by the proposed development.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and

The Cumberland Plain Recovery Plan is relevant to this species. The objectives of this plan are as follows:

1. To build a protected area network, comprising public and private lands, focused on the priority conservation lands;
2. To deliver best practice management for threatened species, populations and ecological communities across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with conservation;
3. To develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program; and
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened species, populations and ecological communities, and thereby improve capacity to manage these in a strategic and effective manner.

The subject site does not occur within any priority conservation lands, as shown on **Page IV** of the plan. However, priority lands are present to the south of the subject site, along the Bargo River. The portions of these lands directly south of the subject site are separated by a topographic low point and therefore would not be particularly vulnerable to surface runoff from the subject site. These lands also support significant weed populations and the proposed development is not considered likely to exacerbate weed diversity and population densities on these lands.

The proposed development is not considered to be consistent with the objectives of this plan. The proposed development would remove habitat from an area with a known population of this species. However, the small amount of clearing required for the proposed development is not considered a significant reduction in habitat for this species in the locality and no significant isolation or fragmentation of habitat would occur as a result of the proposed development on the locality scale.

No threat abatement plan is relevant to this species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development would constitute the following KTPs, relevant to this species:

- Clearing of native vegetation; and

- Removal of dead wood and trees.

The proposed development would remove native vegetation and dead wood and trees from the subject site. However, the level of impact is not considered significant on the locality scale and these habitat resources are not limited on adjacent lands. The proposed development is not considered likely to significantly exacerbate these KTPs in the local area.

Conclusion

The proposed development would remove a small portion of suitable habitat for this species from the locality. The level of proposed clearing is not considered to represent a significant reduction of this habitat on the locality scale. Large areas of similar vegetation are present on adjacent lands which would not be directly affected by the proposed development.

8.2.2.2 Koala (Phascolarctos cinereus)

This species is listed as vulnerable under the TSC Act.

The Koala is an arboreal marsupial with fur ranging from grey to brown above and is white below. It has large furry ears, a prominent black nose and no tail. It spends most of its time in trees and has long, sharp claws, adapted for climbing. Adult males weigh 6 - 12 kg and adult females weigh 5 - 8 kg. During breeding, males advertise with loud snarling coughs and bellows.

The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW, it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands.

The Koala inhabits eucalypt woodlands and forests. It feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.

This species was not detected on the subject site during surveys; however, it is known from 14 contemporary records from within 10km of the subject site and suitable feed trees are present, which would be removed by the proposed development.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;

This species was not encountered on the subject site, but it is known from numerous contemporary records from within 10km of the subject site. The subject site contains suitable CPW vegetation with feed trees. A viable local population is considered present in the locality.

The available CPW habitat on the subject site would be removed by the proposed development. However, this is not considered to represent a significant reduction in available habitat for this species in the locality. Removal of this habitat would not significantly fragment or isolate habitat for this species.

The proposed development is not considered likely to place the local population of this species at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction;

Two endangered populations of this species are listed under **Schedule 1** of the TSC Act, the Hawks Nest and Tea Gardens and the Pittwater LGA populations. The subject site does not occur within either of these lands and therefore neither population would be impacted upon by the proposed development.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to a threatened species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed; and

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development would remove all suitable habitat for this species from the subject site. However, this level of impact is not considered significant on the locality scale.

The available habitat on the subject site for this species does not have significant connectivity with similar native vegetation offsite. Members of this species would need to come to the ground to access these trees. The removal of this vegetation from the subject site would not significantly increase fragmentation across the landscape.

The CPW within the subject site represents a small occurrence in the locality which does not form part of a significant local habitat corridor and its removal is not considered a significant impact on vegetation cover or habitat contiguity on the locality scale. This habitat is not considered highly important to the long-term survival of this species in the local area.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);

No critical habitat for this species is listed under the TSC Act. The TSC Act defines "critical

habitat" as "habitat declared to be critical habitat under **Part 3**" of the Act. No critical habitat for this species would be impacted by the proposed development.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and

The Koala Recovery Plan was adopted by OEH in November 2008. The objectives of this plan are as follows:

1. To conserve koalas in their existing habitat;
2. To rehabilitate and restore koala habitat and populations;
3. To develop a better understanding of the conservation biology of koalas;
4. To ensure that the community has access to factual information about the distribution, conservation and management of koalas at a national, state and local scale;
5. To manage captive, sick or injured koalas and orphaned wild koalas to ensure consistent and high standards of care;
6. To manage overbrowsing to prevent both koala starvation and ecosystem damage in discrete patches of habitat; and
7. To coordinate, promote the implementation, and monitor the effectiveness of the NSW Koala Recovery Plan across NSW.

The proposed development is not considered to be consistent with the objectives of this plan. The proposed development would remove Koala habitat from an area with a known population. However, the small amount of clearing required for the proposed development is not considered a significant reduction in habitat for this species in the locality and no significant isolation or fragmentation of habitat would occur as a result of the proposed development on the locality scale.

No threat abatement plan is relevant to this species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development has the potential to contribute to the following KTPs on the subject site, relevant to this species:

- Clearing of native vegetation; and
- Predation and hybridisation by Feral Dogs (*Canis lupus familiaris*).

The proposed development would remove native vegetation from the subject site. However, the level of impact is not considered significant on the locality scale and these habitat resources are not limited on adjacent lands.

The local area already supports a population of domestic dogs. As, the proposed development would be for a residential estate, introduction of additional dogs is likely. However, this is unlikely to significantly exacerbate predation pressure in the locality.

The proposed development is not considered likely to exacerbate these KTPs on the locality scale.

Conclusion

The proposed development would remove all suitable habitat for this species from the subject site; however, this impact is not considered significant on the locality scale. This removal would also not significantly increase habitat fragmentation in the local area for this species. Potential secondary impacts on retained suitable habitat on adjacent lands as a result of the subject site is not considered likely to significantly affect habitat utility for this species on the locality scale.

Assessed against the definitions in SEPP44, the habitat of the subject site is considered to meet the definition of core Koala habitat; however, based on the specifics of the subject site these resources are considered unlikely to be utilised. If Council is satisfied that the subject site constitutes core Koala habitat, a plan of management as per **Part 3** of SEPP44 must be drafted prior to development consent.

No significant impact on this species is considered likely as a result of the proposed development and consequently further assessment through a SIS is not considered necessary.

8.2.2.3 Tree-dwelling Microchiropteran Bats

This assessment considers the following species, due to their similar habitat requirements:

- Eastern Freetail Bat (*Mormopterus norfolkensis*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*); and
- Little Bentwing Bat (*Miniopterus australis*).

All of these species are listed as vulnerable under the TSC Act.

The Eastern Freetail-bat has dark brown to reddish brown fur on the back and is slightly paler below. Like other freetail-bats it has a long (3 - 4 cm) bare tail protruding from the tail membrane. Freetail-bats are also known as mastiff-bats, having hairless faces with wrinkled lips and triangular ears. They weigh up to 10 grams.

The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.

The Greater Broad-nosed Bat is a large powerful bat, up to 95 mm long, with a broad head and a short square muzzle. It is dark reddish-brown to mid-brown above and slightly paler below. It is distinguished from other broad-nosed bats by its greater size. While similar to the Eastern False Pipistrelle *Falsistrellus tasmaniensis*, it differs by having only two (not four) upper incisors.

The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the

coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.

Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

Little Bentwing-bats are small dark chocolate brown insectivorous bats with a body length of about 45 mm. The tip of the wing is formed by a particularly long joint of the third finger, folded back and bent under the wing while the bat is at rest. The fur is long and thick, especially over the crown and around the neck, and is slightly lighter in colour on the belly. They have distinctly short muzzles, and short, rounded roughly triangular shaped ears. Distinguished from the Common Bentwing-bat by its smaller size.

East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.

In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.

The subject site contains a stand of native woodland and a single hollow-bearing tree. These resources provide suitable foraging and potential roosting habitat for these species.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;

These species were not detected on the subject site; however, dedicated surveys were not conducted for microbats. All three species are known from the local area and the subject site supports suitable habitat in the form of woodlands and a potential roosting tree.

The proposed development would remove all native woodland habitat from the subject including the hollow-bearing tree. However, these impacts are not considered significant in the locality scale. Large areas of similar woodland habitat are present on adjacent lands as well as

numerous mature trees capable of supporting hollows. The subject site would also retain some foraging utility for these species following development.

No significant impact on these species as a result of the proposed development is anticipated.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction;

No endangered population of these species are listed under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to threatened species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed development would remove all woodland habitat for these species from the subject site including the hollow-bearing tree. The loss of these resources is not considered to be a significant loss on the locality scale. Large areas of similar woodland habitat are present with numerous mature trees capable of supporting hollows. The subject site would also retain some foraging utility for these species following development.

These species are highly mobile, capable of crossing large areas of unsuitable habitat. The proposed development would not significantly increase habitat fragmentation for these species.

The subject site contains small areas of suitable woodland habitat for these species, as well as a single potential roosting tree. Similar habitat is present on adjacent properties and in the local area. The habitat to be potentially impacted by the proposed development is not considered important to the long-term survival of these species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);

No critical habitat is listed under the TSC Act for these species. The TSC Act defines "critical

habitat" as "habitat declared to be critical habitat under **Part 3**" of the Act.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan;

No recovery plans or threat abatement plans are relevant to these species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed development would constitute the following KTPs, relevant to these species:

- Clearing of native vegetation;
- Loss of hollow-bearing trees; and
- Removal of dead wood and trees.

The proposed development would remove native vegetation, dead wood and trees and hollow-bearing trees from the subject site. However, the level of impact is not considered significant on the locality scale and these habitat resources are not limited on adjacent lands.

The proposed development is not considered likely to exacerbate these KTPs on the locality scale.

Conclusion

The proposed development would remove a small portion of suitable woodland foraging habitat for these species from the locality, as well as a potential roosting tree hollow. The level of proposed clearing is not considered to represent a significant reduction of this habitat on the locality scale. Large areas of similar vegetation containing mature trees capable of supporting hollows are present on adjacent lands which would not be directly affected by the proposed development.

8.2.3 Fauna Conclusions

It was found that there is unlikely to be a significant impact on any threatened fauna species or populations as a result to the proposed development. As such further assessment through a SIS (NSW) or a referral to the federal Minister for the Environment (federal) is not considered necessary. The proposed development complies with the 'improve or maintain principles' adopted by most councils in relation to biodiversity values.

The removal of the hollow-bearing tree is to be supervised by a suitably trained and equipped wildlife handler and the removal of all hollow-bearing features are to observe appropriate soft-felling procedures or hollows are to undergo thorough inspection for resident fauna immediately prior to removal.

9 APPENDIX 3: SPECIES LISTS

Table A3.1: Flora species list

Family	Scientific name	Common name	NSW status*	Federal status**	Exotic
Apocynaceae	*Araujia sericifera*	Moth Vine			*
Asparagaceae	*Asparagus asparagoides*	Bridal Creeper			*
Asteraceae	*Cirsium vulgare*	Spear Thistle			*
	Conyza bonariensis	Flaxleaf Fleabane			*
	Ozothamnus diosmifolius	White Dogwood			
Chenopodiaceae	*Einadia hastata*	Berry Saltbush			
Convolvulaceae	*Dichondra repens*	Kidney Weed			
Fabaceae	*Acacia falcata*	Sickle Wattle			
	Acacia fimbriata	Fringed Wattle			
	Acacia implexa	Lightwood			
	Acacia parramatensis	Parramatta Wattle			
	Glycine clandestina	Twining Glycine			
	Hardenbergia violacea	False Sarsaparilla			
Gentianaceae	*Centaurium tenuiflorum*	-			*
Juncaceae	*Juncus usitatus*	Common Rush			
Malvaceae	*Sida rhombifolia*	Paddys Lucerne			*
Meliaceae	*Melia azedarach*	Chinaberry			
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush			
	Callistemon linearis	Narrow-leaved Bottlebrush			
	Corymbia maculata	Spotted Gum			
	Eucalyptus tereticornis	Forest Red Gum			
	Leptospermum polygalifolium	Tantoon			
	Melaleuca linariifolia	Narrow-leaved Paperbark			
	Melaleuca styphelioides	Prickly Paperbark			
Oleaceae	*Ligustrum licudum*	Broad-leaved Privet			*
	Ligustrum sinense	Narrow-leaved Privet			*
	Olea europaea subsp. *cuspidata*	African Olive			*
Phytolaccaceae	*Phytolacca octandra*	Inkweed			*
Pittosporaceae	*Bursasia spinosa*	Blackthorn			
	Pittosporum undulatum	Sweet Pittosporum			
Plantaginaceae	*Plantago lanceolata*	Lambs Tongues			*
Poaceae	*Aristida ramosa*	Purple Wiregrass			
	Avena barbata	Bearded Oats			*
	Cynodon dactylon	Couch Grass			
	Ehrharta erecta	Panic Veldt Grass			*
	Eragrostis curvula	African Love Grass			*
	Paspalum dilatatum	Paspalum			*

Family	Scientific name	Common name	NSW status*	Federal status**	Exotic
	Pennisetum clandestinum	Kikuyu Grass			*
	Phalaris aquatica	Harding Grass			*
	Setaria parviflora	Pale Pigeon Grass			
	Sporobolus fertilis	Parramatta Grass			*
Polygonaceae	*Rumex crispus*	Curly Dock			*
Rosaceae	*Rubus fruticosus* aggregate	Blackberry			*
Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein			*
Solanaceae	*Cestrum parqui*	Green Cestrum			*
	Solanum linnaeanum	Apple of Sodom			*
	Solanum pseudocapsicum	Madeira Winter Cherry			*
Verbenaceae	*Verbena litoralis*	Purpletop			*
	Verbena quadrangularis	Purpletop			*

**TSC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2, Endangered Population*
***EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct*

Table A3.2: Fauna species list

Class	Common name	Scientific name	NSW status*	Federal status**	Exotic	Mode of detection
Aves	Australian Magpie	*Cractitus tibicen*				Heard
	Australian Raven	*Corvus coronoides*				Heard
	Bell Miner	*Manorina melanophrys*				Heard
	Common Myna	*Acridotheres tristis*			*	Heard
	Crested Pigeon	*Ocyphaps lophotes*				Seen/heard
	Eastern Rosella	*Platycercus eximius*				Seen/heard
	Golden Whistler	*Pachycephala pectoralis*				Seen
	Grey Butcherbird	*Cracticus torquatus*				Seen
	Magpie Lark	*Grallina cyanoleuca*				Heard
	Noisy Miner	*Manorina melanocephala*				Seen/heard
	Pied Currawong	*Strepera graculina*				Heard
	Rainbow Lorikeet	*Trichoglossus moluccanus*				Heard
	Red-browed Finch	*Neochmia temporalis*				Seen/heard
	Sulphur-crested Cockatoo	*Cacatua galerita*				Seen/heard
	Superb Fairy-wren	*Malurus cyaneus*				Heard
	Welcome Swallow	*Hirundo neoxena*		M		Seen
	White-necked Heron	*Ardea pacifica*				Seen
	Yellow Thornbill	*Acanthiza nana*				Seen/heard
	Yellow-faced Honeyeater	*Lichenostomus chrysops*				Seen/heard
Mammalia	Brown Rat	*Rattus norvegicus*			*	Seen
	Common Wallaroo	*Macropus robustus robustus*				Seen
	Domestic Dog	*Canis lupus familiaris*			*	Tracks

Class	Common name	Scientific name	NSW status*	Federal status**	Exotic	Mode of detection
	Domestic Horse	*Equus caballus*			*	Seen
	European Rabbit	*Oryctolagus cuniculus*			*	Seen
	Feral Goat	*Capra aegagrus hircus*			*	Tracks
	Swamp Wallaby	*Wallabia bicolor*				Seen

**TSC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2, Endangered Population*

***EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct, B=Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II (Bonn Convention), C=China-Australia Migratory Bird Agreement (CAMBA), J=Japan-Australia Migratory Bird Agreement (JAMBA), M=Marine, R=Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)*

10 APPENDIX 4: VEGETATION PLOT DATA

Table A4.1: Plot location data

Recorders	Bo Davidson	**IBRA subregion**	Cumberland

Plot	**Date of survey**	**Zone ID**	**AMG zone**	**Easting**	**Northing**	**Plot dimensions**	**Photo ID**	**Midline bearing (^{O})**	**Vegetation class**	**Plant community type**	**EEC**	**Confidence**
1	4/06/2018	1	56H	279057	6210181	20x50m	P1	21	Coastal Valley Grassy Woodlands	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Yes	H
2	4/06/2018	2	56H	278988	6210177	20x50m	P2	21	Grasslands	Exotic grassland	No	H
3	04/06/2018	1	56H	278944	6210244	20x50m	P3	21	Coastal Valley Grassy Woodlands	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Yes	H

Table A4.2: Plot species data

			Plot		
Growth Form	**Scientific Name**	**Common Name**	**P1**	**P2**	**P3**
Trees	*Acacia parramatensis*	Parramatta Wattle	X	X	
	Eucalyptus tereticornis	Forest Red Gum			X
Shrubs	*Acacia fimbriata*	Fringed Wattle	X		
	Acacia implexa	Lightwood			X
	Bursaria spinosa	Blackthorn			
Grasses etc.	*Aristida ramosa*	Purple Wiregrass			X
	Cynodon dactylon	Couch Grass	X	X	
	Juncus usitatus	Common Rush			X
Forbs	*Dichondra repens*	Kidney Weed	X		X
	Einadia hastata	Berry Saltbush	X		X
Ferns	-	-			
Other	*Glycine clandestina*	Twining Glycine			X
Exotics	*Centarium tenuiflorum*		X		
	Cirsium vulgare	Spear Thistle	X	X	X
	Conyza bonariensis	Flaxleaf Fleabane		X	X
	Phalaris aquatica	Harding Grass		X	
	Phytolacca octandra	Inkweed		X	
	Plantago lanceolata	Lambs Tongues	X		X
	Sida rhombifolia	Paddys' Lucerne	X		X
	Solanum linnaeanum	Apple of Sodom	X		
	Solanum pseudocapsicum	Madeira Winter Cherry	X		X
	Verbena litoralis	Purpletop			
	Verbena quadrangularis	Purpletop		X	X
High Threat Exotics	*Araujia sericifera*	Moth Vine			
	Asparagus asparagoides	Bridal Creeper	X		X
	Cestrum parqui	Green Cestrum	X		
	Ehrharta erecta	Panic Veldt Grass	X		
	Ligustrum lucidum	Broad-leaved Privet			
	Paspalum dilatatum	Paspalum	X	X	X
	Pennisetum clandestinum	Kikuyu Grass		X	
	Rubus fruticosus aggregate	Blackberry	X	X	X

Table A4.3: Plot structural data

BAM Attributes (400m2 plot)			
Richness			
Growth Form	**P1**	**P2**	**P3**
Trees	1	1	1
Shrubs	1	0	1
Grasses etc.	1	1	2
Forbs	2	0	2
Ferns	0	0	0
Others	0	0	1
Exotics	6	6	6
High Threat Exotics	5	2	3
Cover (%)			
Growth Form	**P1**	**P2**	**P3**
Trees	60	0.5	30
Shrubs	1	0	2
Grasses etc.	10	5	0.6
Forbs	5.1	0	1.1
Ferns	0	0	0
Others	0	0	0.1
Exotics	11.4	42.7	15.9
High Threat Exotics	21.3	61	0.8

BAM Attribute (1 000m2 plot)			
	P1	**P2**	**P3**
Stem regeneration (present/absent)	Present	Absent	Present
Tree stem classes	<5, 5-9, 10-19	-	<5, 50-79, 80+
Number of stems with hollows	0	0	1
Length of logs (m)	65	40	2
Litter cover (%)	4	12	11
Bare ground cover (%)	46	21	11
Cryptogram cover (%)	0	0	0
Rock cover (%)	0	0	0

BAM Plot – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	07 06 18	2281	21	BOD			
Zone	Datum GH	Plot ID	P1	Plot dimensions	20x50	Photo #	P1
Easting 279057	Northing 6210181	IBRA region	Sydney	Midline bearing	21°	Magnetic °	
Vegetation Class	Coastal Valley Grassy Woodlands					Confidence: H M L	
Plant Community Type	850			EEC: Yes		Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	1
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	60
	Shrubs	1
	Grasses etc.	10
	Forbs	5.1
	Ferns	0
	Other	0
High Threat Weed cover %		21.3

BAM Attribute (20 x 50 m plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	0	0
20 – 29 cm	0	0
10 – 19 cm	10	0
5 – 9 cm	40	0
< 5 cm	20	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	30,10,10,10,5 =65	

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	12	10	0	0	0	50	20	30	70	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	4					46					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	NR
Cultivation (inc. pasture)	0	
Soil erosion	1	R
Firewood / CWD removal	0	
Grazing (identify native/stock)	1	R
Fire damage	0	
Storm damage	0	
Weediness	3	R
Other		

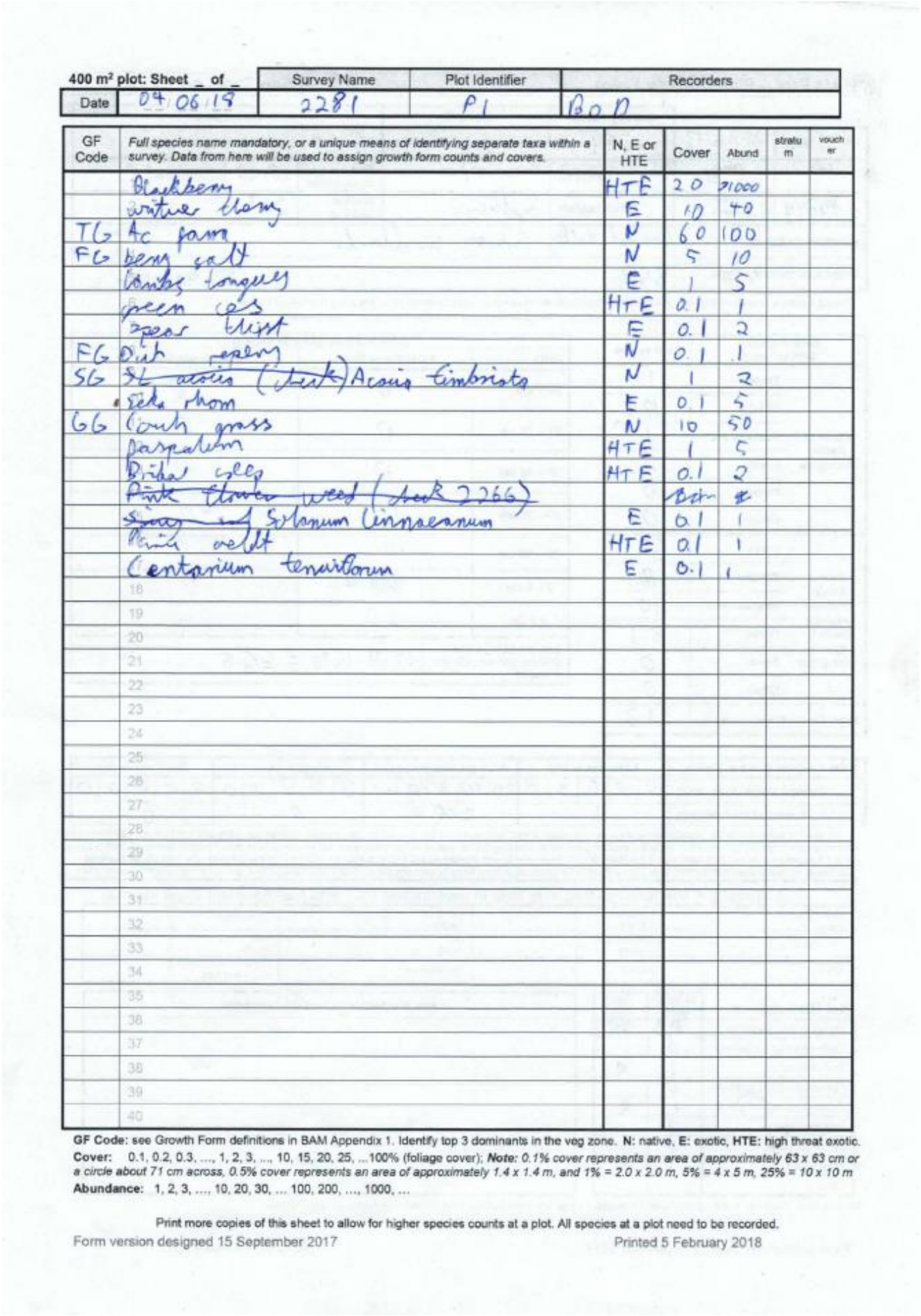
Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Free Text Section for brief site description

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017

Printed 5 February 2018



400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 04/06/19	2281	P1	BOD

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	voucher
	Blackberry	HTE	20	1000		
	native thorny	E	10	40		
TG	Ac parra	N	60	100		
FG	berry salt	N	5	10		
	bindy tongues	E	1	5		
	green cos	HTE	0.1	1		
	spear thist	E	0.1	2		
FG	Dish cress	N	0.1	1		
SG	~~St aloes (thick)~~ Acaia timbrista	N	1	2		
	Sida rhom	E	0.1	5		
GG	couch grass	N	10	50		
	Paspalum	HTE	1	5		
	Bidal weed	HTE	0.1	2		
	~~Pink flower weed (tick 2266)~~		~~Bar~~	~~#~~		
	~~Spray~~ Solanum linnaeanum	E	0.1	1		
	Rain melt	HTE	0.1	1		
	Centaurium tenuiflorum	E	0.1	1		
	18					
	19					
	20					
	21					
	22					
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	24					
	25					
	26					
	27					
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	29					
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	38					
	39					
	40					

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.
Form version designed 15 September 2017 Printed 5 February 2018

Figure A4.1: Plot 1 field sheet

BAM Plot – Field Survey Form

Site Sheet no: 1 of

Survey Name	Zone ID	Recorders
2281	Z2	BoD

Date	04.06.18	Plot ID	P2	Plot dimensions	20x50	Photo #	P2
Zone 56	Datum GDA	IBRA region	Sydney	Midline bearing	21°	Magnetic °	
Easting 278988	Northing 6210777						
Vegetation Class	Exotic grasslands					Confidence: H M L	
Plant Community Type	N/A			EEC: No		Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	1
	Forbs	0
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0.5
	Shrubs	0
	Grasses etc.	5
	Forbs	0
	Ferns	0
	Other	0
High Threat Weed cover %		61

BAM Attribute (20 x 50 m plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	6	0
30 – 49 cm	0	0
20 – 29 cm	0	0
10 – 19 cm	0	0
5 – 9 cm	0	0
< 5 cm	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	10,10,10,10 = 40m	

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	0	20	20	10	10	0	0	50	30	5	0	0	0	0	0	0	0	0	0	6
Average of the 5 subplots	12					21					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	R
Cultivation (inc. pasture)	0	
Soil erosion	1	R
Firewood / CWD removal	0	
Grazing (identify native/stock)	1	R
Fire damage	0	
Storm damage	0	
Weediness	3	
Other		

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Free Text Section for brief site description

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017

Printed 5 February 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 04/06/18	2281	P2	B.O

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	voucher
	Spear this	E	2	5		
	Blackberry	HTE	60	1000		
GG	Couch	N	5	100		
	paspalum	HTE	1	3		
	~~Tall grass head (dock)~~ Phalaris aquatica	E	0.1	1		
	verbena quad	E	20	100		
	Inkweed	E	0.5	1		
	Kikuyu	E	0.1	3		
TG	Ac parva	N	0.5	1		
	Plan Eleo	E	20	100		
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
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	21					
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	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 5 February 2018

Figure A4.2: Plot 2 field sheet

BAM Plot – Field Survey Form

Site Sheet no: 1 of

Survey Name	Zone ID	Recorders
2281	ZB 21	BO.D

Date	04 06 18	Plot ID	P3	Plot dimensions	20 x 50	Photo #	P3
Zone	Datum 56H						
Easting 278944	Northing 6210244	IBRA region	Sydney	Midline bearing	21°	Magnetic °	
Vegetation Class	Coastal Valley Grassy Woodlands					Confidence: H M L	
Plant Community Type	850			EEC: Yes		Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	2
	Forbs	2
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	30
	Shrubs	2
	Grasses etc.	0.6
	Forbs	1.1
	Ferns	0
	Other	0.1
High Threat Weed cover %		0.8

BAM Attribute (20 x 50 m plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	2	1
50 – 79 cm	1	0
30 – 49 cm	0	0
20 – 29 cm	0	0
10 – 19 cm	0	0
5 – 9 cm	0	0
< 5 cm	6	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2 Tally space	

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	15	10	5	15	10	10	30	0	15	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	11					11					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	2	R
Cultivation (inc. pasture)	0	
Soil erosion	1	R
Firewood / CWD removal	0	
Grazing (identify stock)	1	R
Fire damage	0	
Storm damage	0	
Weediness	1	R
Other		

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Free Text Section for brief site description

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017

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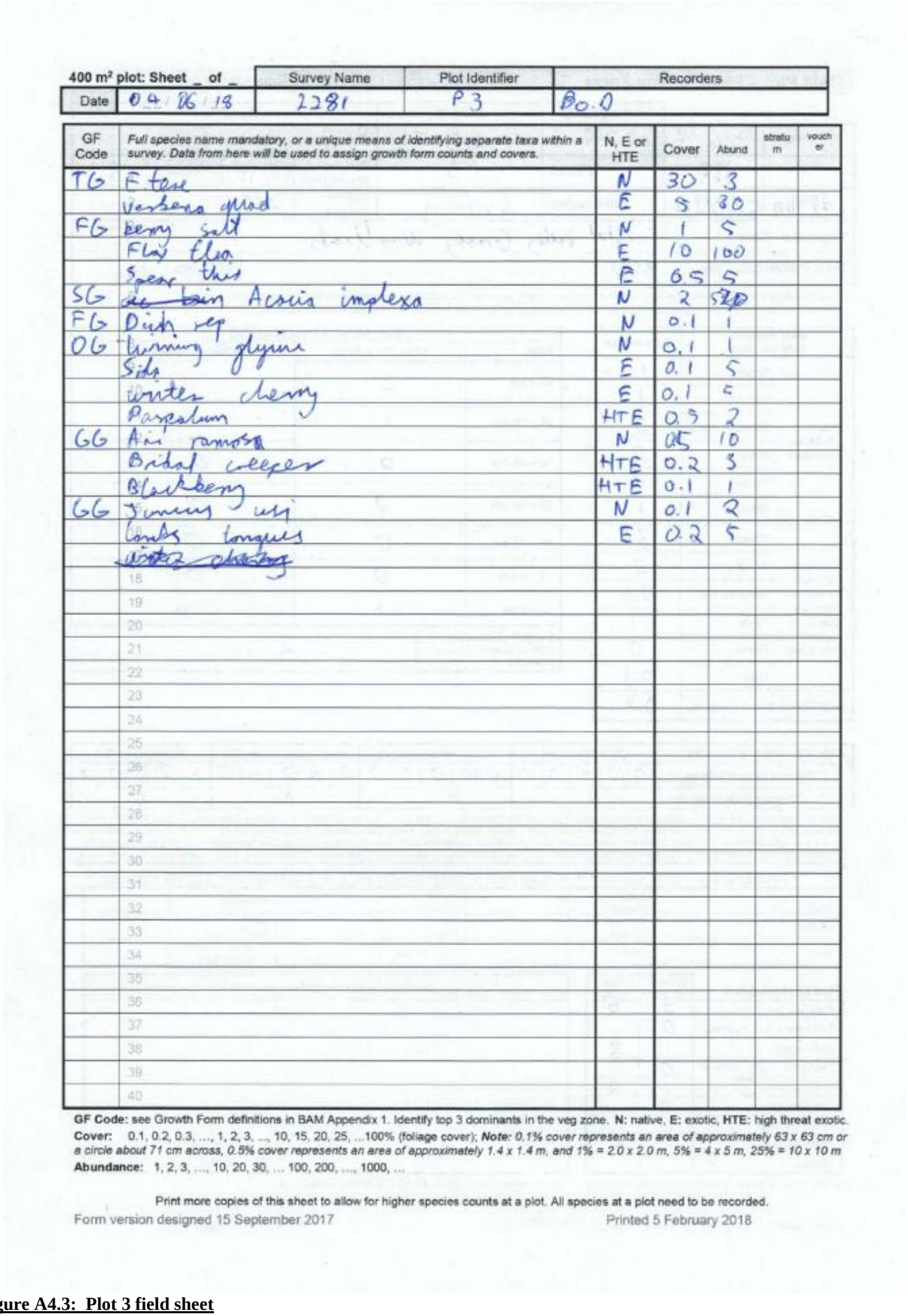

400 m² plot: Sheet _ of _

Survey Name	Plot Identifier	Recorders
2281	P3	BO.D

Date: 04/06/18

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	voucher
TG	E tere	N	30	3		
	Verbena quad	E	5	30		
FG	berry salt	N	1	5		
	Flax flea	E	10	100		
	Spear this	E	0.5	5		
SG	~~ac bain~~ Acacia implexa	N	2	~~5~~ 20		
FG	Dich rep	N	0.1	1		
OG	twining glycine	N	0.1	1		
	Sida	E	0.1	5		
	winter cherry	E	0.1	5		
	Paspalum	HTE	0.5	2		
GG	Aira ramosa	N	0.5	10		
	Bridal creeper	HTE	0.2	3		
	Blackberry	HTE	0.1	1		
GG	Juncus usi	N	0.1	2		
	Lomandra longifolia	E	0.2	5		
	~~winter cherry~~					
	18					
	19					
	20					
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	29					
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	39					
	40					

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 5 February 2018

Figure A4.3: Plot 3 field sheet

Photograph A4.1: Plot 1

Photograph A4.2: Plot 2

Photograph A4.3: Plot 3

11 APPENDIX 5: CREDIT REPORT

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

IBRA sub region	PCT common name	Baseline price per credit	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Cumberland	**850 -** Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion ***Note: This PCT has trades recorded***	$16,111.00	0.6577857	3.282132	16.82%	$40.53	1.0000	$18,250.70	4	$73,002.80
									Subtotal (excl. GST)	**$73,002.80**
									GST	**$7,300.28**
									Total ecosystem credits (incl. GST)	**$80,303.08**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10526	***Meridolum corneovirens*** (Cumberland Plain Land Snail)	Endangered	$296.96	20.8700%	$20.00	4	$1,515.74
10616	***Phascolarctos cinereus*** (Koala)	Vulnerable	$408.16	20.8700%	$20.00	1	$513.34
						Subtotal (excl. GST)	**$2,029.08**
						GST	**$202.91**
						Total species credits (incl. GST)	**$2,231.99**
Calculated as on: **12-06-2018 11:47:17**						**Grand total**	**$82,535.07**

Figure A5.1: Credit report

12 APPENDIX 6: THREATENED FLORA AND FAUNA SPECIES ASSESSMENT TABLES

Table A6.1: Flora species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Bynoe's Wattle *(Acacia bynoeana)*	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Acacia gordonii	Grows in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Downy Wattle *(Acacia pubescens)*	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Allocasuarina glareicola	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Amperea xiphoclada var. pedicellata	*Amperea xiphoclada* var. *pedicellata* was previously widespread in heath, woodland and forest in low-fertility, sandy soils.	E4A	X	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Ancistrachne maidenii	Habitat requirements appear to be specific, with populations occurring in distinct bands in areas associated with a transitional geology between Hawkesbury and Watagan soil landscapes.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Asterolasia elegans	Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (*Syncarpia glomulifera* subsp. *glomulifera*), Smooth-barked Apple (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Forest Oak (*Allocasuarina torulosa*) and Christmas Bush (*Ceratopetalum gummiferum*).	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Thick-leaf Star-hair *(Astrotricha crassifolia)*	Occurs in dry sclerophyll woodland on sandstone.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Thick Lip Spider Orchid *(Caladenia tessellata)*	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Netted Bottle Brush *(Callistemon linearifolius)*	Grows in dry sclerophyll forest on the coast and adjacent ranges.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Sand Spurge *(Chamaesyce psammogeton)*	Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (*Spinifex sericeus*) and Prickly Couch (*Zoysia macrantha*)	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Leafless Tongue Orchid *(Cryptostylis hunteriana)*	The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
White-flowered Wax Plant *(Cynanchum elegans)*	Usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree *Leptospermum laevigatum* – Coastal Banksia *Banksia integrifolia* subsp. *integrifolia* coastal scrub; Forest Red Gum *Eucalyptus tereticornis* aligned open forest and woodland.	E1	E	Yes	Suitable woodland habitat with associated tree species present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development
Darwinia biflora	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	V	V	Yes	Suitable woodland habitat on shale-derived soils present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development
Darwinia fascicularis subsp. oligantha	Occurs around rock platforms and in rocky heath associated with friable sandstone shallow soils. Associated species include *Allocasuarina nana, A. distyla, Banksia ericifolia* and *Caustis flexuosa*.	E		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Darwinia glaucophylla	Occurs in sandy heath, scrub and woodlands often associated with sandstone rock platforms or near hanging swamps and friable sandstone shallow soils.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Darwinia peduncularis	Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	V		Yes	Suitable sandstone derived soils not present	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Spider orchid *(Dendrobium melaleucaphilum)*	Grows frequently on *Melaleuca styphelioides*, less commonly on rainforest trees or on rocks in coastal districts.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Deyeuxia appressa	Given that *D. appressa* hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Dillwynia tenuifolia	In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	V		Yes	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Diuris bracteata	Dry sclerophyll woodland and forest with a predominantly grassy understorey.	E1	X	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Epacris purpurascens var. purpurascens	Found in a range of habitat types, most of which have a strong shale soil influence.	V		Yes	Suitable woodland habitat on shale soils present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Camden White Gum *(Eucalyptus benthamii)*	Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Camfield's Stringybark *(Eucalyptus camfieldii)*	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	V	V	Yes	Suitable sandstone derived soils not present	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Narrow-leaved Black Peppermint *(Eucalyptus nicholii)*	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Eucalyptus sp. Cattai	Occurs as a rare emergent tree in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small clustered groups. The sites at which it occurs are generally flat and on ridge tops.	E4A		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Tangled Bedstraw *(Galium australe)*	Most flowering collections have been made in late spring to early autumn.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Bauer's Midge Orchid *(Genoplesium baueri)*	Grows in dry sclerophyll forest and moss gardens over sandstone.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Narrow-leaf Finger Fern *(Grammitis stenophylla)*	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Caley's Grevillea *(Grevillea caleyi)*	All sites occur on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by *Eucalyptus sieberi* and *E. gummifera*. Commonly found in the endangered Duffys Forest ecological community.	E4A	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Juniper-leaved Grevillea *(Grevillea juniperina subsp. juniperina)*	Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Small-flower Grevillea *(Grevillea parviflora subsp. parviflora)*	Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils drived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park.	V	V	Yes	Suitable woodland habitat on shale-derived soils present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development
(Grevillea parviflora subsp. supplicans)	Strongly associated with clay-capped ridged of the Lucas Heights and Faulconbridge soil landscapes, but that it is quite restricted within these areas, suggesting it has a preference for yellow clays with periodically impeded drainage.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Grevillea shiressii	Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Gyrostemon thesioides	Grows on hillsides and riverbanks and may be restricted to fine sandy soils.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Square Raspwort *(Haloragis exalata subsp. Exalata)*	Square Raspwort appears to require protected and shaded damp situations in riparian habitats.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Haloragoden dron lucasii	Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Spreading Guinea Flower *(Hibbertia procumbens)*	Majority of known populations occur within *Banksia ericifolia–Angophora hispida–Allocasuarina distyla* scrub/heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Hibbertia puberula	Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. One of the recently (2012) described subspecies also favours upland swamps.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Hibbertia sp. Bankstown	Soil at the site is a sandy (Tertiary) alluvium with a high silt content.	E4A	CE	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Hibbertia superans	Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Hypsela sessiliflora	Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.	E1	X	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Kunzea rupestris	Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Lasiopetalum joyceae	Grows in heath on sandstone.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Leptospermum deanei	Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Woronora Beard-heath *(Leucopogon exolasius)*	The plant occurs in woodland on sandstone. Found along the upper Georges River area and in Heathcote National Park.	V	V	Yes	Suitable sandstone derived soils not present	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Leucopogon fletcheri subsp. fletcheri	Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
(*Marsdenia viridiflora subsp. viridiflora*) population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Grows in vine thickets and open shale woodland	E		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Maundia triglochinoides	Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Biconvex Paperbark *(Melaleuca biconvexa)*	Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Deane's Paperbark *(Melaleuca deanei)*	The species grows in heath on sandstone.	V	V	Yes	No suitable sandstone-derived soils present	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Grove's Paperbark *(Melaleuca groveana)*	Grove's Paperbark grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcopping granite, rhyolite and sandtone on rocky outcrops and cliffs.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Micromyrtus blakelyi	Typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Micromyrtus minutiflora	Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Angus's Onion Orchid *(Microtis angusii)*	It is not easy to define the preferred natural habitat of this orchid as the Ingleside location is highly disturbed. The dominant species occurring on the site are introduced weeds *Hyparrhenia hirta* (Coolatai grass) and *Acacia saligna*. The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys Forest - Terrey Hills - Ingleside and Belrose areas.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Olearia cordata	Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Tall Knotweed *(Persicaria elatior)*	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Bargo Geebung *(Persoonia bargoensis)*	The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well-drained, loamy, gravelly soils of the Wianamatta Shale and Hawkesbury Sandstone.	E1	V	Yes	Suitable woodland habitat on shale-derived soils present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Mittagong Geebung *(Persoonia glaucescens)*	The Mittagong Geebung grows in woodland to dry sclerophyll forest on clayey and gravely laterite. The preferred topography is ridge-tops, plateaux and upper slopes. Aspect does not appear to be a significant factor.	E1	V	Yes	Suitable woodland habitat on shale-derived soils present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development
Hairy Geebung *(Persoonia hirsuta)*	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	E1	E	Yes	Suitable sandstone derived soils not present	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Persoonia mollis subsp. maxima	Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Nodding Geebung *(Persoonia nutans)*	Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Austral Pillwort *(Pilularia novae-hollandiae)*	Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Pimelea curviflora var. curviflora	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.	V	V	Yes	Suitable woodland habitat on shale-derived soils present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development
Spiked Rice-flower *(Pimelea spicata)*	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Brown Pomaderris *(Pomaderris brunnea)*	Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	E1	V	Yes	No suitable alluvial or floodplain habitat present	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
(*Pomaderris prunifolia*) population in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	On rocky slopes, often along creeks. Mainly south of the Hunter Valley, also at the western extremity of the Nandewar Ra. and Chandler R. gorge; not common.	E		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Singleton Mint Bush *(Prostanthera cineolifera)*	Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Somersby Mintbush *(Prostanthera junonis)*	Grows in sclerophyll forest and woodland, usually near the coast, in sandy loamy soils, overlying sandstone.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Seaforth Mintbush *(Prostanthera marifolia)*	Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	E4A	CE	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Sydney Plains Greenhood *(Pterostylis saxicola)*	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where Pterostylis saxicola occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Pultenaea parviflora	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Matted Bush-pea *(Pultenaea pedunculata)*	The Matted Bush-pea occurs in a range of habitats. NSW populations are generally among woodland vegetation but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Eastern Australian Underground Orchid *(Rhizanthella slateri)*	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest.	V	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Dwarf Kerrawang *(Rulingia prostrata)*	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*E. haemostoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Heath Wrinklewort *(Rutidosis heterogama)*	Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Magenta Lilly Pilly *(Syzygium paniculatum)*	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	E1	V	Yes	No suitable littoral rainforest habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Tetratheca glandulosa	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops.	V		Yes	Suitable woodland habitat present	This species was not detected on the subject site during surveys. Surveys were conducted during an appropriate season and were considered adequate for the size of the subject site. Considered very unlikely to be present. No significant impact on this species is anticipated as a result of the proposed development
Creek Triplarina *(Triplarina imbricata)*	Along watercourses in low open forest with Water Gum (*Tristaniopsis laurina*).	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Velleia perfoliata	Occurs on fairly shallow soils of sandy loam texture. Often found growing on moss and lichen mats formed on rock.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Tadgell's Bluebell *(Wahlenbergia multicaulis)* population in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite). Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of various forms), typically amongst other herbs rather than in the open.	E		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Narrow-leafed Wilsonia *(Wilsonia backhousei)*	This is a species of the margins of salt marshes and lakes.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Zieria involucrata	Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation. Also known from at least two atypical ridgetop locations.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

**TSC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2, Endangered Population*
***EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct*

Table A6.2: Fauna species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Regent Honeyeater *(Anthochaera phrygia)*	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	E4A	CE	Yes	Suitable woodland foraging habitat present. However, lacks key habitat attributes such as high numbers of mistletoes	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Fork-tailed Swift *(Apus pacificus)*	The Fork-tailed Swift is almost exclusively aerial, flying from less then 1 m to at least 300 m above ground and probably much higher. Occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea.		C,J,R	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Cattle Egret *(Ardea ibis)*	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures.		J,M	Yes	Suitable grassland foraging habitat and small waterbody present	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	The Dusky Woodswallow lives primarily in open eucalyptus forests and woodlands. They range mostly from Atherton Tablelands, Queensland down to Tasmania and west to the Eyre Peninsula, in South Australia. They roost communally, usually nocturnally. During the breeding season, they nest in large flocks. These flocks are typically between 20-30 individuals in size	V		Yes	Suitable woodland foraging habitat present. No signs that the subject site is used for breeding by this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Australasian Bittern *(Botaurus poiciloptilus)*	Favors permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.) Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Bush Stone-curlew *(Burhinus grallarius)*	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Curlew Sandpiper *(Calidris ferruginea)*	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland.	E1	CE,C,J,R	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Gang-gang Cockatoo *(Callocephalon fimbriatum)*	Generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Gang-gang Cockatoo (*Callocephalon fimbriatum*) population in the Hornsby and Ku-ring-gai Local Government Areas	Generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	E		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Glossy Black-Cockatoo *(Calyptorhynchus lathami)*	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location No feed trees (Allocasuarinas and Casuarinas) observed on the subject site	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Eastern Pygmy-possum *(Cercartetus nanus)*	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Large-eared Pied Bat *(Chalinolobus dwyeri)*	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	V	V	Yes	Suitable woodland foraging habitat present. No cave resources present on the subject site for roosting, although they are present along the Bargo River to the south	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Lesser Sand-plover *(Charadrius mongolus)*	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.	V	C,J,R	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Speckled Warbler *(Chthonicola sagittata)*	The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Spotted Harrier *(Circus assimilis)*	Occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Brown Treecreeper (eastern subspecies) *(Climacteris picumnus victoriae)*	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging.	V		Yes	Suitable woodland foraging habitat present. No signs that the subject site is used for breeding by this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Varied Sittella *(Daphoenositta chrysoptera)*	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.	V		Yes	Suitable woodland foraging habitat present. No signs that the subject site is used for breeding by this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Spotted-tailed Quoll *(Dasyurus maculatus)*	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	V	E	Yes	Suitable woodland foraging habitat present. No suitable denning sites were observed on the subject site for this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Black-necked Stork *(Ephippiorhynchus asiaticus)*	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Storks usually forage in water 5-30cm deep for vertebrate and invertebrate prey.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
White-fronted Chat *(Epthianura albifrons)*	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
White-fronted Chat (*Epthianura albifrons*) opulation in the Sydney Metropolitan Catchment Management Area	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	E		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Beach Stone-curlew *(Esacus magnirostris)*	Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves.	E4A		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Black Falcon *(Falco subniger)*	Black Falcons on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Eastern False Pipistrelle *(Falsistrellus tasmaniensis)*	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Latham's Snipe *(Gallinago hardwickii)*	Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies)		J,R	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Little Lorikeet *(Glossopsitta pusilla)*	Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Painted Honeyeater *(Grantiella picta)*	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Insects and nectar from mistletoe or eucalypts are occasionally eaten.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Sooty Oystercatcher *(Haematopus fuliginosus)*	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Pied Oystercatcher *(Haematopus longirostris)*	Favours intertidal flats of inlets and bays, open beaches and sandbanks.	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
White-bellied Sea-Eagle *(Haliaeetus leucogaster)*	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea).		M	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Giant Burrowing Frog *(Heleioporus australiacus)*	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Little Eagle *(Hieraaetus morphnoides)*	Occupies open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	V		Yes	Suitable woodland habitat present. No signs to indicate site used for breeding observed	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
White-throated Needletail *(Hirundapus caudacutus)*	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland		C,J,R	Yes	Suitable woodland foraging habitat present	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Barn Swallow *(Hirundo rustica)*	The Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires , and also in or over freshwater wetlands, paperbark *Melaleuca* woodland, mesophyll shrub thickets and tussock grassland.		C,J,R	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Pale-headed Snake *(Hoplocephalus bitorquatus)*	Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Broad-headed Snake *(Hoplocephalus bungaroides)*	Nocturnal, Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Comb-crested Jacana *(Irediparra gallinacea)*	Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. Forage on floating vegetation, walking with a characteristic bob and flick.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Southern Brown Bandicoot (eastern) *(Isoodon obesulus obesulus)*	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Black Bittern *(Ixobrychus flavicollis)*	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Golden-tipped Bat *(Kerivoula papuensis)*	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests. Bats will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid and upper-slopes. Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Swift Parrot *(Lathamus discolor)*	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Broad-billed Sandpiper *(Limicola falcinellus)*	Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches.	V	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Black-tailed Godwit *(Limosa limosa)*	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats.	V	C,J,R	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Green and Golden Bell Frog *(Litoria aurea)*	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Booroolong Frog *(Litoria booroolongensis)*	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Green-thighed Frog *(Litoria brevipalmata)*	Green-thighed Frogs occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range, but extends into drier forests in northern NSW	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Littlejohn's Tree Frog *(Litoria littlejohni)*	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heathbased forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Square-tailed Kite *(Lophoictinia isura)*	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid northwestern NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	V		Yes	Suitable woodland habitat present. No signs to indicate site used for breeding observed	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Macquarie Perch (*Macquaria australasica*)	The Macquarie Perch is a riverine, schooling species. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning sites		E	Yes	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Parma Wallaby *(Macropus parma)*	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest. Typically feed at night on grasses and herbs in more open eucalypt forest and the edges of nearby grassy areas. During the day they shelter in dense cover.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Hooded Robin (south-eastern form) *(Melanodryas cucullata cucullata)*	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Black-chinned Honeyeater (eastern subspecies) *(Melithreptus gularis gularis)*	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*).	V		Yes	Suitable woodland foraging habitat present. No signs that the subject site is used for breeding by this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Cumberland Plain Land Snail *(Meridolum corneovirens)*	Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	E1		Yes	Suitable CPW habitat on the Cumberland Plain present	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Rainbow Bee-eater *(Merops ornatus)*	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins 1999). It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches.		J,M	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Little Bentwing-bat *(Miniopterus australis)*	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Eastern Bentwing-bat *(Miniopterus schreibersii oceanensis)*	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	V		Yes	Suitable woodland foraging habitat present	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Stuttering Frog *(Mixophyes balbus)*	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Giant Barred Frog *(Mixophyes iterates)*	Giant Barred Frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Black-faced Monarch (*Monarcha melanopsis*)	The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest	-	B	Yes	Suitable woodland foraging habitat present	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Eastern Freetail-bat *(Mormopterus norfolkensis)*	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Satin Flycatcher (*Myiagra cyanoleuca*)	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests	-	B	Yes	Suitable woodland foraging habitat present.	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Southern Myotis *(Myotis macropus)*	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site Subject site is not located near to any riparian corridor	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Turquoise Parrot *(Neophema pulchella)*	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Barking Owl *(Ninox connivens)*	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Powerful Owl *(Ninox strenua)*	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Eastern Osprey *(Pandion cristatus)*	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	V	M	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Greater Glider (*Petauroides volans)*	Inhabits a wide range of habitats including tall open woodland, eucalypt forests and low woodlands. Prefers habitats that are in older forests and have large number of hollows.		V	Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Yellow-bellied Glider *(Petaurus australis)*	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Squirrel Glider *(Petaurus norfolcensis)*	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site. Considered unlikely to be used by this species due to exposed location	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Brush-tailed Rock-wallaby *(Petrogale penicillata)*	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Scarlet Robin *(Petroica boodang)*	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps.	V		Yes	Suitable woodland foraging habitat present. No signs that the subject site is used for breeding by this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Flame Robin *(Petroica phoenicea)*	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Pink Robin *(Petroica rodinogaster)*	Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down. It is situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Brush-tailed Phascogale *(Phascogale tapoatafa)*	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Koala *(Phascolarctos cinereus)*	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	V	V	Yes	Suitable native woodlands with known feed tree species present	This species was not detected on the subject site during surveys; however, the species is known from numerous contemporary occurrence records. The subject site is considered to meet the definition of core Koala habitat under SEPP44. However, the species is considered unlikely to be utilising the resources of the subject site in reality. The removal of a small amount of suitable habitat is not considered to represent a significant impact on this species in the locality

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Glossy Ibis *(Plegadis falcinellus)*	The Glossy Ibis' preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons		M	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Superb Parrot *(Polytelis swainsonii)*	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Grey-crowned Babbler (eastern subspecies) *(Pomatostomus temporalis temporalis)*	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Flight is laborious so birds prefer to hop to the top of a tree and glide down to the next one. Birds are generally unable to cross large open areas.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Eastern Chestnut Mouse *(Pseudomys gracilicaudatus)*	In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps. In the tropics it is more an animal of grassy woodlands.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
New Holland Mouse *(Pseudomys novaehollandiae)*	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals		V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Red-Crowned Toadlet *(Pseudophryne australis)*	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Grey-headed Flying-fox *(Pteropus poliocephalus)*	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	V	V	Yes	Suitable woodland foraging habitat present. No evidence of a camp was observed on the subject site or adjacent lands	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Rose-crowned Fruit-Dove *(Ptilinopus regina)*	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Superb Fruit-Dove *(Ptilinopus superbus)*	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Rufous Fantail (*Rhipidura ruffirons*)	In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns	-	B	Yes	Marginal woodland foraging habitat present.	This species was not detected on the subject site during surveys. Marginal habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Australian Painted Snipe *(Rostratula australis)*	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	E1	E,M	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Yellow-bellied Sheathtail-bat *(Saccolaimus flaviventris)*	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Greater Broad-nosed Bat *(Scoteanax rueppellii)*	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	V		Yes	Suitable woodland habitat present. One hollow-bearing tree observed on the subject site	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Diamond Firetail *(Stagonopleura guttata)*	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	V		Yes	Suitable woodland foraging habitat present. No signs that the subject site is used for breeding by this species	This species was not detected on the subject site during surveys. Suitable habitat is present but not limited in the locality. Subject site is not considered important to the long-term survival of this species. No significant impact on this species is anticipated as a result of the proposed development
Freckled Duck *(Stictonetta naevosa)*	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Red-backed Button-quail *(Turnix maculosus)*	Red-backed Button-quail inhabit grasslands, open and savannah woodlands with grassy ground layer, pastures and crops of warm temperate areas, typically only in regions subject to annual summer rainfall greater than 400 mm.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Eastern Grass Owl *(Tyto longimembris)*	Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Masked Owl *(Tyto novaehollandiae)*	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. Pairs have a large home-range of 500 to 1000 hectares.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Sooty Owl *(Tyto tenebricosa)*	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) or Sugar Glider (*Petaurus breviceps*).	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Rosenberg's Goanna *(Varanus rosenbergi)*	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species Names	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Eastern Cave Bat *(Vespadelus troughtoni*)	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

**TSC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2, Endangered Population*

***EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct, B=Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II (Bonn Convention), C=China-Australia Migratory Bird Agreement (CAMBA), J=Japan-Australia Migratory Bird Agreement (JAMBA), R=Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)*

13 APPENDIX 7: SITE PLAN

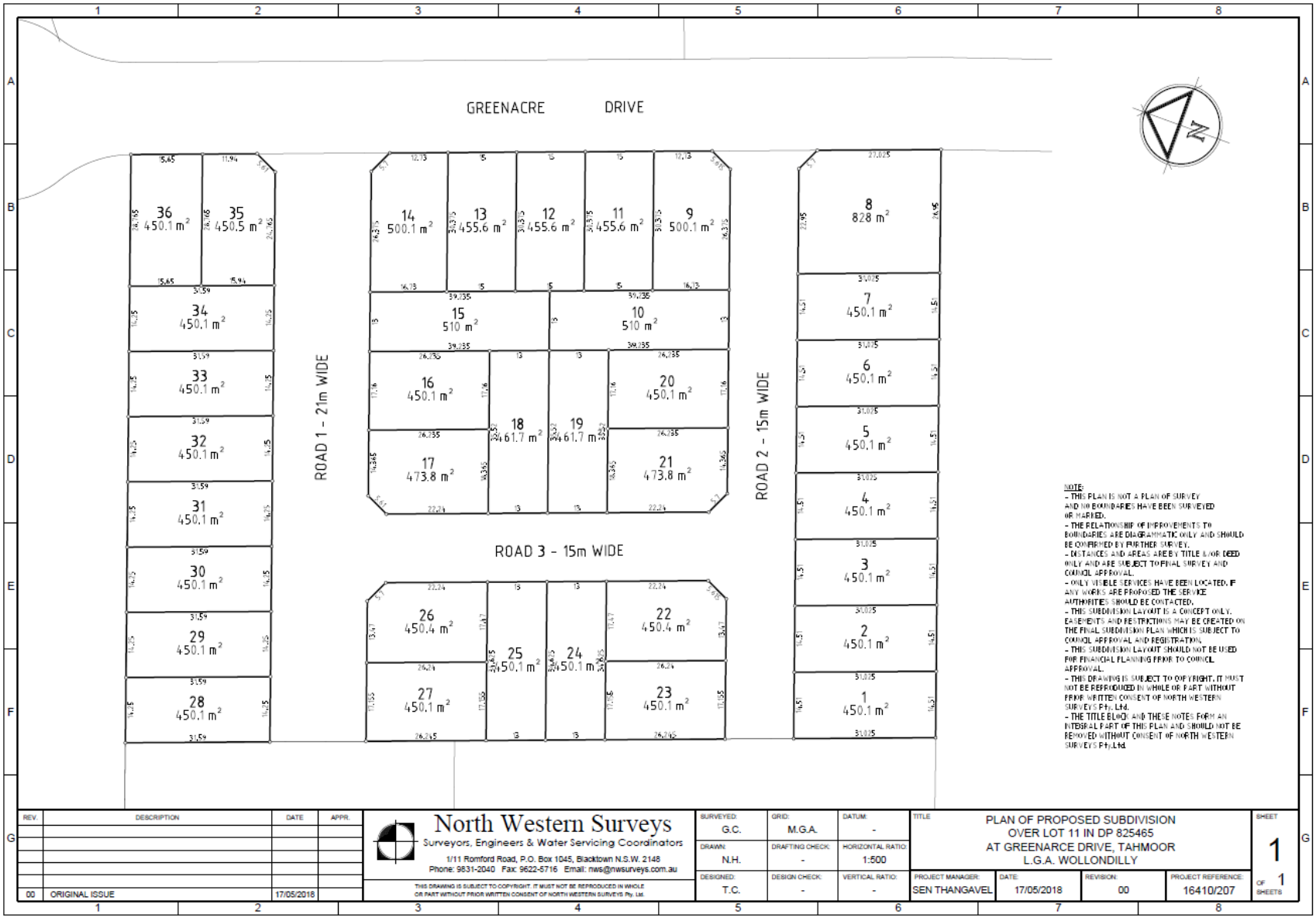

Figure A7.1: Site plan

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