



Expert Report for the Koala at the Macarthur-Onslow Mt Gilead Biobank Site

Koala (*Phascolarctos cinereus*)

Prepared for
Mt Gilead Pty Ltd

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Abbreviations

Abbreviation	Description
BCAA	Biodiversity Certification Assessment Area
BBAM 2014	Biobanking Assessment Methodology 2014
dbh	Diameter at breast height
DECC	Department of Environment and Climate Change (now OEH)
DoE	Department of the Environment (Commonwealth)
ELA	Eco Logical Australia Pty Ltd
LGA	Local Government Area
Mt Gilead	Mt Gilead Pty Ltd
OEH	Office of Environment and Heritage
PCT	Plant Community Type
SEPP 44	State Environmental Planning Policy No 44 – Koala Habitat Protection
TSC Act	NSW <i>Threatened Species Conservation Act</i> 1995

1 Introduction

1.1 Reasons for expert report

An area of land, located on Lots 1 and 2 //DP 807555, is proposed to be registered as a Biobank site: the Macarthur-Onslow Mt Gilead Biobank Site (**Figure 1**). The Macarthur-Onslow Mt Gilead Biobank Site is located in Gilead in the Campbelltown Local Government Area (LGA), and is accessed from Appin Road. The biobank site, along with a second biobank site known as 'Noorumba-Mt Gilead Biobank Site' to the north adjacent to Noorumba Reserve, is proposed to offset impacts to adjacent land intended for biocertification within a selected portion of a property owned and referred to by Mt Gilead Pty Ltd (Mt Gilead) as the MDP lands. A Biodiversity Certification application is currently being prepared for the MDP lands. It is envisaged that the biocertification assessment and strategy for the MDP lands will be considered by the NSW Office of Environment and Heritage (OEH) in June or July 2015, with public exhibition occurring from August 2015 through to the end of September 2015. Biocertification is likely to be achieved after the registration of the associated biobank sites.

Potential habitat for *Phascolarctos cinereus* (Koala) is present in the proposed lands to be biocertified (i.e. 'development areas') and 'conservation areas' in the MDP lands, as well as the biobank sites, Noorumba Reserve, the registered Beulah Biobank Site, and adjacent lands proposed as future biobank sites (**Figure 1**). Koala has not been recorded in the MDP lands despite targeted searches for the species and opportunistic surveys of the wider area (Eco Logical Australia [ELA] 2006 and 2014). However, the species occurs at low densities and can be difficult to detect. There are a number of records in the NSW Wildlife Atlas (OEH 2015a) adjacent to the biodiversity certification assessment area (BCAA) and the proposed biobank sites, to the east of Appin Road Noorumba Reserve, the registered Beulah Biobank Site.

Accordingly, and to be precautionary, for the purposes of the Biocertification Assessment, Koala was 'assumed' to be present in the proposed lands to be certified/impact areas, and was considered 'likely to be present' in conservation lands within the BCAA. For the purposes of the Biobanking Assessment of the Macarthur-Onslow Mt Gilead Biobank Site, Koala was considered 'likely to be present'. Under the Biobanking Assessment Methodology 2014 (BBAM 2014; OEH 2014) an 'expert report' must be prepared to state whether a species is likely or unlikely to be present in a biobank site if field survey has not been undertaken, or if field survey has been undertaken and the species has not been found. If the Chief Executive Officer of the OEH agrees with this opinion, then species credits can be awarded which can be used to offset any assumed impacts to the same species.

This document is the expert report for the likely presence of Koala in the Macarthur-Onslow Mt Gilead Biobank Site. It outlines the amount of habitat that will be improved for the species through management actions within the Macarthur-Onslow Mt Gilead Biobank Site, and calculates the number of Koala credits that can be generated through managing the site.

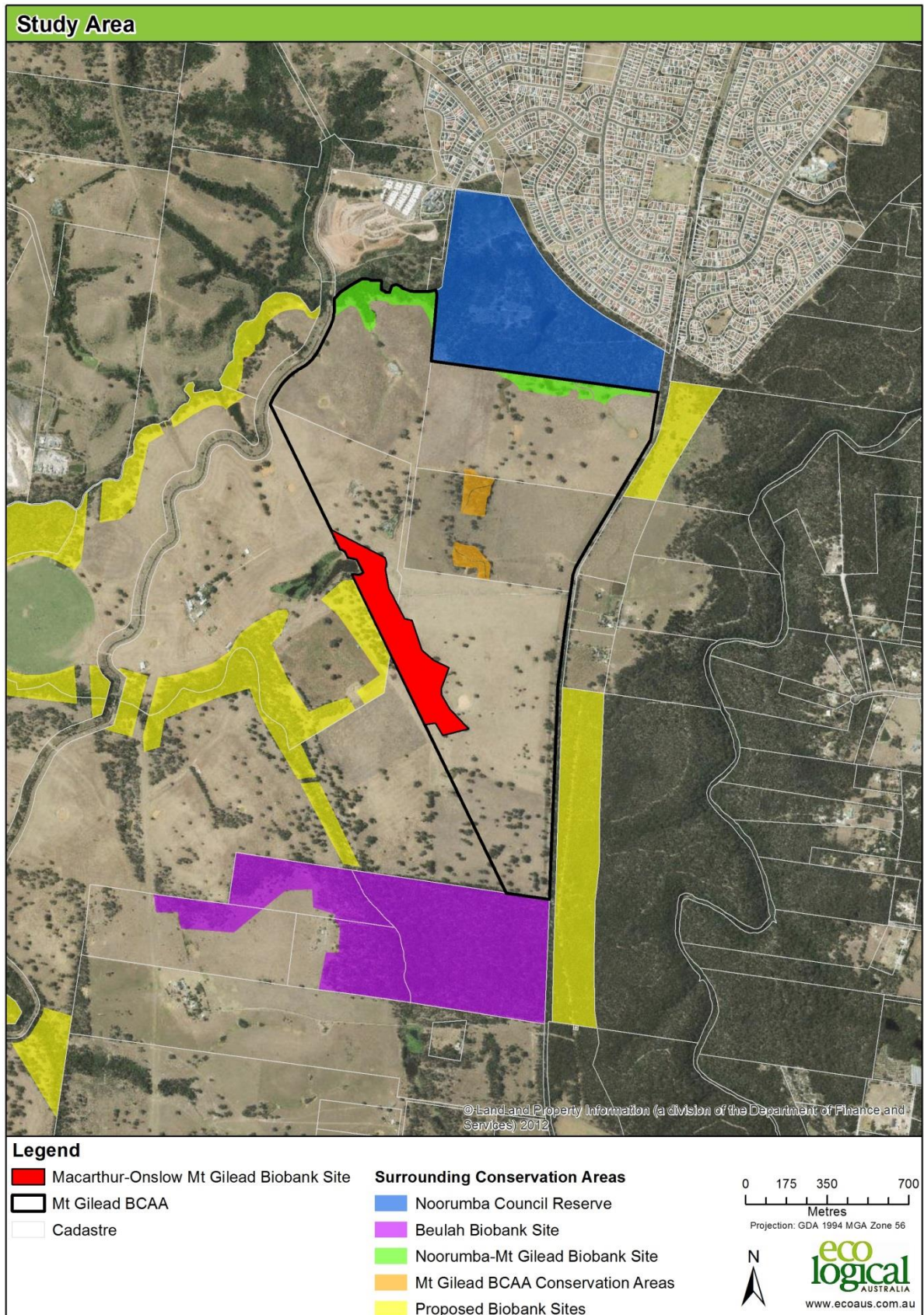


Figure 1: Location of the Macarthur-Onslow Mt Gilead Biobank Site, the Noorumba-Mt Gilead Biobank Site, Noorumba Reserve, the registered Beulah Biobank Site, nearby proposed biobank sites, and the Biodiversity Certification Assessment Area

1.2 Qualifications/experience of expert

Bruce Mullins is an ecologist/zoologist with over 20 years' post-graduate experience in wildlife and environmental investigations. He is ELA's Senior Ecologist and Manager of the Ecology and Assessment team. Bruce has a Master of Science, for which he examined patch dynamics and plant ecophysiology at an abandoned mine site in the central tablelands of NSW. Prior to becoming ELA's Manager of Ecology and Assessment, Bruce worked as a researcher and environmental consultant, and managed the environmental consulting activities of Charles Sturt University, principally through the Johnstone Centre. Bruce is an accredited consultant under the NSW BioBanking and BioCertification Accreditation scheme.

As a professional ecological consultant, Bruce 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. He has worked on numerous projects, including projects associated with Koala populations and threats faced by the species.

Relevant projects that demonstrate Bruce's experience with respect to Koala are detailed in the list below.

- Crudine Ridge Wind Farm Part 3A Ecological Assessment – included target survey for Koala, and an assessment of impact.
- Koala Plan of Management for 127 Georges River Road Kentlyn.
- L&E Court expert witness for Coffs Harbour Council – Council required an expert witness regarding impacts to threatened species and ecological communities. Koala was a main issue.
- North Hawks Nest Local Environment Study – this project included target survey for Koala, and comment on key resources for Koala and other threatened species.
- Campbelltown Biodiversity Study, Campbelltown City Council.

2 Species information

2.1 Legal status

In NSW Koala is listed as vulnerable under Part 1 of Schedule 1 of the NSW *Threatened Species Conservation Act 1995* (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 Koala are drawn mainly from the Recovery Plan for Koala (Department of Environment and Climate Change [DECC] 2008), unless otherwise cited.

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 Koala 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 Koala are most abundant are subject to intense development pressures such as agriculture and urban expansion. Koala 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.

However, Koala is also a highly cryptic species when occurring at low density, and recent research by Close *et al.* (in press) concluded that Koala 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 are no recorded occurrences of Koala in the BCAA from the NSW Wildlife Atlas (OEH 2015a), and the species was not recorded by ELA during targeted or opportunistic surveys of the area (ELA 2006 and 2014). However there are an abundance of records of Appin Road and a record within Noorumba Reserve in the NSW Wildlife Atlas (OEH 2015a).

2.3 Ecology and habitat requirements

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. Koala 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, Koala 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, Koala 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).

2.3.3 Soil nutrients

It has been observed that vegetation on more fertile soils provide the most suitable habitat for Koala 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).

2.3.4 Climate and rainfall

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

2.3.5 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 Koala 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 and results

The following sections outline the assessment methodologies undertaken for this report, and results.

3.1 Methods

3.1.1 Desktop assessment

A desktop assessment was undertaken that included accessing databases (Atlas of NSW Wildlife; OEH 2015a, Campbelltown Council threatened species records; Campbelltown City Council [CCC] 2014) and assessing known Koala records in NSW for their accuracy/reliability. Relevant literature and past reports were also reviewed including:

- NSW Recovery Plan (draft) for Koala (DECC 2008)
- Koala Species Profile and Threats Database Profile (Department of the Environment [DoE] 2015)
- Office of Environment and Heritage Koala – profile (OEH 2015b)
- Mt Gilead Flora and Fauna Assessment: Stage 2 (ELA 2006)
- Mt Gilead Rezoning: Ecological Assessment (ELA 2014)
- Southern Sydney's urban Koalas: Community research and education at Campbelltown (Ward and Close 2004).

Information from the literature was used to determine suitable habitat present for Koala in the Macarthur-Onslow Mt Gilead Biobank Site.

3.1.2 Field assessment

A field assessment which focussed on validating and surveying plant community types (PCTs) in the Macarthur-Onslow Mt Gilead Biobank Site for a Biobank assessment for the site was undertaken on 10 April 2015. While the field survey did not specifically target Koala e.g. through scat searches, the survey of PCTs present on site confirmed the presence/absence of Koala food trees within and adjacent to the Macarthur-Onslow Mt Gilead Biobank Site.

Previous survey by ELA undertaken for a rezoning assessment also confirmed the presence/absence of Koala food trees within and adjacent to the Noorumba-Mt Gilead Biobank Site. This survey was undertaken over five days on 25th and 26th March, 4th April, 27th June, and 20th September 2013 (ELA 2014).

3.2 Results

3.2.1 Records

There are a number of Koala records east of Appin Road (OEH 2015a) and within Noorumba Reserve (CCC 2014) (**Figure 2**). These were largely recorded over 10 years ago, although there are records that were made between five and ten years ago, and less than five years ago.

3.2.2 Available habitat

All vegetated areas within the Macarthur-Onslow Mt Gilead Biobank Site were mapped by ELA (2006 and 2014), and confirmed during field survey, as '*Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion*'.

This PCT supported *Eucalyptus tereticornis* (Forest Red Gum), *E. punctata* (Grey Gum), and *E. moluccana* (Grey Box), with the proportion of these species varying across the PCT. Within the Koala Management Area (as defined in the Koala Recovery Plan; DECC 2008) in which the Macarthur-Onslow Mt Gilead Biobank Site occurs (Management Area 2 – Central Coast), *E. tereticornis* is identified as a primary food tree for Koala, while *E. punctata* and *E. moluccana* are identified as secondary food trees. *Eucalyptus tereticornis* and *E. punctata* are also identified as feed tree species under Schedule 2 of the State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44).

Under SEPP 44, potential koala habitat is defined as ‘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’. In the areas of ‘*Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion*’ within the site, the proportion of *E. tereticornis* and *E. punctata* was together greater than 15%. As such, potential koala habitat was assessed as present within the mapped PCT in the Macarthur-Onslow Mt Gilead Biobank Site (**Figure 2**).

The Macarthur-Onslow Mt Gilead Biobank Site is loosely connected by scattered paddock trees to the east and south, as well as more intact vegetation to the west, to a large patch of vegetation east of Appin Road that is also contiguous with vegetation south of the Macarthur-Onslow Mt Gilead Biobank Site. The connection to the east and south would be disrupted by development should land be certified within the BCAA. However, the connection on the west is likely to remain given vegetation in this area is proposed to be conserved through establishment of a Biobank Site to offset impacts to other areas of land proposed to be developed in the future (see **Figure 1**). Like vegetation within the Macarthur-Onslow Mt Gilead Biobank Site, the connecting vegetation and the large patch of vegetation present east of Appin Road and to the south of the Macarthur-Onslow Mt Gilead Biobank Site, supports ‘*Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion*’. Therefore, it contains primary food trees/feed trees and is habitat for Koala (**Figure 2**). Records of Koala in this patch are evidence that vegetation represents known Koala habitat. Given the site is and will remain connected to a larger patch of better quality habitat representing known koala habitat, it is even more likely that koala habitat in the Macarthur-Onslow Mt Gilead Biobank Site may be used by Koala.

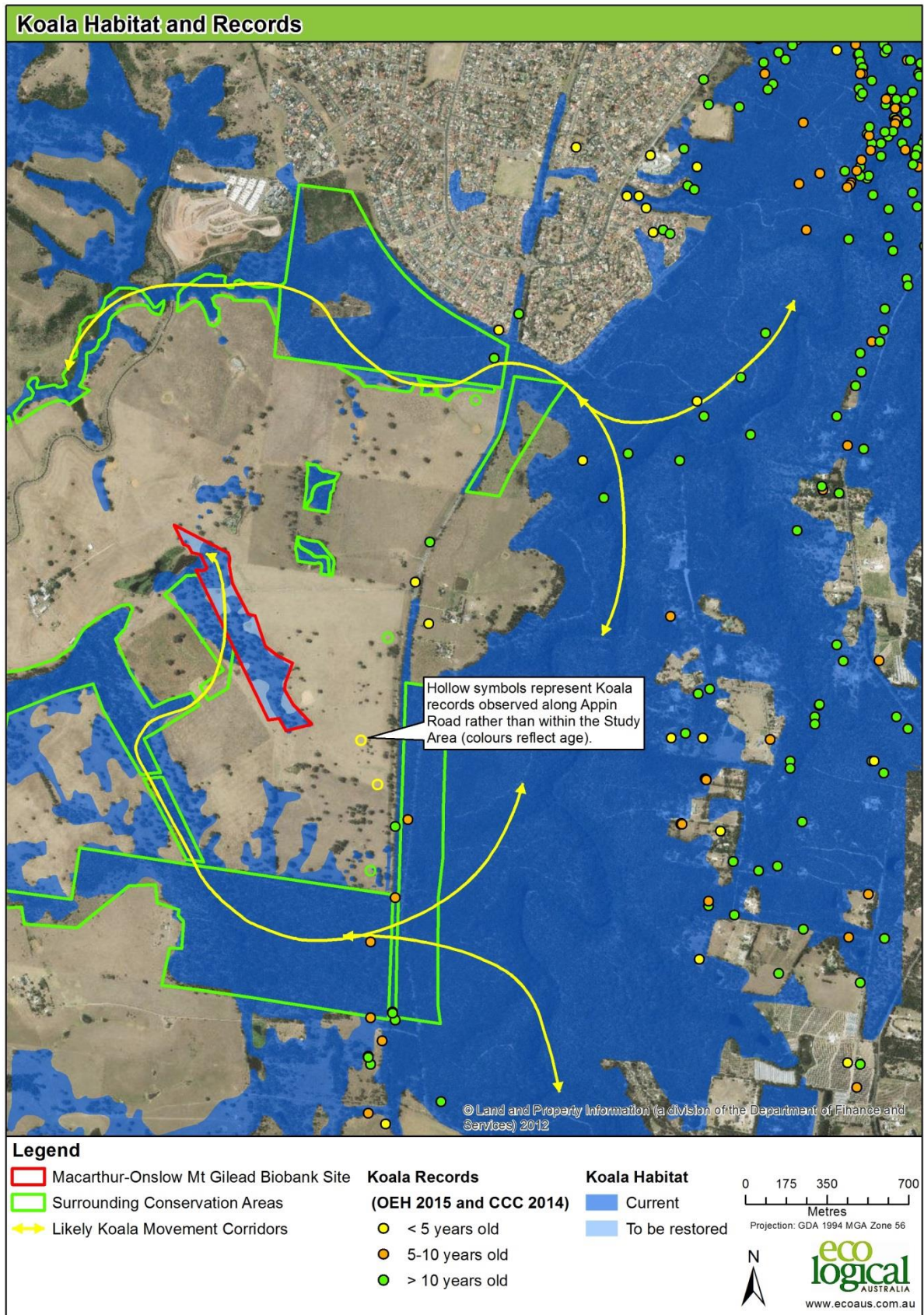


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4 Conclusion

Koala was assessed as likely to be present within, or likely to use on an occasional basis, the vegetated areas in the Macarthur-Onslow Mt Gilead Biobank Site. This assessment was based on:

- several recent and reliable records of Koala near the Macarthur-Onslow Mt Gilead Biobank Site, within Noorumba Reserve and east of Appin Road;
- the presence of '*Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion*' in the Macarthur-Onslow Mt Gilead Biobank Site. This vegetation community contains primary and secondary/listed Koala food trees (*E. tereticornis*, *E. punctata*, and *E. moluccana*) as listed in the Koala Recovery Plan (DECC 2008) and Schedule 2 of SEPP44, and represents potential koala habitat as defined under SEPP 44; and
- the connection of the Macarthur-Onslow Mt Gilead Biobank Site to a large patch of vegetation south of the Macarthur-Onslow Mt Gilead Biobank Site which further connects to vegetation east of Appin Road. The patch of vegetation is known Koala habitat.

Koala in the Campbelltown region also occur at low density. Therefore, they are cryptic and extremely difficult to detect (Close *et. al* in press), so while not recorded within the Macarthur-Onslow Mt Gilead Biobank Site, could nevertheless be present.

Accordingly a Koala habitat polygon of 8.14 ha has been delineated across the Macarthur-Onslow Mt Gilead Biobank Site based on current vegetation type and condition. The Biobanking assessment has calculated that this habitat area will generate 58 Koala species credits as a 100% conservation measure. Koala habitat will be restored with in-perpetuity management of the biobank site. Restored Koala habitat, totalling 3.74 ha, will generate 27 Koala species credits.

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