



## Expert Report for the Koala at Macquariedale Road, Appin Biodiversity Certification Application

Koala (*Phascolarctos cinereus*)

Prepared for  
Wollondilly Shire Council

18 March 2015



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# Abbreviations

Abbreviation	Description
BCAA	Biodiversity Certification Assessment Area
BCAM	Biodiversity Certification Assessment Methodology
ELA	Eco Logical Australia Pty Ltd
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act</i> 1999
EP&A Act	NSW <i>Environmental Planning and Assessment Act</i> 1979
NPW Act	<i>National Parks and Wildlife Act</i> 1974
OEH	Office of Environment and Heritage
SSTF	Shale Sandstone Transition Forest
TSC Act	NSW <i>Threatened Species Conservation Act</i> 1995
UoWS	University of Western Sydney
WSC	Wollondilly Shire Council

# 1 Introduction

## 1.1 Reasons for expert report

Wollondilly Shire Council (WSC) has been in consultation with the Office of Environment and Heritage (OEH) and Department of Planning and Environment (DPE) since 2008 regarding a proposal to rezone land fronting Macquariedale and Appin Roads in Appin consistent with Wollondilly Council's Growth Management Strategy. An application for Biodiversity Certification is being prepared concurrently with the rezoning proposal (ELA 2015).

The Biodiversity Certification Assessment Area (BCAA) encompasses a total area of 60.47 ha located close to the township of Appin. The site is accessed off Macquariedale Road and includes land proposed for 'biodiversity certification' (development), land subject to 'conservation measures', and two areas of 'retained land' being the proposed Appin bypass (i.e. land that is not proposed for development or subject to conservation measures)(Figure 1).

Potential habitat for the Koala (*Phascolarctos cinereus*) was recorded by Travers bushfire & ecology in 2012 within the impact area although no Koalas, or evidence of Koalas, was noted during the assessment period despite targeted direct and indirect survey effort (Travers bushfire & ecology 2014). Whilst not recorded during the assessment undertaken by Travers bushfire & ecology, the species occurs at low densities and can be difficult to detect. There are a number of records in the NSW Wildlife Atlas close to the assessment area and long term local residents have reported to Wollondilly Council that Koala's have been seen in the assessment area.

Accordingly, and to be precautionary, for the purposes of the Biodiversity Certification Assessment the Koalas was 'assumed' to be present in the impact area in all areas of woodland and forest. Based on impacts to 13.19 ha of potential habitat, the Biodiversity Certification Assessment Methodology (BCAM) has found that 347 species credits are required (ELA 2015).

With regards to the creation of species credits, it would appear to be consistent and appropriate to also 'assume' presence within the proposed conservation lands, especially as the Koala habitat to be conserved is immediately adjacent to the lands to be developed. However, under the BCAM, Koalas cannot be 'assumed' to be present in land subject to conservation measures, the methodology requires that an 'expert report' be prepared stating that in the opinion of the expert, Koala's are 'likely' to be present on land subject to conservation measures. If the Chief Executive Officer of the OEH agrees with this opinion, then BCAM species credits can be awarded for the Koala which can be used to offset the assumed impacts.

This expert report outlines the opinion by Koala expert, Dr Steven Ward, as to the likelihood that Koala's would be using habitat at the proposed on-site offset site at Macquariedale Road and thus able to generate BCAM species credits.



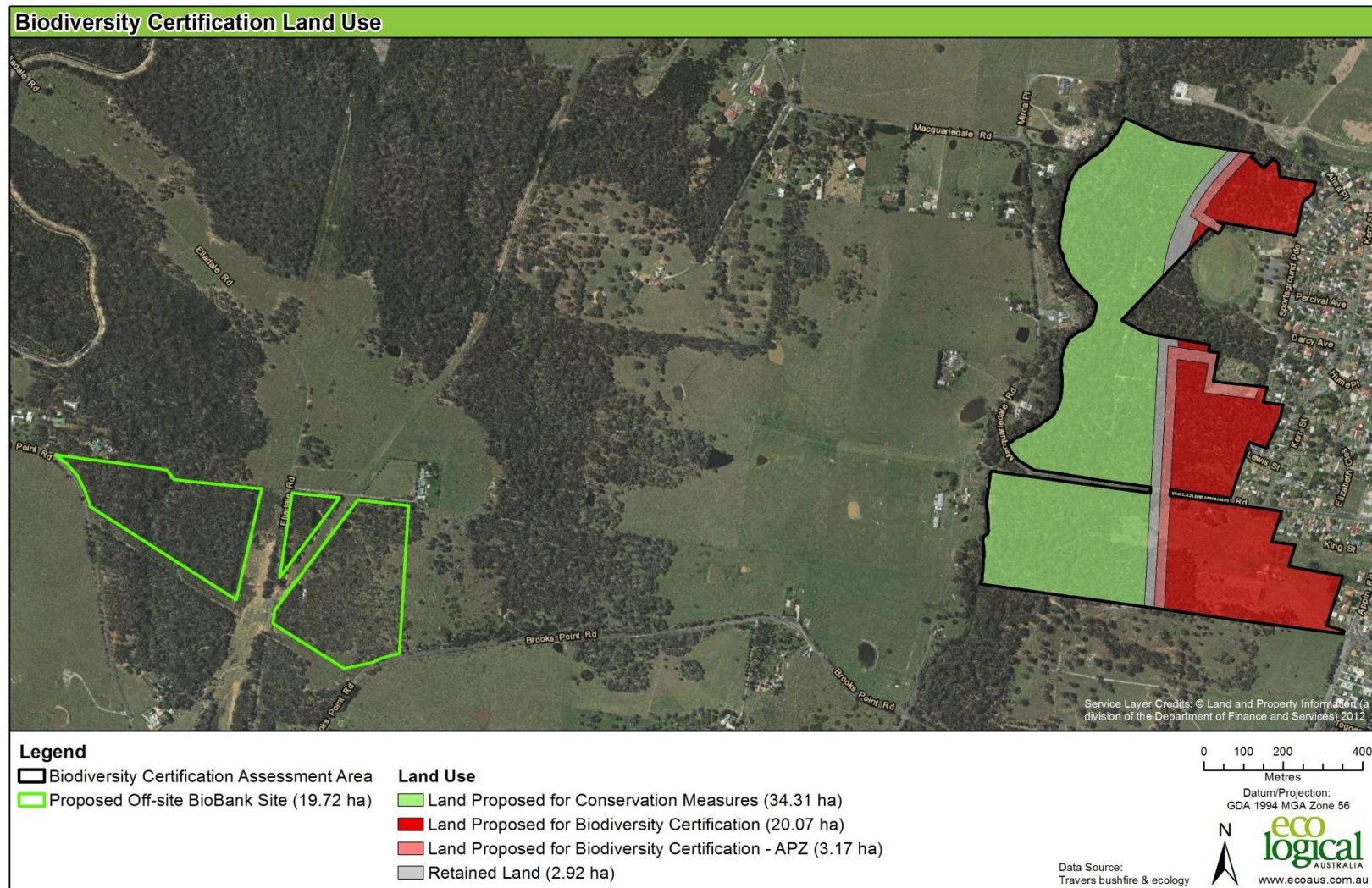


Figure 1: Biodiversity Certification Assessment Area and proposed land uses

## 1.2 Qualifications/experience of expert

Dr Steven Ward is an ecologist/zoologist with over 20 years' experience in wildlife and environmental investigations. Steven has a Ph.D. in Koala ecology from the University of Western Sydney, where he researched the distribution, density, health, home range size and tree preferences of Koalas in the southern Sydney region. Since graduating from the University of Western Sydney in 2002 he has worked as an ecological/environmental consultant for Eco Logical Australia and is a trainer in the NSW BioBanking and BioCertification Accredited Assessor Training Course, as well as being an accredited consultant under this scheme.

Steven has subsequently worked as a professional ecological consultant and been engaged to undertake a variety of projects on Koala populations. During this time he has acquired an excellent knowledge and understanding of the ecology of NSW threatened flora and fauna, native vegetation and associated ecological and threatening processes, and has been involved in many key Government initiated broad-scale natural resource assessment projects.

Relevant Roles and Project Experience that demonstrate Steven's bone fides with respect to making an expert judgement on Koala impact assessment and conservation are detailed in the list below.

Preparation, authorship or significant input to:

- Koalas and the community: a study of low density populations in Southern Sydney, Unpublished PhD thesis, University of Western Sydney (2002)
- Koala Plan of Management - Review of Coffs Harbour Comprehensive Koala Plan of Management, and advice on management of Koala habitat, Department of Planning
- Leaf's Gully Koala Assessment - Assessment of vegetation for suitability as Koala habitat at Leaf's Gully (south of Campbelltown), and recommendations on design to consider koala habitat and movements.
- Moonee Creek - Assessment of Koala habitat, and recommendations regarding environmental protection and sustainable development at Moonee Creek, Coffs Harbour
- Far South Coast Koala Management Framework, NSW Department of Environment and Conservation
- Identification and Mapping of Koala Habitat for Hawks Nest and Tea Gardens Endangered Population
- Hawkesbury Koala Habitat Survey – Multiple plots to assess koala habitat for Hawkesbury City Council
- Koala trapping – Capture of radio-collared koalas for NPWS
- Comprehensive Koala Plan of Management for Campbelltown local Government Area (in progress)
- Scientific Papers:
  - Community assistance with koala *Phascolarctos cinereus* sightings from a low density population in the south-west Sydney region. Pp. 97-102 in: *Ecology for Everyone: Communicating Ecology to the Scientists, the Public and the Politicians* (1998)
  - Southern Sydney's urban koalas: community research and education at Campbelltown. Pp. 44– 54 in: *Urban Wildlife: More Than Meets the Eye* (2004)

## 2 Species information

### 2.1 Legal status

In NSW the Koala is listed as vulnerable under Part 1 of Schedule 1 of the TSC Act and is categorised as a species credit species under the BioBanking and BioCertification schemes.

### 2.2 Abundance and distribution

The following comments on the overall abundance and distribution of the Koala are drawn mainly from the Recovery Plan for the Koala (DECC 2008), unless otherwise cited.

The Koala occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. Surveys in NSW indicate that since 1949 populations of Koalas have been lost from many localities, particularly on the southern and western edges of their distribution (Reed *et.al.* 1990). Most populations in NSW now survive in fragmented and isolated habitat and many of the areas in which Koalas are most abundant are subject to intense development pressures such as agriculture and urban expansion. Koalas continue to be absent in some areas of suitable Koala habitat, demonstrating the difficulty of species recovery when faced with high levels of fragmentation and the ongoing pressure from a number of threats (DECC 2008).

However, the Koala is also a highly cryptic species when occurring at low density, and recent research by Close et al. (in press) concluded that koalas can exist and utilise habitat at quite low densities (around 0.01 animals per ha), utilising larger home ranges than in higher density populations. The species is very difficult to detect at such low densities.

In the Sydney Basin, a known population which has been well researched exists in the Wedderburn/Campbelltown area (Ward and Close 2004). Koalas are also known to occur further south within the southern highlands with multiple records and captures within this region (Ward 2002). Genetic analysis of tissue collected from captures and roadkill or fatalities found that a genetically distinct population occurred south of the Appin to Bulli road. Koalas have also been recorded from the Blue Mountains, the Sutherland shire, and in the Ku-ring-gai area, though knowledge of these populations is much less.

There were no recorded occurrences of the Koala in the BCAA during the assessment period, however there are an abundance of records east of Appin Rd, in the NSW Wildlife Atlas and provided to Wollondilly Shire Council by Associate Professor Rob Close of the UoWS.

### 2.3 Ecology and habitat requirements

The Koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains. Koalas also utilise isolated paddock trees. The quality of forest and woodland communities as habitat for koalas is influenced by a range of factors (Reed *et al.* 1990), such as:

- species and size of trees present
- structural diversity of the vegetation
- soil nutrients
- climate and rainfall
- size and disturbance history of the habitat patch.



### 2.3.1 Species and size of trees present

The most important factor influencing Koala occurrence is the suite of food tree species available. In any one area, Koalas rely primarily on regionally specific primary and/or secondary food tree species. If primary food tree species are not present or occur in low density, Koalas will rely on secondary food tree species, but the carrying capacity of the habitat (i.e. number of animals per hectare) is inevitably lower.

Although primary and secondary food trees provide the bulk of a koala's diet, leaves from other species, including non-eucalypts, may provide a seasonal or supplementary dietary resource. The quality of habitat is also influenced by the presence of suitable shelter trees, particularly in harsh climates, such as cypress pine and brush box (DECC 2008).

### 2.3.2 Structural diversity of the vegetation

It has been found that Koala activity is greater in structurally diverse forest with the majority of trees 25.5–80 cm diameter at breast height (dbh), with under-utilisation of trees less than 25.5 cm dbh. Some groundcover vegetation and other features such as hollow logs, are also useful to provide shelter while on the ground and refuge in extreme weather conditions (DECC 2008).

## 2.4 Soil nutrients

It has been observed that vegetation on more fertile soils provide the most suitable habitat for Koalas due to the greater availability of nutrients within leaves. This can be best demonstrated by the varying degree of use of two primary food tree species, *Eucalyptus tereticornis* and *E. viminalis*, according to substrate. Both species are used as primary food trees when on nutrient rich soils but not when on nutrient deficient soils (DECC 2008).

## 2.5 Climate and rainfall

Koalas rely primarily on the moisture within their food to meet their water requirements. Where soil moisture is low, Koalas would be expected to depend on areas with relatively high rainfall. Where rainfall is low Koalas primarily occur in areas of higher soil moisture in the vicinity of waterways. Koalas have been demonstrated to change their foraging patterns seasonally, for example it has been observed that in summer, Koalas selected trees with a higher leaf moisture content (DECC 2008).

## 2.6 Size and disturbance history of the habitat patch

Small, fragmented or highly disturbed habitats are less likely to be able to support a Koala population in the long term due to edge effects, limited resource availability and increased predation. Although Koalas do utilise scattered trees in largely cleared environments, travelling across open ground leaves them more vulnerable to threats such as predation. Vegetated links are important to support continued Koala movement; where dispersal and recruitment are impeded by barriers such as large areas of open ground and roads, populations would be expected to decline (DECC 2008).

### 3 Assessment methodology

The following sections outline the desktop assessment methodologies undertaken for this report.

#### 3.1 Desktop assessment

A desktop assessment was undertaken that included accessing databases and assessing known Koala records in NSW (historic for the vicinity of the subject site). Relevant literature was also reviewed including:

- NSW Recovery Plan (draft) for the Koala (DECC 2008)
- Koala Species Profile and Threats Database Profile (DSEWPaC 2015)
- Office of Environment and Heritage Koala – profile (OEH 2015)
- Koala records provided by Associate Professor Robert Close to Wollondilly Shire Council
- Macquariedale Road, Appin Biodiversity Certification Assessment Report & Biocertification Strategy (ELA 2015)
- Travers Bushfire and ecology Koala Survey Addendum Report - Macquariedale Road, Appin (2015)
- Southern Sydney's urban Koalas: Community research and education at Campbelltown (Ward S. and Close R. 2004)

#### 3.2 Results

There are a number of Koala records east of Appin Rd, in the NSW Wildlife Atlas and provided to Wollondilly Shire Council by Associate Professor Robert Close of University of Western Sydney (Campbelltown)(UoWS) (**Figure 2**).

The land proposed for conservation measures in the Biodiversity Certification assessment is mapped by Travers Ecology and bushfire (2014) as dominated by good condition Shale Sandstone Transition Forest (SSTF). SSTF is dominated by a canopy of *E. tereticornis* (Forest Red Gum) and *E. punctata* (Grey Gum) with some *E. eugenioides* (Thin-leaved Stringybark). These canopy species are identified as primary, secondary and supplementary food trees for the Koala respectively in the NSW Koala Recovery Plan (DECC 2008).

WSC has provided additional information on local Koala records supplied Associate Professor Robert Close from the University of Western Sydney, a recognised local Koa expert, who stated that;

*“Local residents have sighted young male Koalas in Appin in Neal Place, Technology Drive, Kennedy Street, Kennedy Grove and the Dog Track and a juvenile female Koala in Kennedy St. Many have been killed all along Campbelltown and Appin Road and a few along the Appin-Bulli Rd (western end). There was also a sighting near the water channel and Elladale Creek. The Brooks Rd animal was a female and the people who spotted her said they had heard strange noises at night (possibly males bellowing). But that is the only evidence that there are female home-ranges near the development sites. One of our tagged koalas was seen in Wedderburn Road then later beside Appin Rd and finally at Douglas Park. Most of the Koalas killed on Appin Road we think are males displaced from the breeding areas at Campbelltown. **There is no doubt that the area between Appin Rd and the Nepean River is an important movement zone for Koalas from the Georges River.**”*

Travers ecology & bushfire as part of the ecological assessment of the proposed rezoning of land at Macquariedale Road have undertaken a number of surveys and investigations of Koala's in the vicinity of the land proposed for biocertification, including most recently interviewing local residents regarding their observations of Koala's in the area (Travers ecology & bushfire 2015). Three long term residents were able to confirm that they had seen Koala's in the land proposed for conservation as indicated in **Figure 2**. As the Koala is not a species easily confused or mistaken for other arboreal mammals, these records add weight to the conclusion that Koala's have and are likely to use habitats within the proposed conservation area.

The BCAA is connected to other suitable habitat to the north and west of the site and provides what is most likely an important movement corridor to areas of higher quality habitat in particular the Georges and Nepean River Catchments where the Koala is known to occur (**Figure 2**).

### 3.3 Conclusion

The subject site contains substantial areas of breeding and foraging habitat for the Koala. The site is dominated by good condition Shale Sandstone Transition Forest (SSTF). The vegetation contains Koala food trees including *E. tereticornis* and *E. punctata*.

There are several recent records east of Appin Rd, in the NSW Wildlife Atlas and provided to WSC by Professor Rob Close of the UoWS (**Figure 2**). There are also sightings within the land proposed for conservation reported by local residents (Travers ecology & bushfire 2015).

It was noted by expert zoologist Robert Close in data provided to WSC, that local residents have sighted young male and female Koalas within and surrounding the study area on various occasions, and in his opinion '*there is no doubt that the area between Appin Rd and the Nepean River is an important movement zone for Koalas from the Georges River.*'

The subject site is connected to other suitable habitat to the north and west of the site and provides an important movement corridor to areas of higher quality habitat in particular the Georges and Nepean River Catchments where the Koala is known to occur (**Figure 2**).

Koalas in this region occur at low density and are therefore cryptic and extremely difficult to detect (Close *et. al* in press). Given these constraints delineation of koala habitat has been applied consistently across all lands in the Biodiversity Certification area, irrespective of development or conservation outcomes.

It is my expert opinion, that due to the presence of primary and supplementary food trees, records near and within the subject site, and connectivity to areas of high quality habitat, the entire conservation site is considered habitat for the Koala.

Accordingly a Koala habitat polygon of 34.31 ha has been delineated across the proposed conservation area based on vegetation type and condition. The Biodiversity assessment has calculated that this habitat area will generate 206 Koala BCAM species credits as a 100% conservation measure.



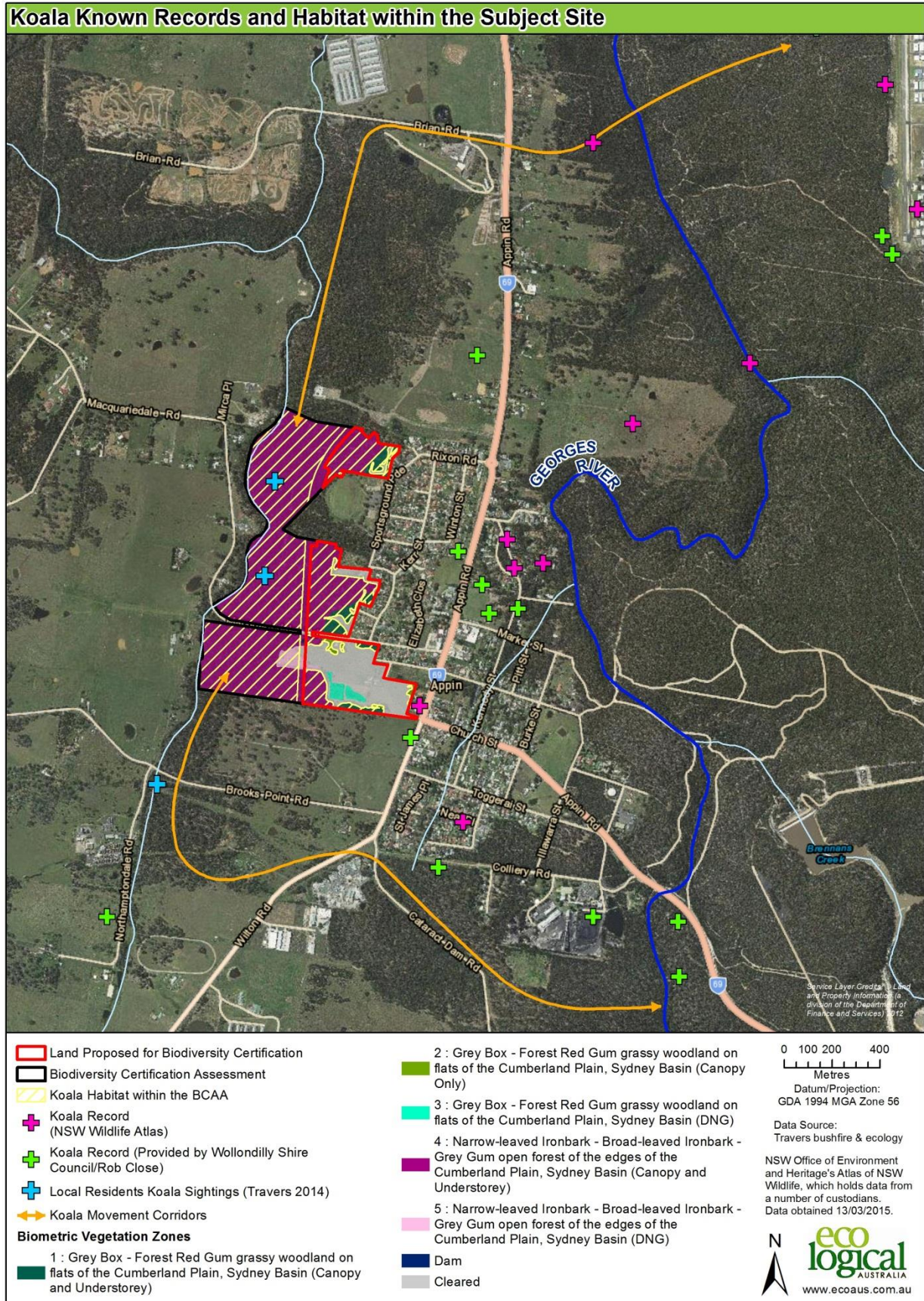


Figure 2: Koala known records and habitat within the subject site

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