

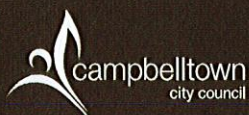


COMPREHENSIVE
**KOALA PLAN OF
MANAGEMENT**

Prepared by Biolink for Campbelltown City Council



Office of
Environment
& Heritage



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Definitions and acronyms

The following definitions and acronyms are used throughout this document:

| | |
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| AoS | means an Assessment of Significance under the NSW TSC Act |
| APZ | means Asset Protection Zone |
| CRUI | means Campbelltown Rural-Urban Interface KMP |
| CLEP | means Campbelltown Local Environmental Plan 2015 |
| CKPoM | means Comprehensive Koala Plan of Management |
| Core koala habitat | means any parcel of land that either: <ul style="list-style-type: none"> a) occurs either in or within 500 m of a arbitrarily placed series of 2km x 2km (400 ha) grid-cells covering the entire LGA and within which records of koalas occur for each of the three most recent koala generations, or b) any area of native vegetation (including largely cleared land with scattered trees) that returns a SAT-derived koala activity level of 10% or greater. |
| Council | means Campbelltown City Council |
| DBH | means (tree) diameter at breast height, this being a measurement around the tree trunk at a height of 1.3 m off the ground |
| DA | means a Development Application |
| DCP | means Development Control Plan |
| DoD | means the Commonwealth Department of Defence |
| DotE | means the Commonwealth Department of the Environment |
| DPE | means the NSW Department of Planning & Environment |
| ECA | means the Ecological Consultants Association of NSW |
| EIANZ | means Environment Institute of Australia and New Zealand |
| EP&A Act | means the NSW <i>Environmental Planning and Assessment Act, 1979</i> |
| EPBC Act | means the Commonwealth <i>Environment Protection and Biodiversity Conservation Act, 1999</i> |
| HLA | means key koala Habitat Linkage Areas, being important areas of preferred koala habitat that support major movement corridors for koalas |
| IKPoM | means an Individual Koala Plan of Management prepared under SEPP 44 |
| IUCN | means International Union for Conservation of Nature |
| KAAR | means Koala Activity Assessment Report |
| KMA | means Koala Management Area |
| KMC | means Koala Management Committee |
| KMP | means Koala Management Precinct |
| KMPRG | means Koala Management Project Reference Group |
| KTP | means Key Threatening Process under the NSW TSC Act |
| LEP | means Local Environmental Plan |

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| LCAMP | means Local Companion Animals Management Plan under the <i>Companion Animals Act, 1998</i> |
| LGA | means Local Government Area |
| Major development | means a DA that relates to the subdivision of a single lot of land into three or more lots and/or will result in the loss of three or more PKFTs for each ha of assessable land to which the DA relates. |
| Minor development | means a DA that relates to the construction of a single residential dwelling on land with a dwelling entitlement and which requires the removal of no more than 2 PKFTs or the subdivision of a single lot of land into no more than two lots and/or which will result in the loss of no more than two PKFTs for each hectare of assessable land to which the DA relates |
| MNES | means Matters of National Environmental Significance under the EPBC Act |
| MOU | means Memorandum of Understanding |
| Native vegetation | means any species of tree or shrub endemic to NSW |
| NPW Act | means the NSW National Parks and Wildlife Act, 1974 |
| NPWS | means NSW National Parks and Wildlife Service |
| OEH | means the NSW Office of Environment & Heritage |
| PKFT | means a Preferred Koala Food Tree being, any one of the following species that has a DBH > 200mm: <ul style="list-style-type: none"> • Blue-leaved Stringybark <i>Eucalyptus agglomerata</i> • Woollybutt <i>E. longifolia</i> • Grey Gum <i>E.punctata</i> • Forest Red Gum <i>E. tereticornis</i> • Manna Gum <i>E. viminalis</i> |
| Preferred koala habitat | means any vegetation community categorized as primary or secondary (class A, B or C) koala habitat as illustrated by Figure 5.1 in Part 2.1, or identified as such by other processes arising from the Plan. |
| RFS | means the NSW Rural Fire Service |
| RMS | means NSW Roads & Maritime Services |
| SAT | means the Spot Assessment Technique |
| SEE | means a Statement of Environmental Effects |
| SEPP 44 | means State Environmental Planning Policy No. 44 (Koala Habitat Protection) |
| Shelter tree | means a tree species known to be commonly or preferentially utilised for roosting or thermoregulatory purposes; in the Council LGA being any one of the following tree species that has a dbh > 350mm: <ul style="list-style-type: none"> • Turpentine <i>Syncarpia glomulifera</i> • Brush Box <i>Lophostemon confertus</i> |
| Significant koala activity | means a SAT-derived koala activity level of 10% or greater |
| SIS | means a Species Impact Statement under the NSW TSC Act |
| SLA | means Strategic Linkage Area, being a broadly defined area of land approximately 200m wide (that are yet to be identified) for the purpose of facilitating movement of koalas within and between KMPs |
| Stadia-metric survey | means a survey showing the precise location of an object, in this case a PKFT or a shelter tree |
| Suitably qualified and/or accredited | means an individual with post-graduate qualifications in koala ecology and/or demonstrable work experience that includes publication of works on koala ecology in peer-reviewed scientific literature and/or accreditation as a koala specialist by Council and/or a professional body such as the EIANZ |
| Sydney Wildlife | means Sydney Metropolitan Wildlife Services Inc |
| TSC Act | means the NSW <i>Threatened Species Conservation Act, 1995</i> |
| VAR | means Vegetation Assessment Report |
| WIRES | means NSW Wildlife Information, Rescue and Education Services |
| WSU | means Western Sydney University |

PREAMBLE

EXECUTIVE SUMMARY

The koala (*Phascolarctos cinereus*) has suffered a dramatic decline in numbers and distribution since the arrival of Europeans, aspects of which have included hunting for the fur trade in the late 19th and early 20th centuries. Even though the fur trade ceased in the late 1930s, millions of koala pelts were exported over a 50 year period preceding this date (Fowler, 1993). Many koala populations in NSW now survive in fragmented and isolated habitat, while some areas in which koalas remain more common are increasingly subject to ongoing pressures, in particular clearing for agriculture, logging and urban expansion.

The koala is listed as 'Vulnerable' to extinction under the NSW *Threatened Species Conservation Act, 1995* (TSC Act) because of declining numbers and habitat. In 2008, the State Government approved the NSW Recovery Plan for the koala under Part 4 of the TSC Act, which identifies actions to be taken to ensure the long-term viability of the koala in nature, and the parties who are responsible for undertaking these actions. These actions include:

- habitat management
- community education
- monitoring, research and mapping.

Campbelltown has one of the last known koala populations in the Sydney region and was identified in the approved recovery plan as a priority area for preparation of a CKPoM. The conservation of koalas and their habitat within parts of the Campbelltown Local Government Area (LGA) has long been of interest to the local community. This interest has resulted in a number of scientific studies focused on koala habitat use, distribution and abundance, movement patterns, planning and welfare issues. The historical clearing of fertile plateau land for agricultural and then urban development, resulted in remnants of the Campbelltown LGA's koala population persisting on lower carrying capacity habitat on the plateau/gorge-land interface. A series of major fires in the latter part of the 20th century and in particular from 1955 to 1975 are considered to have further diminished the local population. While a detailed population estimate remains to be determined, and in the light of evidence indicating that koala numbers have increased in recent decades, the total population size is likely in the order of no more than 100 – 150 individuals as at the time this CKPoM was being prepared.

State Environmental Planning Policy No.44 – Koala Habitat Protection (SEPP44) came into effect in 1995 with the aim of reversing trends in koala population decline by encouraging better management of habitat that supports the species. The principal aim of SEPP44 is to 'encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.' SEPP44 is a prescribed consideration under the *NSW Environmental Planning and Assessment Act, 1979* (EP&A Act) for all development applications (DA) that may impact on koalas or their habitat.

One of the proposed ways of achieving the stated aim of SEPP44 is for a CKPoM to be prepared for part or all of an LGA so as to enable a consistent, landscape-based approach to matters relating to how koalas and their habitat are managed. The Campbelltown CKPoM has been prepared in accordance with the provisions of SEPP44, and provides a strategic approach to the protection, management and restoration of koala habitat for the entire LGA. Compliance with the CKPoM will constitute compliance with the provisions of SEPP44. The documentation that follows is intended to function as a CKPoM for the whole of the Campbelltown LGA and is comprised of two key parts:

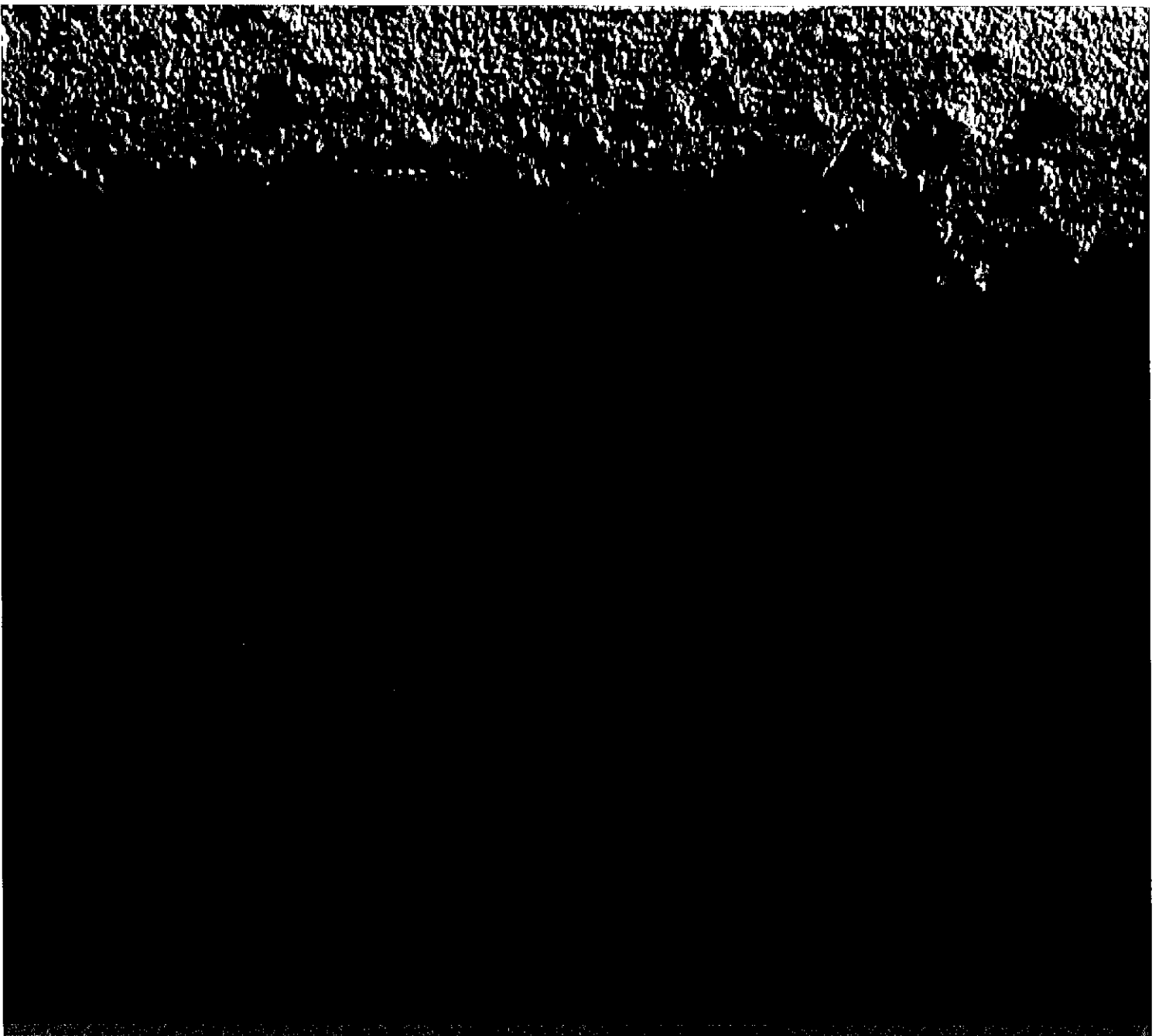
1. Part A (Background Information) initiates the CKPoM process by placing koalas, humans and the habitat they share into an appropriate Commonwealth, State and Local Government planning context. This section explains how the different levels of governance work and how the balance between a growing human population and that of the natural environment ideally remains balanced through frameworks such as LEPs. Also detailed are the legislative interactions intended to afford protection to biodiversity elements of the Campbelltown LGA, with particular emphasis on koalas and their habitat. The recent listing of koalas as a threatened species for purposes of the Commonwealth Government's *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act) is particularly relevant given its capacity in the context of 'important' koala populations to potentially over-ride State legislation.

2. Part B (Working Provisions) establishes the statutory framework for future koala management by recognising four Koala Management Precincts (KMPs) within the LGA, where management actions can be focussed to assist implementation of a long-term, sustainable management regime. Habitat buffers are also proposed, to provide an early warning system to notify the proponents of development and associated decision makers to the proximity of important areas of koala habitat. A voluntary mechanism to create a network of Strategic Linkage Areas (SLAs) is also put forward with a view to enhancing connectivity both within KMPs and across the broader Campbelltown LGA over time.

Several new mechanisms to assist control of development outcomes within KMPs are also established in Part B. One important part is the way in which areas of native vegetation are assessed within KMPs through a requirement for a Vegetation Assessment Report (VAR). While outside of KMPs, koala population assessment procedures are standardised to ensure that best practice measures are applied through the requirement for a Koala Activity Assessment Report (KAAR). Through this process, Council's Planners are supplied with information in a standardised way that enables interaction with other elements of the CKPoM's assessment and determination process. Also detailed in the document, are compensation and offsetting mechanisms arising from the loss of Preferred Koala Food Trees (PKFTs), to assist the undertaking of koala habitat rehabilitation works on private and public lands which are being managed for conservation purposes. In terms of the decision making process, the CKPoM also defines Council's discretionary capacity in terms of dealing with non-conforming subdivision proposals within unoccupied habitat areas outside of designated KMPs. Subject to considerations relating to the numbers of PKFTs that may need to be removed, the Plan also makes a distinction between 'minor' and 'major' development, with the intent to streamline the planning and approval process for single dwelling entitlement and small subdivision applications.

Part B also establishes procedures by which the Campbelltown koala population will be monitored over time, and how the efficacy of the CKPoM will be regularly reviewed and updated. Also identified, are mechanisms to assist broader community engagement with the conservation of koalas and their habitat, matters requiring further research and the need for better networking and engagement between Council and relevant stakeholders.

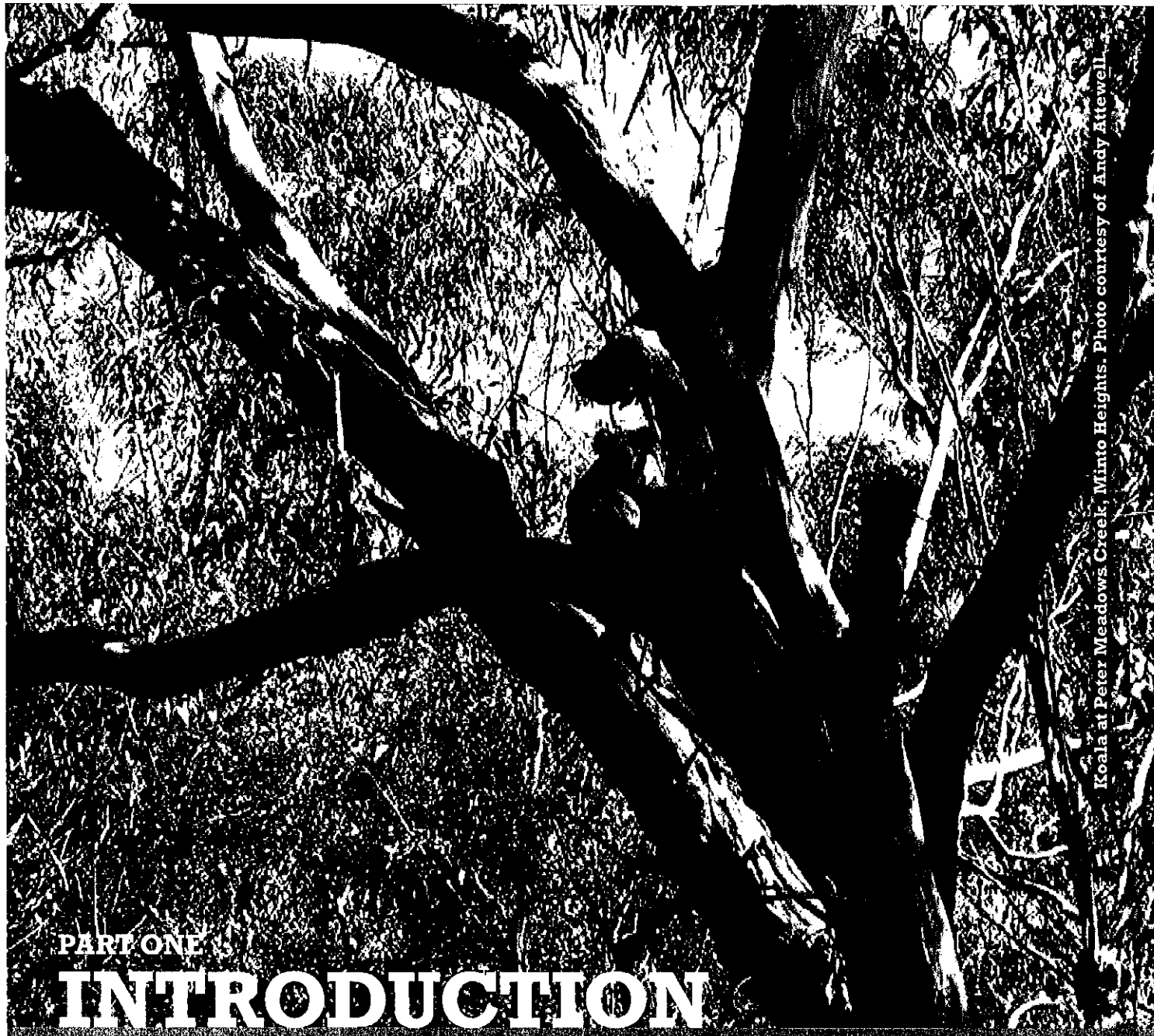
Memorandums of Understanding (MoU) relating to the need for greater collaboration between Council and agencies such as the Commonwealth Department of Defence (DoD), NSW Office of Environment & Heritage (OEH), NSW National Parks and Wildlife Service (NPWS), NSW Rural Fire Service (RFS) and NSW Roads and Maritime Services (RMS) are also envisaged, these bodies having key roles to play in terms of collectively working towards the CKPoM's stated objective of assisting in the long-term maintenance and sustainable management of a permanent, free living koala population in the Campbelltown LGA.





PART A

BACKGROUND INFORMATION



Koala at Peter Meadows Creek, Minto Heights. Photo courtesy of Andy Attewell

PART ONE

INTRODUCTION

The aim of SEPP44 is to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over the species' present range, and reverse a state-wide trend of population decline. Among measures required to assist this aim is the preparation of Koala Plans of Management.

In addition to conservation measures enacted by SEPP44, the NSW Government's TSC Act additionally lists koalas as a Vulnerable species and in December 2008, a Recovery Plan for the koala was approved by the NSW Government (DECC, 2008). Objectives of the approved Recovery Plan include:

- the integration of koala habitat conservation into Local and State Government planning processes
- development of appropriate road risk management in areas of koala habitat
- implementation of strategies which minimise the impacts of domestic dogs on free ranging koalas
- development and implementation of strategies to reduce the impact of fires on koala populations
- the rehabilitation and restoration of koala habitat and populations.

In 2012, the koala (combined populations of QLD, NSW and ACT) was listed as Vulnerable under the Commonwealth Government's EPBC Act.

Given the recent Commonwealth listing and the preceding, long history of statutory protection in NSW, it is arguable that much has really been achieved in terms of sustainable management of free-ranging koala populations. Indeed, mitigating the processes that threaten the viability and survival of free-ranging koala populations is not a straightforward task. However, we do know what the problems are, and the knowledge is there to enable such matters to be managed more sustainably. In this context and with regard to background studies (outlined in Section 2.3) that inform this Plan, the following management issues will need to be addressed in order to ensure a sustainable future for koalas inhabiting the Campbelltown LGA:

1. ongoing loss of PKFTs along with fragmentation/modification of Important habitat areas supporting resident koala populations
2. increasing numbers of koala mortalities due to vehicle-strike and domestic dog attacks
3. bushfire management.

These issues are not unique to the Campbelltown LGA, although the potential extent and severity of the associated impacts of habitat loss/modification and vehicle-strike have become more apparent in recent years as koala numbers have slowly recovered to now reoccupy some of their former range in the east of the LGA. While a number of actions have been taken by Council and other stakeholders to address some issues, it is clear that further measures will be required if the potential for the population to be sustainably managed over the long-term is to be achievable. Indeed, such a goal will require actions that:

- (i) facilitate and encourage coordinated action across all levels of governance
- (ii) effectively resource Council to enable it to be the lead agency in terms of implementing required management actions on lands under its governance
- (iii) ensure that best practice koala habitat and population assessment procedures are applied
- (iv) adequately inform and engage all sectors of the community in the processes of sustainable koala management.

1.1 The planning area

This document functions as a CKPoM for koalas and their habitat in the Campbelltown LGA south-west of Sydney, NSW. Including areas of the National Parks and Wildlife Services (NPWS) estate that are otherwise exempt from SEPP44, the Campbelltown LGA covers a total area of 311.66 square kilometres (31,166ha), approximately half of which has been mostly cleared and is bounded to the southwest by the Nepean River and by the Georges River to the northeast. The M5 South-West Motorway passes through the north western section of the Campbelltown LGA.

The following information is primarily derived from the work of (Callaghan et al 2005).

1.1.1 The human environment

The Campbelltown LGA has grown from a country locality supporting a small population of less than 1,000 people in the latter part of the 19th century, to an urban centre now supporting more than 150,000 residents. Until the 1950s, the LGA comprised of small farms located around the urban landscape of Campbelltown with emerging urban villages expanding out from railway platforms at Glenfield, Macquarie Fields, Ingleburn, Minto, Leumeah and Menangle Park. During the 1960s, all of the villages except Menangle Park were expanding and a planned satellite city concept guided urban development which joined Leumeah to Campbelltown and developed the suburbs of Bradbury and Ruse.

In the 1970s, Campbelltown became a growth corridor in the planned urban expansion of Metropolitan Sydney under the Sydney Region Outline Plan 1970 – 2000 and the New Cities of Campbelltown – Camden – Appin Structure Plan. The New Cities Structure Plan identified sensitive environmental land adjacent to the Georges River, together with vegetated corridors joining the river and its tributaries. The identified land, which is adjacent to the Campbelltown urban area from Glenfield south to St Helens Park, was identified as Regional Open Space. A majority of the Regional Open Space has been acquired by the NSW Government for conservation purposes and further management options are being considered.

Today, the Council LGA is home to more than 150,000 people who occupy diverse housing from low density to medium density and limited high rise residential apartments, in the suburbs and centres. Dispersed lifestyle housing opportunities occur in the rural-residential areas fringing the suburbs and

centres, while a small number of people reside on rural holdings (CLEP, 2015). The current landuse zonings that apply across the LGA are illustrated in Figure 1.1.

Embedded in the matrix of sensitive environmental lands are the plateau landscapes of Wedderburn, Kentlyn and Minto Heights. These plateau areas have a long history of agricultural use which has been followed in more recent years by subdivision for rural residential purposes, so the sustainable management of koalas, agriculture and rural-residential lifestyles is a key focus of this plan. Elsewhere arguably less sensitive land from Macquarie Fields south to St Helens Park has been zoned Scenic Protection with a two ha standard for subdivision and erection of houses, as have other largely forested areas to the west and south of Campbelltown City. In contrast, the greater proportion of forested lands to the east is under the control of the DoD's Australian Army's Holsworthy Barracks.

Overall, this pattern of land tenure and use means that controls on koala habitat vary throughout the LGA in response to differing legislative requirements that inter alia affect such things as planning, bushfire management and the clearing of native vegetation; most importantly however it also means that meaningful koala conservation and management is a responsibility shared across the entire community and relevant stakeholders.

Campbelltown is a developing regional centre, and significant future projected growth pressure is anticipated for the region.

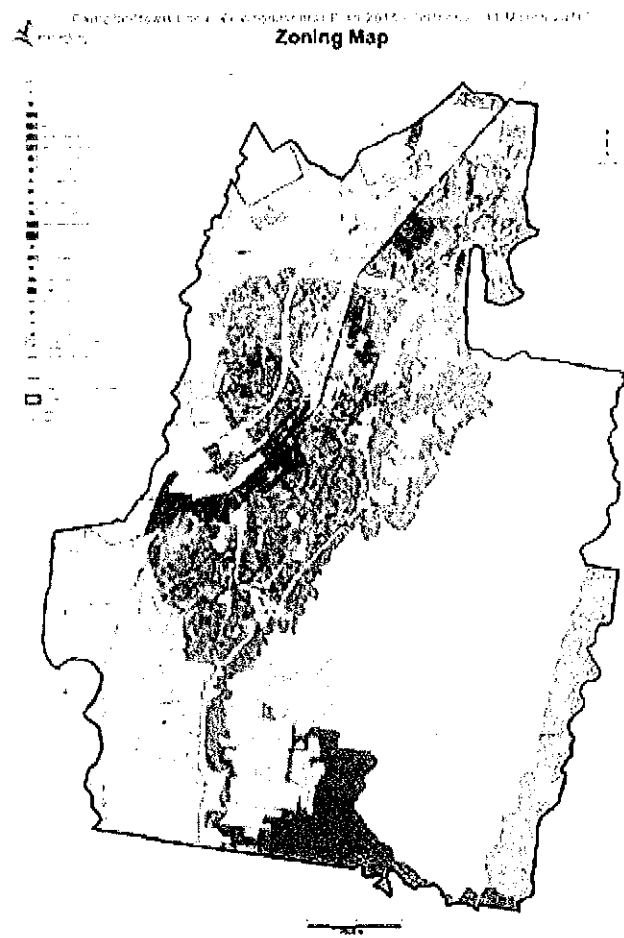


Figure 1.1: Campbelltown City Council LGA land-use zoning map (CLEP, 2015)

Forward projections by the Department of Planning and Environment (DPE) indicate that Campbelltown's population is set to increase by close to 50% in the next 15 years (DPE, 2014). Therefore, in addition to the fundamental need to provide quality assets and infrastructure to ensure that the city can cope with a range of future challenges, the identification and protection of important biodiversity conservation values in the LGA (such as core koala habitat) is imperative to ensure long-term, sustainable planning outcomes.

1.1.2 The natural environment

a) Topography and geomorphology

The Campbelltown LGA consists predominately of sandstone and plateau landscapes, the eastern and southern parts deeply dissected by gorges associated with O'Hare's, Williams, Stokes and Pheasants Creeks and the Nepean, Woronora and Georges Rivers. Elevations within the Campbelltown LGA range from approximately 100m above sea level in the gorges to 240m above sea level on the plateau.

The east and south of the Campbelltown LGA are characterised by Hawkesbury Sandstone geology and geomorphology with steep, cliffed benches along the Georges River, and stepped platforms exposing prominent interbedded shale layers associated with O'Hare's and Pheasants Creeks. On the plateau tops, transitional beds of shale and sandstone are common and are exposed in some areas to produce an impervious layer with associated 'hanging swamps'. In the western and northern sections of the LGA, the landscape is dominated by gentle undulating rises associated with Wianamatta Shale formations. Floodplain landscapes, including the southern section of the Cumberland Plain, occur in the north and west.

Soil types within the LGA range from yellow earths, sandy skeletal podzols and red podzols associated with plateau formations to brown, red and yellow podzols and prairie soils on the Wianamatta Shales. The yellow earth soils are generally confined to residual plateau tops where the underlying strata are composed of lightly cemented, quartz rich sandstone. The podzols have clay subsoil as a result of weathering of the

underlying shale, claystone or siltstone with the red podzols developing from material with an iron rich component.

b) Climate

The climate of Campbelltown can be described as temperate with warm to hot summers (maximum temperatures in excess of 30 degrees) and cool to mild winters. The LGA typically experiences its wettest periods in January – February and June with average annual rainfall in the range of 700 to 900mm.

c) Flora and fauna

Land units in the western and north western parts of the LGA include scattered trees and remnant stands of eucalypt forest and woodland communities. In the southeast, the vegetation is predominantly woodland with Blue-leaved Stringybark (*Eucalyptus agglomerata*) and Red Bloodwood (*Corymbia gummifera*) the dominant canopy species. Grey Gum (*E. punctata*) becomes dominant where interbedded lenses of shale occur, but is replaced as the dominant canopy species by Blackbutt (*E. pilularis*) where sandstone outcrops occur.

To the south, the vegetation changes to one dominated by Scribbly Gum (*E. racemosa*), Red Bloodwood (*C. gummifera*) and Blue-leaved Stringybark (*E. agglomerata*). Narrow-leaved Apple (*Angophora bakeri*) occurs as a dominant lower-stratum tree on some easterly aspects. Other land units support wet heathlands under a woodland canopy of Sydney Peppermint (*E. piperita*), Smooth-barked Apple (*A. costata*) and Red Bloodwood (*C. gummifera*), interspersed with pockets of Whip-stick Mallee Ash (*E. multicaulis*).

Historical accounts indicate that the Campbelltown area once supported a rich and diverse fauna assemblage. Despite the loss of some species over time since settlement, more than 330 fauna species have been recorded within the LGA. Forty-four of these species are listed as threatened under the TSC Act, 16 of which are also listed under the EPBC Act. Many of these species also have global significance, and are listed on the IUCN Red List for Threatened Species. Iconic threatened species found in the LGA range from the tiny Red-crowned Toadlet (*Pseudophryne australis*) to the Giant Burrowing Frog (*Heliophorus australiacus*) and Broad-headed



Core Koala Habitat at Frere's Crossing, Kentlyn
Photo courtesy of Renee Winsor.

Snake (*Hoplocephalus bungaroides*), Glossy Black Cockatoo (*Calyptorhynchus lathami*), several species of micro-bat and of course, the koala (*P. cinereus*).

1.2 Statutory context

Interest in the management of koalas is reflected by a range of Commonwealth and State-based statutory measures that are intended to minimise impacts on koalas and their habitat. A brief overview of the legislation at work within the Campbelltown LGA is provided below.

1.2.1 Commonwealth legislation

a) Environment Protection and Biodiversity Conservation Act 1999

The koala is listed as a Vulnerable species throughout NSW for purposes of this legislation. In order to assist the conservation of important populations, the EPBC Act has the ability to over-ride the majority of State legislation. For EPBC Act purposes, the Campbelltown koala population readily meets two criteria required for identification as an important population, these being:

- it is a key source population either for breeding or dispersal
- it is a population necessary for maintaining genetic diversity.

Some large-scale DA/re-zonings that have the potential to impact on koalas and/or their habitat within the LGA may require referral to the Commonwealth Government as a consequence of the EPBC Act listing; Significant Impact Guidelines (DotE 2013) are available to assist this process, as are referral guidelines for the vulnerable koala (DotE 2014).

b) Defence Act 1903

This legislation governs the management of Commonwealth lands comprising those areas of the Holsworthy Barracks that fall within the Council LGA. Unless otherwise exempted from compliance by discretionary powers of the Minister, all infrastructure and capability projects, operations, training exercises, research trials, other projects and even maintenance activities potentially constitute 'actions' for the purposes of the aforementioned EPBC Act. Defence must not undertake actions that cause a significant impact on Commonwealth Matters of National Environmental Significance (MNES) without obtaining approval from the Federal Minister for the Environment.

1.2.2 State legislation

a) Threatened Species Conservation Act 1995

The koala is listed as Vulnerable to extinction throughout NSW for purposes of this legislation.

As a consequence of TSC Act links to other legislation such as the EP&A Act (see below), the potential for negative impact up koalas must be assessed by way of what is generally known as a 7 – part test or Assessment of Significance (AoS). A Species Impact Statement (SIS) will be required for any DA and/or rezoning that the AoS determines as having the potential for a significant impact on a local population of koalas.

The NSW Recovery Plan for the Koala (DECC, 2008) has been prepared under the TSC Act, and outlines conservation actions being undertaken in NSW to support the koala.

The Commonwealth government considers the protection of threatened species and its habitat to be primarily each State's responsibility. A draft approval bilateral agreement provides

for accreditation of NSW processes for approval of proposed actions that would otherwise be assessed by the Australian Government for approval under the EPBC Act. Only one decision including conditions on approval is made by NSW, accounting for State matters and Commonwealth MNES.

b) Environmental Planning & Assessment Act 1979

The EP&A Act sets out the laws under which planning in NSW takes place. The main parts of the EP&A Act that relate to development assessment and approval are Part 4 (Development Assessment) and Part 5 (Environmental Assessment).

The EP&A Act also makes provision for the creation of environmental planning instruments which provide for the protection of koala habitat, including State Environmental Planning Policies (SEPPs), Local Environmental Plans (LEPs) and Development Control Plans (DCPs).

Within the Campbelltown LGA, those planning instruments of particular relevance to koalas include:

- State Environmental Planning Policy No. 44 (Koala Habitat Protection)

SEPP44 "aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

- (a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
- (b) by encouraging the identification of areas of core koala habitat
- (c) by encouraging the inclusion of areas of core koala habitat in environment protection zones".

Under SEPP44:

"Core koala habitat" means 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.

"Potential koala habitat" means 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.

Clause 6 only applies to land in relation to which a DA has been made that has an area (or together with any adjoining land in the same ownership) of more than 1 ha. Clause 5 excludes land dedicated or reserved under the *National Parks and Wildlife Act, 1974* (NPW Act), such as Dharawal National Park. In order to give effect to the aims of the SEPP44, Clause 15 provides that LGAs listed in Schedule 1 of the SEPP (which includes Campbelltown) should:

- (a) survey the land within its area so as to identify areas of potential and core koala habitat
- (b) make or amend a local environmental plan:
 - (i) to include land identified as a core koala habitat within an environmental protection zone
 - (ii) to identify land that is a core koala habitat and apply special provisions to control the development of that land
- (c) give consideration to preparing an appropriate development control plan for land that is or adjoins an area of core koala habitat.

Under Clause 6 of SEPP44, Local councils cannot approve development on lands greater than 1ha without an investigation of potential and where warranted, core koala habitat as described in Clause 7 and 8. The Department of Planning Circular No. B35 guides councils through the process of addressing koala conservation through either Individual Koala Plans of Management (IKPoM) for small, localised developments, or CKPoM that apply to part or the whole of a LGA. A site-specific IKPoM must accompany any DA where core koala habitat is found to occur. However, if a CKPoM has been approved for the area, then individual DAs no longer need to include an IKPoM – as long as the DA is not inconsistent with the requirements of the CKPoM. In this way, the adoption of a CKPoM effectively streamlines the process for proponents applying to undertake development in areas of core koala habitat. However, an applicant may still prepare an IKPoM if they so choose.

Clause 10 states that a council must take into consideration the guidelines made by the Director-General, DPE. Appendix B sets out how this Plan has addressed these guidelines.

- Draft Campbelltown Local Environmental Plan 2015

In response to the State Government's requirement for all NSW councils to adopt new planning controls based on state-wide standards, Council has prepared a Campbelltown Local Environmental Plan 2015 (CLEP 2015). Formerly known as the Draft Campbelltown Local Environmental Plan, 2014, the CLEP 2015 has now been finalised with its publication on the NSW Legislation website in December 2015, and gazetted in March 2016.

The CLEP 2015 is a legal document that aims to control land use and development across the Campbelltown LGA and guides planning decisions, largely through the application of land use zones and development controls.

The plan applies to most land in the Council area. It consolidates and updates a wide range of existing planning controls and introduces some new policy positions that describe what development may be permissible in specific locations. It sets out future growth, as well as environmental and infrastructure goals for the city, and identifies what landowners can do on their properties.

- Campbelltown (Sustainable City) Development Control Plan 2014

The Sustainable City DCP is Council's primary DCP; its specific purpose is to provide more detailed provisions to supplement the CLEP 2015 by promoting high quality development and encouraging safe and livable environments.

Part 11 of the DCP sets out controls relating to the management of native vegetation and wildlife habitat (flora and fauna), including the requirement for koala habitat assessments.

c) Rural Fires Act 1997

The Rural Fires Act 1997 effectively created the NSW Rural Fire Service (RFS) and its associated command structure. Among other things, the objects of this legislation provide for the protection of the environment by requiring its key management focus (ie fire prevention, mitigation and suppression) to be carried out having regard to the principles of ecologically sustainable development as defined by Section 6 (2) of the Protection of the Environment Administration Act 1991.

Because of the nature of bush fires and the danger they pose to life and property, both managed and emergency bushfire hazard reduction have legal priority. Environmental Planning

Instruments such as those referred to above cannot prohibit, require development consent for or otherwise restrict activities associated with bushfire planning and management. Similarly, Part 5 of the EP&A Act does not apply to managed bushfire hazard reduction work carried out on land other than excluded land if:

- (a) the work is carried out in accordance with a bushfire risk management plan that applies to the land
- (b) there is a bushfire hazard reduction certificate in force in respect of the work and the work is carried out in accordance with any conditions specified in the certificate
- (c) the work is carried out in accordance with the provisions of a bushfire code applying to the land specified in the certificate."

Similar legal over-ridings are in place in respect of the TSC Act and the NPW Act.

- Bush Fire Environmental Assessment Code for NSW

The purpose of this Code is to provide a streamlined environmental assessment process for use by issuing authorities and certifying authorities in determining bushfire hazard reduction certificates. The Code has been prepared pursuant to sections 100J to 100N of the *Rural Fires Act, 1997*. Section 4.5 of the Code sets out standards for the protection of biodiversity, including determining the presence of threatened species and management conditions set out in the Threatened Species Hazard Reduction List. Under this list, the species specific conditions outlined for koalas relate to the:

- Use of fire: Low intensity fire only in areas formally identified as koala core habitat or koala high use habitat
- Mechanical forms of hazard reduction: No tree removal.
- 10/50 Vegetation Clearing Code of Practice 2014.

This Code of Practice under Section 100Q of the *Rural Fires Act, 1997* permits landowners within a 10/50 Vegetation Clearing Entitlement Area to clear certain vegetation near their homes, and enable residents to guard their homes against bushfire with a minimum amount of red tape. In August 2015, a review of the 10/50 scheme was conducted by the NSW RFS, DPE and OEH, and the Code of Practice was amended in September 2015 to incorporate the 30 recommendations made in the final report.

- The Rural Fires Amendment (Bush Fire Prevention) Bill 2015

This Bill amends the *Rural Fires Act 1997* to make provision with respect to bushfire hazard reduction work and vegetation clearing work associated with the 10/50 Vegetation Clearing Code of Practice. Under the Code, land parcels (lots) which are wholly or partly mapped within core koala habitat as identified in CKPoMs, are now excluded from the operation of the 10/50 scheme meaning tree clearing measures associated with the Code of Practice cannot be applied. However, it should be noted that core koala habitat as identified in approved IKPoMs are not excluded from the operation of the Code of Practice.

d) Companion Animals Act 1998

The *Companion Animals Act 1998* requires dogs to be under the control of a competent person when in public places they should not be permitted to roam and/or attack other animals including native wildlife, such as koalas. In practice, enforcement of these key aspects of the Act can be problematic.

The Act provides for the preparation of a Local Companion Animals Management Plan (LCAMP), to enable a council to fulfil its responsibilities under the Act by determining relevant

objectives and priorities along with a clear program of implementation.

e) Local Government Act 1993

The *Local Government Act, 1993* requires Council to have in place an Integrated Planning and Reporting Framework to ensure that Council operations and strategic planning are meeting the needs of the community. Among other things, budgetary items such as those arising from nominated actions in the Plan must be sanctioned within this framework before they can be actioned. Within this framework, Strategy 1.2 under Council's Delivery Program 2012-2016 and Operational Plan 2015-2016 (Strategy 1.2.1) commits to the development and completion of a CKPoM.

f) Roads Act 1993

Among other things, the *Roads Act 1993* regulates the carrying out of activities on public roads, including those managed by Local Government authorities. Section 88 in Division 3 of this Act enables Council to lop or remove any tree (including a PKFT) that is growing in or overhanging a road reserve, and exempts them from the need to consider any other State Act or law to the contrary.

g) National Parks and Wildlife Act 1974

Under the NPW Act, the Director-General of NPWS is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves.

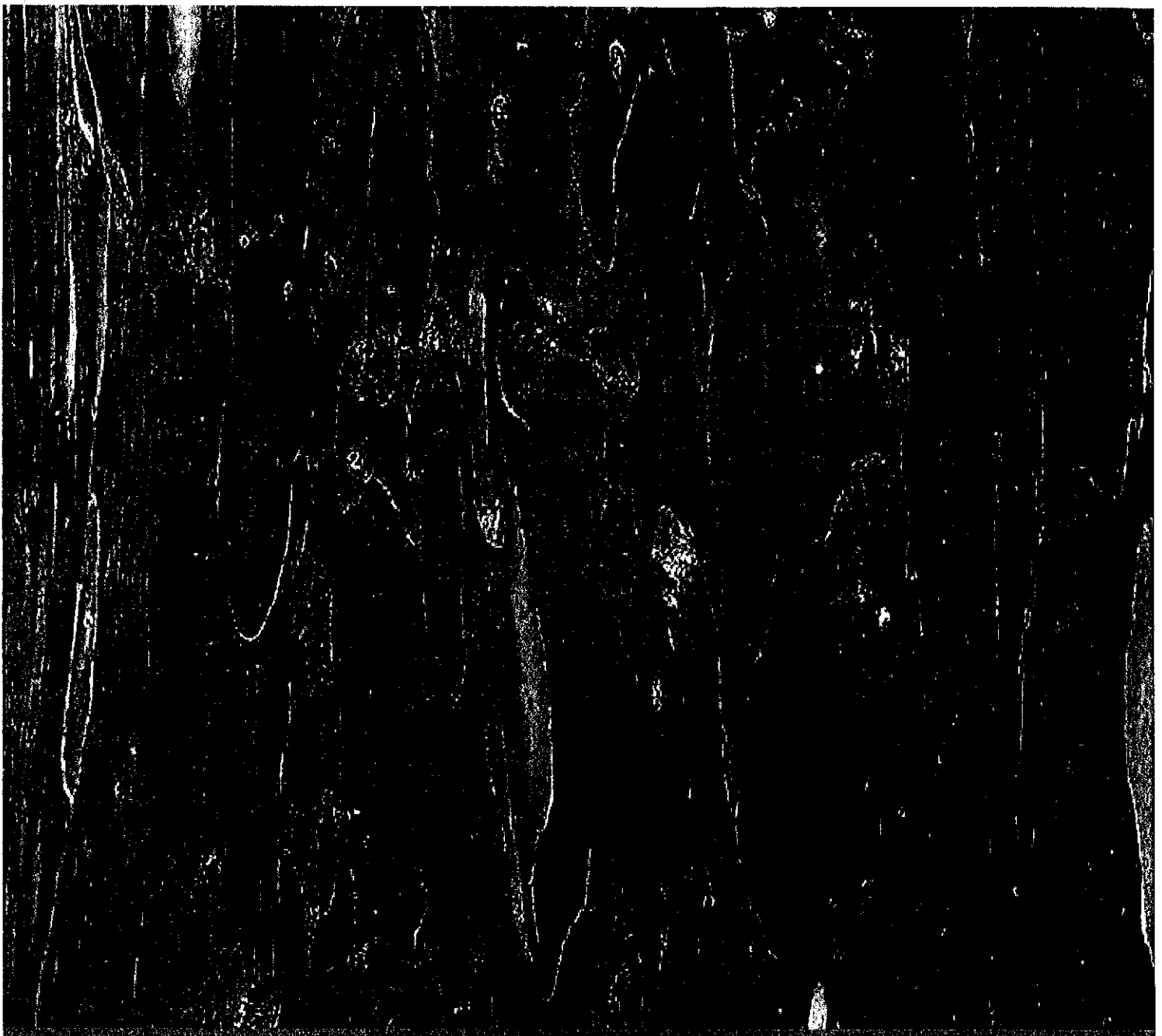
The Director-General is also responsible under this legislation for the protection and care of native fauna and flora (including koalas) and Aboriginal places and objects throughout NSW.

1.2.3 Legislative overview

A review of relevant legislation confirms an extensive framework of legal protection afforded to koalas and their habitat on which long-term sustainable management of the Campbelltowns koalas can be based. However, current land use zonings (other than environmental protection areas) do not accurately reflect their value as koala habitat. Hence, there is a need for consistency and coordination of actions at all levels of governance, planning and management if a long-term sustainable future for the koalas in the Campbelltown LGA is to be realised. The Plan that follows is intended to provide the basis for this, but it needs to be well coordinated. While Council is arguably best placed to co-ordinate orderly implementation, it also needs both resources and cooperation to achieve this outcome.



Koala at Peter Meadows Creek, Murrumbidgee
Photo courtesy of Andy Attewell





PART B

WORKING PROVISIONS

PRELIMINARIES

1. The following information is provided for the year ended 31 December 2016:

1. The following are the names of the persons who have been appointed to the various committees of the Board of Directors of the American Telephone and Telegraph Company, for the year 1907:

14. Do you have any other things you would like to say about your child's health?

14. Whittaker, J. H. and J. C. McLaughlin. 2000. Effects of land use change on the distribution of native plants in a semi-arid woodland. *Journal of Vegetation Science* 11: 101-110.

2.4. Commencement date

(i) The Plan was adopted by resolution of Council on [insert date] and approved by the Director-General, DPE on [insert date].

(ii) Council shall incorporate a clause that activates the approved provisions of the Plan for purposes of any LEP that covers all or part of the area to which the Plan applies.

2.5. Relationship to other koala plans of management

(i) The Plan does not supersede any other approved IKPoM that has been prepared in accordance with SEPP 44 and which is currently in force on lands to which the Plan applies, unless there is provision within that IKPoM for ongoing amendment and/or revision, in which case relevant provisions of the Plan must be applied and incorporated.

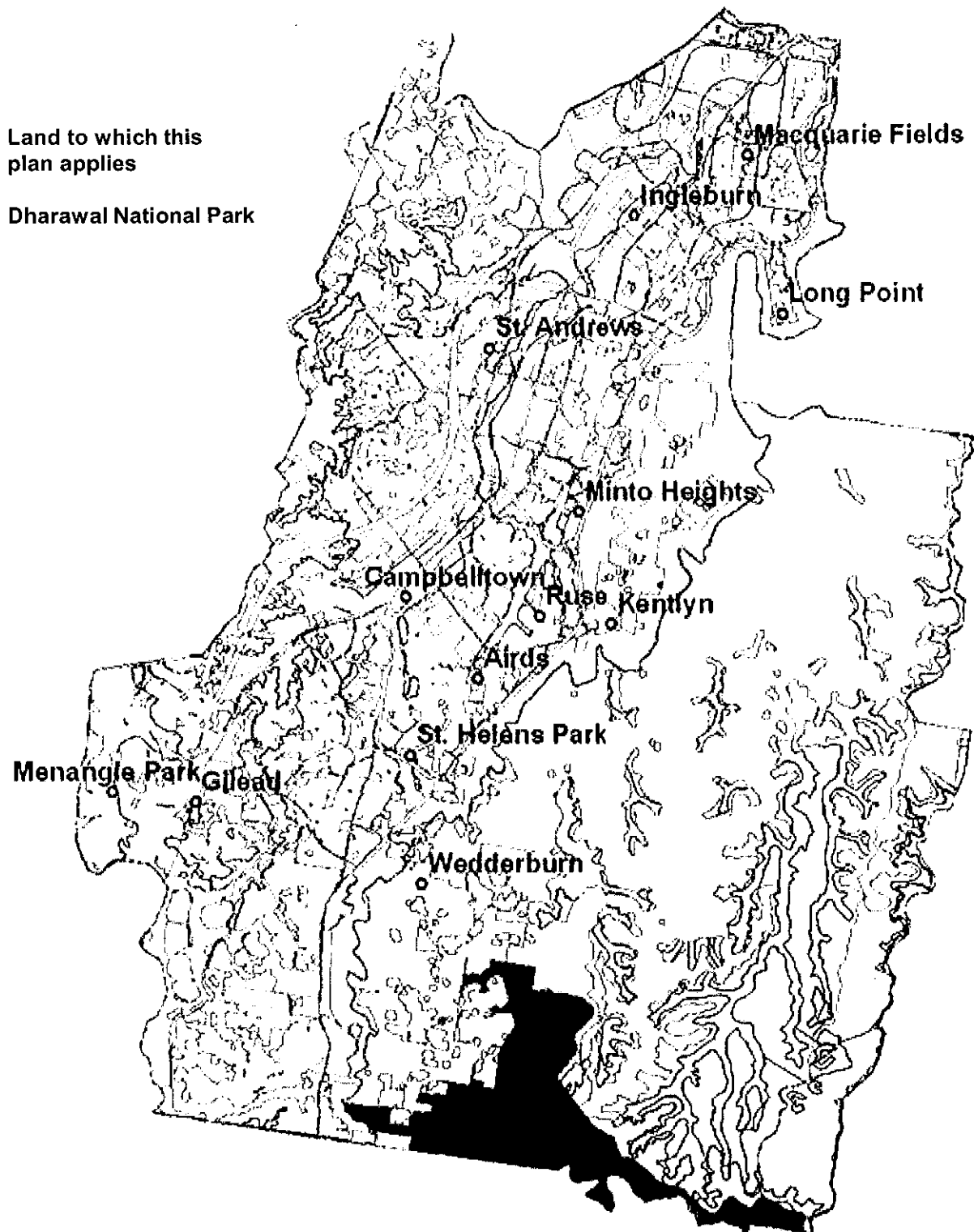


Figure 2.1: The Campbelltown City Council LGA - the land to which the plan applies.

Note: The NPWS estate (Dharawal National Park) is otherwise excluded from the provisions of SEPP44.



PART THREE

VISIONS, AIMS and OBJECTIVES

3.1 Visions and aims

(l) In accordance with the aims and objectives of SEPP44 and the approved NSW Koala Recovery Plan, the overall vision of this Plan is to:

"provide for the long-term maintenance of a viable, free-ranging koala population in the Campbelltown LGA."

This vision is to be realised by way of the following aims:

- a) To the maximum extent possible, enable persistence of a koala population of at least 300 koalas over the life of the Plan
- b) To support the harmonious co-existence of the community with koalas
- c) To provide regulatory and non-regulatory mechanisms to safeguard the future of the Campbelltown koala population.

3.2. Objectives

(i) The aims of the Plan will be realised by way of the following objectives:

- a) Seeking support and engagement from all relevant stakeholders with a view to increasing the extent of koala friendly habitat and associated connectivity options
- b) Incorporating best-practice habitat assessment procedures to ensure that adequate detail is provided with all development and/or rezoning applications, along with an accompanying set of development standards and controls
- c) Developing appropriate fire management regimes to minimise bushfire risk
- d) Minimising koala mortalities due to vehicle-strike and domestic dog attacks



Mum and bub at St Helens Park. Photo courtesy of Carla-Maree Simmons



Hazard reduction burn at Freres Crossing Reserve, Kentlyn. Photo courtesy of Troy Lessels

- e) Formulating a strategic program of koala habitat regeneration and/or rehabilitation projects
- f) Increasing community and public awareness through education programs promoting koala conservation and management
- g) Securing financial compensation through DAs for the removal of PKFTs, and utilising funds to provide resources for koala habitat restoration and rehabilitation initiatives
- h) Establishing procedures for long-term monitoring of the conservation status of the Campbelltown koalas, so as to assess the efficacy of the Plan and enable regular review
- i) Identifying koala welfare and research needs intended to improve and inform long-term management of the Campbelltown LGA's resident koala population
- j) Procuring MOU's related to issues such as fire management that are intended to encourage better networking and cooperative management between other agencies whose activities can have a significant influence on koala conservation in the planning area.

Do you want to keep up to date on koalas in the Campbelltown LGA?

Head to www.campbelltown.nsw.gov.au/koalas



PART FOUR

ROLES and RESPONSIBILITIES

Context: responsibilities for the management of koalas and their habitat are spread widely across the community. While some land tenures (such as National Park estate) and activities (such as fire hazard reduction) are excluded from the provisions of SEPP 44, it is important that all stakeholders strive to manage remaining areas of habitat in the Campbelltown LGA without detriment to koalas. To facilitate/coordinate this commitment, a lead agency is essential.

Overall objective: to create the framework for coordination and integration of the actions of all agencies responsible for land management across the lands to which the Plan applies, and ensure broad community representation and inter-agency involvement in the processes of koala management.

4.1 Lead authority

(i) Council will be the lead authority to champion sustainable koala management within the Campbelltown LGA by:

- developing, implementing and enforcing planning controls that relate to the management of koala habitat
- undertaking and supervising habitat rehabilitation works
- supporting koala welfare groups
- preparing and implementing education programs
- monitoring koala populations and the effectiveness of the Plan
- integrating the provisions of the Plan into all other plans and policies associated with governance of the area to which the Plan will apply.

Council will seek the support of government agencies in managing the Campbelltown LGA's koala population, particularly in respect of those elements of the Plan such as fire control, vehicle-strike on State-owned roads and the management of Commonwealth land and National Park estate which fall outside Council's responsibility.



"Alexis" the koala and cub at Smiths Creek Reserve, Russ. Photo courtesy of Carla-Maree Simmons

Council will advise and work with landowners who will be encouraged to review their land management practices in light of the Plan, and examine the potential of their holdings to assist with koala management and/or habitat rehabilitation measures.

Council will advise and work with developers to ensure adoption of best practice measures to accommodate and/or assist koala management in the context of development proposals.

Council will assist the Campbelltown community to become more actively involved with the management effort through participation in habitat regeneration/rehabilitation programs and assisting licensed welfare activities, being better informed about koala management issues and increasing levels of vigilance and engagement with koalas.

4.2. Establishment of a koala management committee

(i) Council shall establish a Koala Management Committee (KMC) to assist with implementation of the Plan.

(ii) Within the first six months following commencement of the Plan, Council shall have drafted and adopted Terms of Reference for the KMC and arranged for the first meeting.

(iii) The Terms of Reference shall include the following:

- minimum representation by Council, OEH, RFS, WSU and a minimum of two persons from the local community
- a chairperson elected from the members who shall retain that position for a period of no greater than 12 months
- a minimum of three meetings a year for the first 5 years of the Plan, and thereafter as required but no less than twice a year.

Keen to get involved in koala conservation?

Check out Council's environmental grant webpage for more information on current projects.

Head to www.campbelltown.nsw.gov.au/environmentalgrantprograms

PART FIVE

KOALA MANAGEMENT FRAMEWORK

Context: achieving the vision of the Plan requires a consistent approach to matters of koala habitat and koala population management. This includes establishing a clearly enunciated framework by which key management components of the koala management strategy can be discussed.

Overall objective: to set out a strategic framework for koala management that will form the basis of all future actions, allow Council to respond to specific opportunities as they arise and to focus, prioritise and direct the management actions required to achieve the objectives of the Plan.

5.1 Classification of preferred koala habitat

(i) For purposes of the Plan the term preferred koala habitat means:

- a) any vegetation community categorised as Primary, Secondary (Class A), Secondary (Class B) or Secondary (Class C) koala habitat as illustrated by Figure 5.1 of the Plan
- b) any area that is largely cleared but otherwise contains scattered PKFTs
- c) any other land identified as such by other processes arising from the Plan.

5.2 Identification of core koala habitat

(i) For purposes of the Plan, core koala habitat is determined as any area of land that:

- a) occurs in or within 500m of any one of the 21 x 400ha grid cells identified as an area of generational persistence (ie containing one or more koala records for each of the three consecutive koala generations 1994 – 2012) as illustrated by Figure 5.1 of the Plan

- b) any area of native vegetation (including largely cleared land with scattered trees) that returns a SAT-based koala activity level of 10% or greater¹.

5.3 Review of koala habitat mapping

- (i) Council will give consideration to the need to update the mapping of areas of preferred and core koala habitat with each major review of the Plan.

¹ Based on an assessment undertaken in accord with methodology specified in Appendix D.

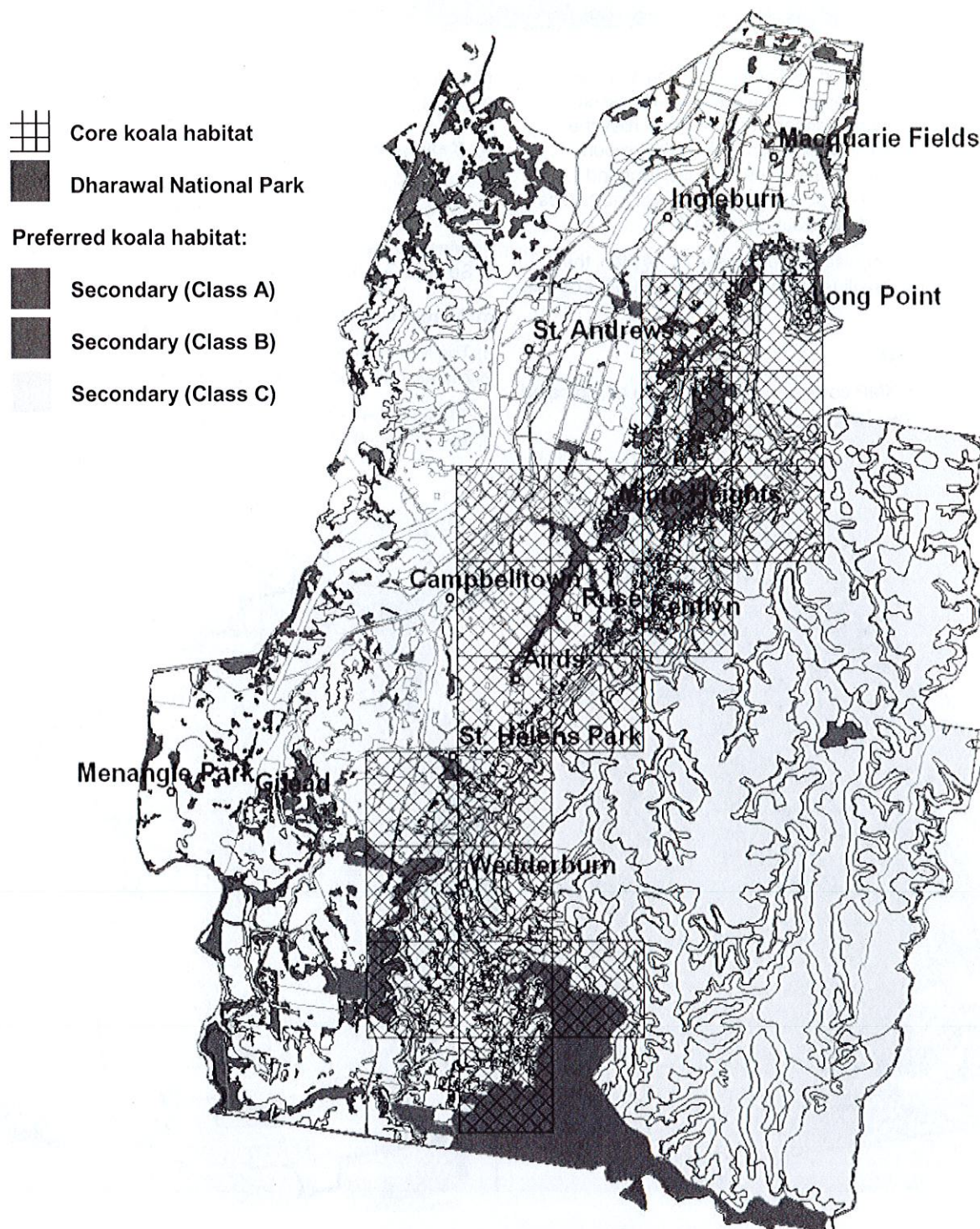


Figure 5.1: Extent of preferred and core koala habitat across the Campbelltown LGA.

Note: Areas of Secondary Class A, Class B, and Class C collectively constitute preferred koala habitat. The approximate extent of core koala habitat as evidenced by the presence of one or more koala records for each of the three most recent koala generations 1994 - 2012.

5.4 Koala Management Precincts

For purposes of the plan, there is a need to be able to focus management efforts in known areas of core koala habitat, while also enabling the dynamic between occupied and unoccupied areas of preferred koala habitat to be managed as single landscapes units for planning purposes. The best way to achieve this is to use a precinct-based approach. Precinct boundaries have been aligned with OLEP 2016 planning boundaries to identify areas under the planning control of Council that are considered capable of assisting the long-term survival of koalas given effective management of the habitat, protection from threats such as domestic dog

attack and care and enhancement for a suitable network of habitat linkage to assist the free movement of animals. The key determinants of KMPs, primarily based on the underlying principles of core koala habitat as defined by SEPP 44 are:

- evidence of generational persistence (ie historical koala records) or at least the three most recent koala generations;
- evidence and/or the presence of one or more resident koala populations (including breeding females).

(i) Within the broader context established by Part 3 of the Plan, the underlying objectives for the KMPs are to assist broader management and conservation efforts across the lands to which the plan applies by optimising the amount of koala-friendly habitat (including fire management and connectivity issues) and reducing the incidence of mortalities due to vehicle-strike and domestic dog attack.

(ii) Four KMPs are recognised for purposes of the plan, the boundaries of which are illustrated in Figure 5.2. Further details are as follows:

a) Wedderburn KMP

(i) The Wedderburn KMP covers an area of 1386ha as indicated in Figure 5.2(a) of the Plan.

(ii) Management objectives for this KMP are as detailed in Part 3, Sec 3.2 (a – f) of the Plan.

b) Kentlyn KMP

(i) The Kentlyn KMP covers an area of approximately 360ha as indicated in Figure 5.2(b) of the Plan.

(ii) Management objectives for this KMP are as detailed in Part 3, Sec 3.2 (a – f) of the Plan.

c) Minto Heights KMP

(i) The Minto Heights KMP covers an area of approximately 217ha as indicated in Figure 5.2(c) of the Plan.

(ii) Management objectives for this KMP are as detailed in Part 3, Sec 3.2 (a – f) of the Plan.

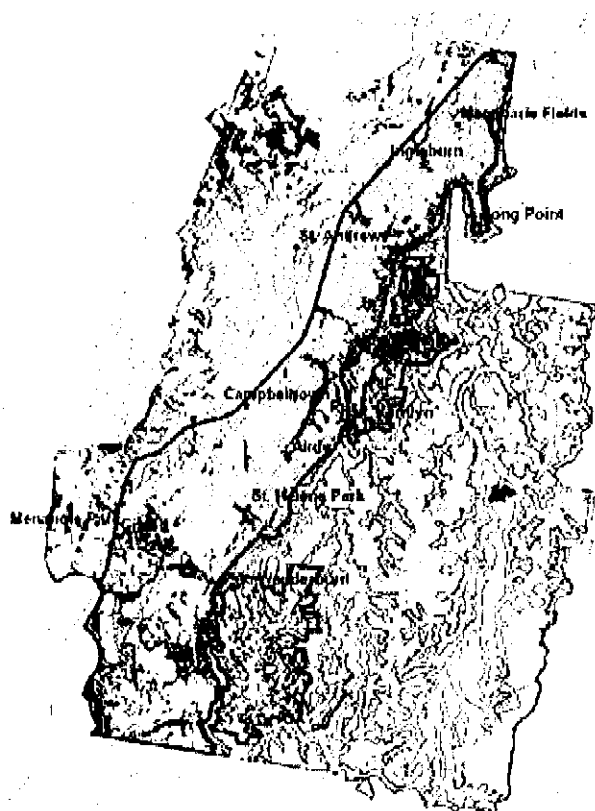


Figure 5.2: KMPs in the Campbelltown LGA showing the extent of the CRUI KMP

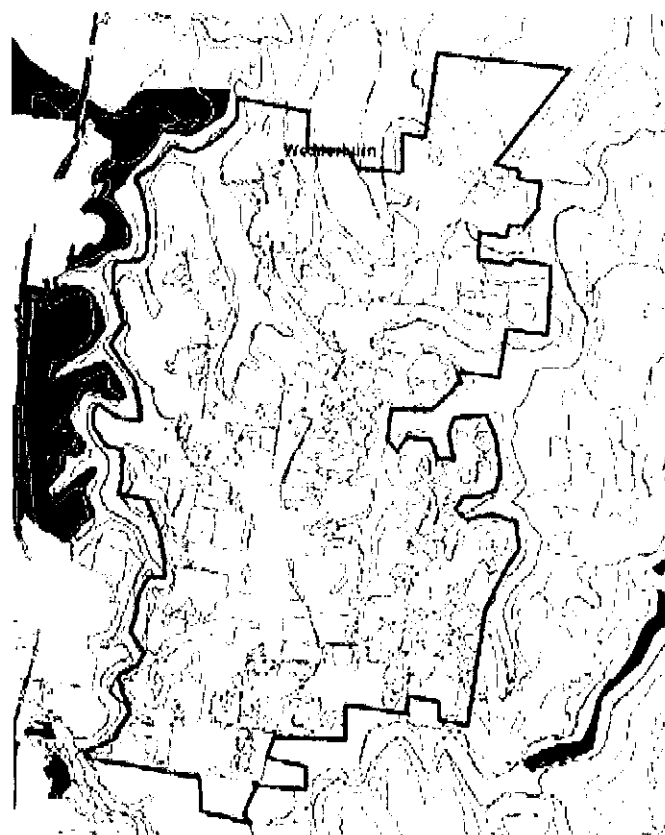


Figure 5.2(a): Boundaries of the Wedderburn KMP (500 buffer not illustrated)

d) Campbelltown Rural-Urban Interface KMP

(i) The Campbelltown Rural-Urban Interface (CRUI) KMP covers an area of approximately 8100ha as indicated in Figure 5.2 of the Plan.

(ii) The purpose of the CRUI KMP is to acknowledge the presence of areas of preferred and core koala habitat within rural and urbanised areas of the Council LGA, as well as – in the south-west, the presence of potential linkages connecting the Wedderburn KMP with the Nepean River.

(iii) Management objectives for this KMP are as follows:

- minimise losses of and or further fragmentation of otherwise contiguous patches of preferred koala habitat > 10 ha in size
- ensure connectivity options between Wedderburn KMP and the Nepean River are optimised and maintained in perpetuity

- maximise retention of preferred koala food trees
- minimise numbers of koala mortalities due to domestic dog attack and vehicle strike through community education.

5.4.1 Changes to KMP boundaries

(i) Changes to the boundaries of KMPs established by this Part and/or the creation of new KMPs can only be enacted through, the procedures detailed in Part 10 (Monitoring, reporting and review) of the Plan.

5.4.2 Relationship of KMPs to EPBC Act and other legislation

(i) Excluding the CRUI KMP, all lands within KMPs identified by the Plan comprise:

- a) the habitat of an important koala population as defined by the EPBC Act Significant Impact Guidelines (DECC, 2008)
- b) areas of core koala habitat within the meaning of SEPP 44.

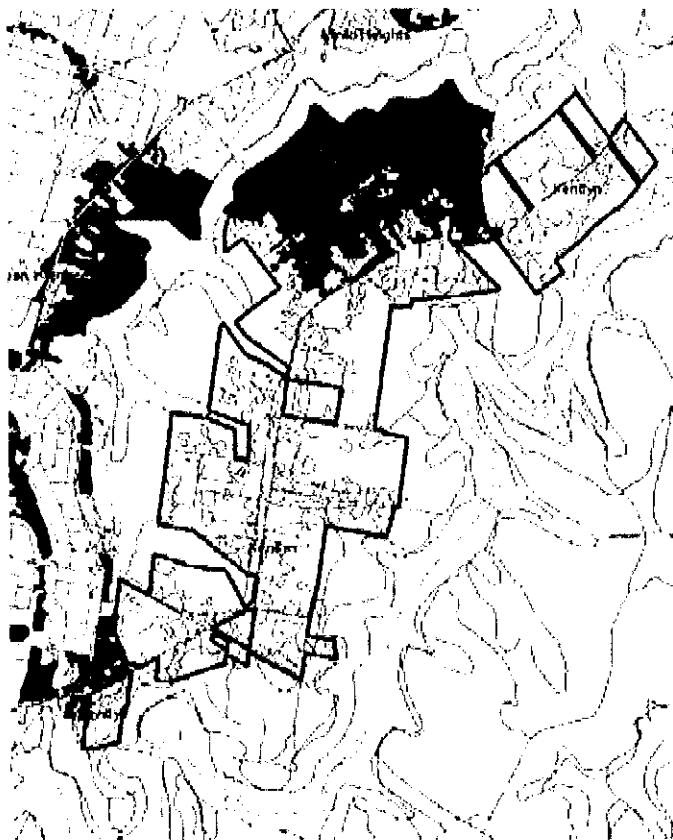
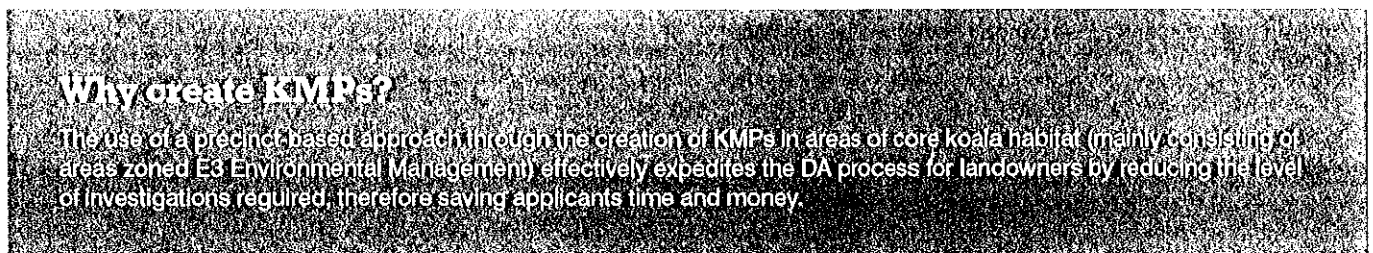


Figure 5.2(b): Boundaries of the Kentlyn KMP (500 buffer not illustrated)

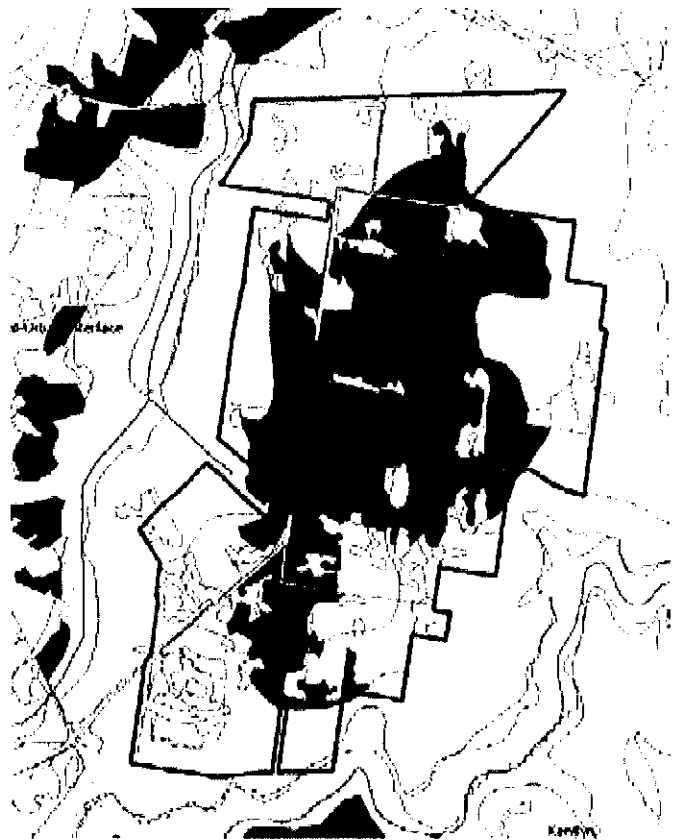


Figure 5.2(c): Boundaries of the Minto Heights KMP (500 buffer not illustrated)

5.5 Strategic linkage areas

Within landscape scale, local koala populations are maintained by processes of recruitment and dispersal from other populations in the general area. Koalas are at their most vulnerable when on the ground travelling between trees. Hence safe movement of koalas across the landscape can be facilitated by the presence of vegetation.

(i) A schematic illustration showing key koala Habitat Linkage Areas (HLA) within the Campbelltown LGA is provided in Figure 5.3 of this plan.

(i) Within the first three months of the Plan, Council and the KMC will establish an ongoing process soliciting expressions of interest from landholders within KMPs to have their land identified as part of a SLA that assists in affording safe passage for koalas into and between key koala HLA's.

(ii) Subject to landholder permission and available funds, where a SLA occurs across cleared land, revegetation containing PKFTs to at least a Woodland standard (ie scattered trees/discontinuous canopy cover) will be facilitated by Council.

(iii) Works associated with the establishment of additional vegetation cover in SLAs may be funded from grant monies obtained by landholders and/or Council.

(iv) The provision of grant monies referred to in (iii) will be contingent on the landholder entering into a conservation agreement or other restriction that functions to protect the habitat on the land containing the SLA. Council will investigate a range of financial and non-financial incentives to promote conservation to encourage private landholders to actively manage their lands for conservation purposes.

5.6 Section 149 Certificates

(i) Pursuant to Section 149(5) of the EPA Act, Council may include advice on such other relevant matters affecting the land of which it may be aware. This could include information on the presence of mapped areas of preferred koala habitat and/or SLA.

What is the difference between key koala HLAs and SLAs?

Key koala HLAs identify important areas of preferred koala habitat that support major movement corridors for koala dispersal across the Campbelltown LGA.

For purposes of the Plan, a SLA means a broadly defined but indicative area of land approximately 200m wide (that are yet to be defined) for the purpose of facilitating the movement of koalas within and between KMPs.



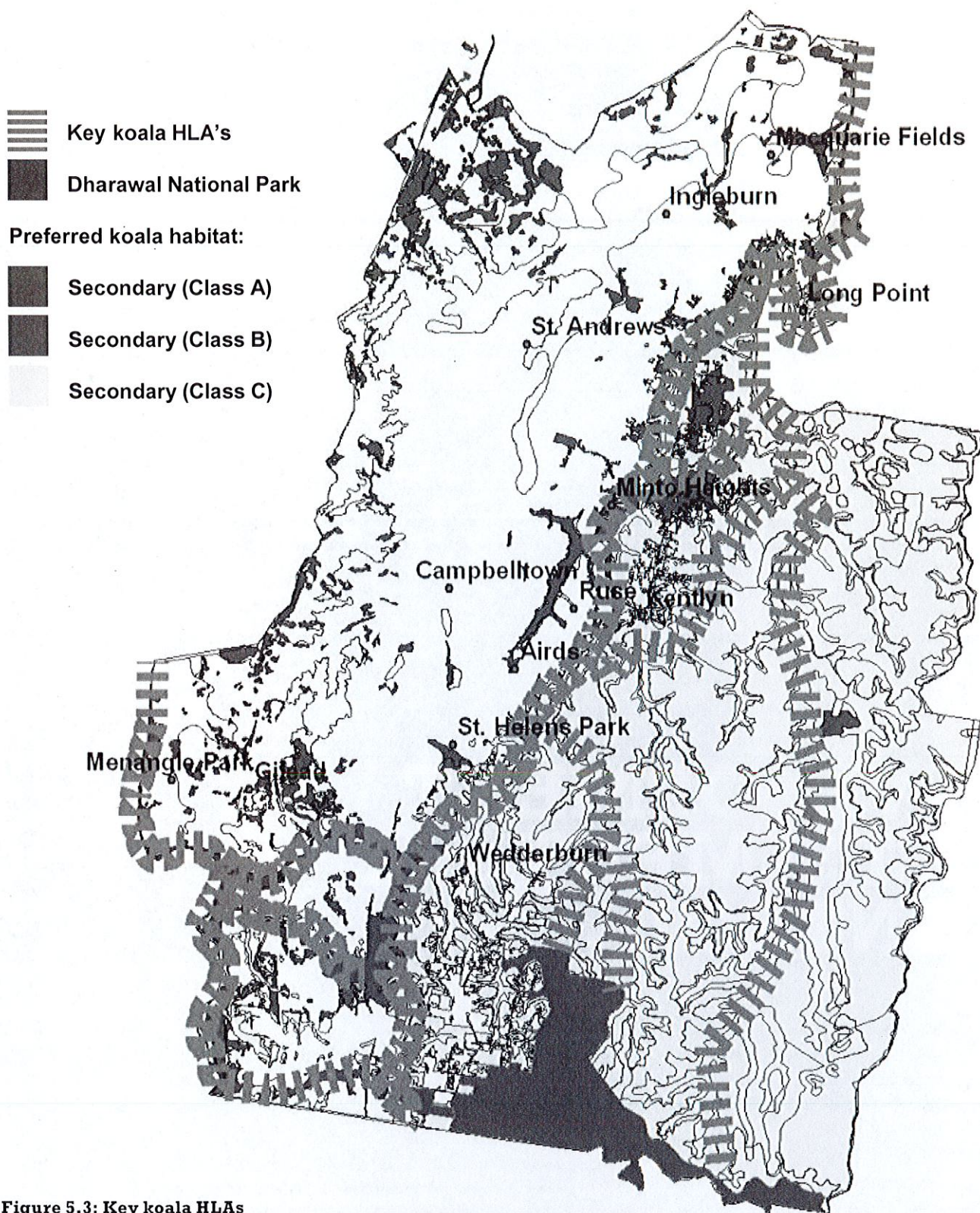


Figure 5.3: Key koala HLAs

Are you interested in restoring koala habitat on your property?

For more information, contact Council's Senior Environmental Officer on 02 4645 4151 or email koalas@campbelltown.nsw.gov.au

PART SIX

DEVELOPMENT ASSESSMENT and CONTROL

Context: to assist future assessments and associated planning decisions, it will be essential for Council to have unambiguous data on koala habitat use to ensure that potential impacts are effectively minimised in areas of core koala habitat.

Overall objective: to ensure that koala habitat is correctly assessed for purposes of development and/or rezoning applications so any potential for negative impact can be identified, and to protect and effectively manage remaining koala habitat through application of best practice measures.

6.1 Application and exclusions

(i) Subject to the exclusions specified in (ii) and (b) below and unless otherwise specified elsewhere, this Part applies to all lands to which the Part applies.

(ii) This Part does not apply to a DA that does not require the removal of native vegetation and which otherwise relates to:

- a boundary adjustment, electricity or a connection to a lawfully erected building;
- lands that are wholly located outside of a LGA, the either singly or together with any other buildings in the same ownership have an area of less than 1ha, whether or not the DA applies to the whole or only part of the land;
- although the adoption of this plan replaces the requirement for the preparation of an EIS or a DA under S149(43), the applicant can opt to prepare an EIS or a DA instead.

6.2 General objectives

6.2.1 Register of development

(i) Council shall establish and maintain a register of development and/or zoning applications that arise from (i) above. The register must include a mechanism to ensure that any matters concerning koala habitat arising from the development can be tracked and mapped for monitoring and review purposes. This includes nominated action in any Statement of Environmental Effects (SEE) and the polling of associated consent conditions.

(ii) The register must also include details of any lands with an associated program of habitat restoration and/or rehabilitation that is being undertaken as a consequence of Part 8 of the Plan.

(iii) A summary of items entered into the register must be provided to each meeting of the KMC.

(iv) The register shall be available for public inspection at any time during normal office hours.

6.2.2 Assessment and control standards

(i) A DA for any land the subject of Clause 6.1 above must include an assessment of the proposed development against the flowchart located in Figure 6.

(ii) Council cannot approve a DA that does not conform to the required controls and standards arising from this part unless:

- a) there are proven to be extenuating circumstances
- b) the overarching objectives of the Plan are not unduly compromised
- c) any proposed deviation has the support of the KMC.

6.2.3 Strategic linkage areas

(i) Council cannot approve a DA to which this section applies unless it is satisfied that the proposal will not sever or otherwise interfere with the movement of koalas within a designated SLA.

6.2.4 Rezoning applications

(i) A planning proposal pursuant to Section 55 of the EPA Act should demonstrate consistency with this Plan so as to identify the likely impact on koala habitat and populations of the type of development to be facilitated by the rezoning.

6.3 Assessment of koala habitat

6.3.1 Vegetation assessment report

(i) A rezoning or DA must establish if the land being the subject of the application contains any preferred koala habitat by way of a Vegetation Assessment Report (VAR).

(ii) As a minimum, the VAR shall include:

- a description of the tallest stratum cover as well as details of the species composition of each vegetation community
- a checklist of native vegetation species occurring in each vegetation patch, including any isolated paddock trees on partially cleared lands
- a stadia-metric survey that identifies the precise location, identity and dbh of all native vegetation proposed to be removed and/or within 20m of the proposed development footprint, including any proposed infrastructure, easements and APZs
- a statement as to whether any PKFTs were recorded.

6.3.2 Koala activity assessment report

(i) Subject to the qualification detailed in 6.3.2 (v) below, this section only applies to land that is located outside the boundaries of a KMP and on which PKFTs have been identified as a consequence of a VAR.

(ii) A DA for any land the subject of 6.3.2(i) must include a Koala Activity Assessment Report (KAAR) for that land.

(iii) The KAAR must employ the methodology outlined in Appendix D of the Plan so as to assess the site for levels of use by koalas.

(iv) The KAAR must be undertaken by a suitably qualified and/or accredited person, being an individual with post-graduate qualifications in koala ecology, and/or demonstrable work experience that includes publication of works on koala ecology in peer-reviewed scientific literature and/or accreditation as a koala specialist by Council and/or a professional body such as the EIANZ or ECA. Council will maintain a register of suitably qualified and/or accredited people and/or organisations.

(v) Council may also require a KAAR to be prepared for any development within a KMP where detailed information on the distribution of koala activity and movement is required to assist evaluation of development design, and also reserves the right to have any KAAR prepared pursuant to this section peer-reviewed.



6.4 Development standards

6.4.1 Application

(i) This section applies to all rezoning and DA's that relate to all areas of core koala habitat by virtue of the following:

- being lands within the boundaries of a KMP
- where a KAAR has identified the presence of significant koala activity levels (being activity levels $\geq 10\%$).

6.4.2 Retention of PKFTs.

For the purposes of this plan, development has been classified into 'minor' and 'major' development (see explanation in caption below).

(i) There shall be no removal of PKFT ≥ 200 mm DBH as a consequence of any new DA, beyond what is permissible under the definitions for minor and major development.

(ii) The applicant must demonstrate to the satisfaction of Council that the protection of all PKFTs is consistent with the requirements of AS 4970-2009 (Protection of Trees on Development Sites).

(iii) Retained PKFTs that occur within residential allotments arising from the subdivision of land must be protected by a covenant or other effective restriction on the user on title of the land where appropriate.

6.4.3 Swimming pools

(i) All new swimming pools must incorporate a design component such as a shallow ramp or other design feature that will enable egress by koalas and/or a stout rope (minimum 50 mm diameter), one end of which must be secured to a stable poolside fixture, the other end of which must trail in the pool at all times.

(ii) Without contravening provisions of the *Swimming Pools Act 1992*, fencing must also be of a type that prevents access to the pool area by koalas (eg not be of timber or have timber posts or have shrubs and trees within 1m of either side of the fence that would allow koalas to climb over).

6.4.4 Domestic dogs¹

(i) Either the keeping of domestic dogs on any new residential lots arising from the subdivision of land shall be prohibited by an effective restriction as to user on the title of the land or other suitable planning measure

(ii) Resulting residential lots must be the subject of a covenant, imposing a legal requirement to install a dog-proof yard, whether the prospective owner has the immediate intention of owning a dog or not. The yard must enclose a PKFT-free, minimum area of approximately 300m² around a residential dwelling or part thereof. Yard-fencing must be a minimum of 1.8 m high and either be partially buried or have an associated buried component to a minimum depth of 0.3m. All gates into the enclosed area must be of the same height and general structure as the yard-fence and must have minimum clearance above ground to allow for swinging of the gate, below which must be a solid barrier such as concrete to deter digging.

6.4.5 Other fencing

(i) Fencing of residential lots must not impede the movement of koalas. Fences that do not impede koala movement may include:

- hedges or screens of trees and/or shrubs
- fences where the bottom of the fence is a minimum of 300mm above the ground to allow koalas to freely move underneath
- open post and rail fences
- post and 4 or 5 strands of wire whereby the bottom strand of wire is not barbed and a minimum 300mm above the ground at any in-line fence post and/or dropper.

6.4.6 Road design

(i) Road design standards and/or approved vehicle calming devices must be incorporated on any new roads such that motor vehicles are restricted to a maximum speed of 40km/hr within the development area.

¹ Excludes an "assistance animal" as defined for purposes of Part 6 of the Companion Animals Act 1998

Is my DA classified as 'minor' or 'major' development?

Minor development means a DA that relates to the construction of a single residential dwelling on land with a dwelling entitlement and which requires the removal of no more than two PKFTs or the subdivision of a single lot of land into no more than two lots and/or which will result in the loss of no more than two PKFTs for each hectare of assessable land to which the DA relates.

Major development means a DA that relates to the subdivision of a single lot of land into three or more lots and/or will result in the loss of three or more PKFTs for each ha of assessable land to which the DA relates.

Did you know...

Significant koala activity levels for the Campbelltown population are those $\geq 10\%$.

Ongoing evaluation of the significant use activity level threshold in east-coast low density koala populations has been assisted by the large data sets collected by the NSW OEH from the south-east forests of NSW. These data have unequivocally established that activity levels below 10% are associated with transient use (ie tree species / faecal pellet associations appear random), whereas those above 10% are not (ie pattern non-random and associated with preferential utilisation of food tree species typical of habitat use by individual koalas with established home range patterns clearly indicative of resident koala populations).

(ii) Outside of residential subdivisions, where new roads or road upgrades are proposed that traverse areas of preferred koala habitat and are predicted to accommodate in excess of 1,500 vehicle movements/day, the following standards will apply:

(a) approved wildlife exclusion fencing must be installed along both sides of the road, the lower half of which must be clad with galvanised tin sheeting on the outside face.

(b) round pipe koala-grids or other approved devices must be installed at fence-ends and driveways and other access points to prevent koala access to the road corridor.

(c) on new roads, koala underpasses comprising a minimum of 1.2m X 1.2m reinforced concrete box culverts must be installed at regular intervals that approximate one underpass per 250m of exclusion fencing.

(d) in areas where the installation of exclusion fencing and underpasses are not possible due to topographical or engineering constraints, wildlife-activated signage, street lighting and appropriate vehicle calming devices such as speed humps, roundabouts and/or chicanes must be deployed.

(e) detailed design in accordance with (i) and (ii) above must be prepared in consultation with a suitably qualified and/or accredited person.

6.4.7 Protection of koalas from disturbance

(i) Clearing of native vegetation and/or earthworks as part of any development approval consent from Council must be temporarily suspended within a range of 25m from any tree which is concurrently occupied by a koala and must not resume until the koala has moved from the tree of its own volition.

(ii) Any clearing of land must not commence until the area proposed for clearing has been inspected for the presence of koalas by a suitably qualified and/or accredited individual and approval given in writing.

(iii) Approval to proceed with the clearing of vegetation in accordance with this section is only valid for the day on which

the inspection has been undertaken.

(iv) The individual referred to in (ii) above, or a nominated representative, must remain on site during any approved clearing of vegetation. If clearing operations are being undertaken concurrently in different sections of a property, a suitably qualified and/or accredited individual must be present in each section.

6.5 Discretionary planning controls

The majority of preferred koala habitat occupied by koalas within the Campbelltown LGA will be managed within KMPs in accordance with Section 6.4 of the Plan. Outside of KMPs, less habitat is occupied and consideration can be given to relaxing development controls of the Plan.

6.5.1 Unoccupied areas of preferred koala habitat

(i) This section applies to all rezoning applications and/or DA's that have identified areas of preferred koala habitat and/or the presence of individual PKFTs and:

- are not within a KMP
- where a KAAR undertaken within the preceding 12 month period has established that koalas are not present
- where a KAAR has identified the presence of transient koala activity levels of less than 10%.

(ii) for the purposes of Section 6.4.2 of the Plan, Council may exercise discretion subject to the application demonstrating to the satisfaction of Council that that retention of PKFTs greater than 200mm DBH has been maximised and that the proposed tree removal will not prejudice the overall vision, aims and objectives of the Plan.

(iii) for the purposes of Sections 6.4.3 – 6.4.6 of the Plan, Council may exercise discretion in terms of requiring the development to conform.

(iv) Part 7 of the Plan applies to any DA being considered for the purposes of this section.



6.5.2 Non-conforming developments

In the event that extenuating circumstances beyond the capacity of the Plan to resolve can be demonstrated, some basis may exist for Council to consider modifying a development proposal in such a way as to not compromise long-term koala management objectives.

(i) This section applies to a DA relating to land to which this Part applies and:

- that is within a KMP
- if outside of a KMP, where a KAAR undertaken in accordance with Section 6.4.2 has established the presence of koalas.

(ii) Notwithstanding the requirements of Section 6.4 and at the discretion of Council, a DA for the subdivision of land for the creation of three or more lots may be approved for enclaving in such a way as to permanently exclude koalas by way of fencing, koala-grids and gateways of a type that do not allow koalas to enter the area.

(iii) Any DA to be considered for enclaving must be accompanied by a KAAR.

(iv) Areas of land where the presence of koalas has been established by a KAAR cannot be included in any land that is proposed for enclaving.

(v) In considering any application for the purposes of this section and only after consultation with the KMC, Council must be satisfied that all options relating to conformity with Section 6.4 of the Plan have been explored and exhausted.

(vi) For the purposes of (v) above, the KMC must provide a written response which must be considered by Council as part of the assessment process.

(vii) Council may consequently consider approval of the application subject to:

a) All roads and pedestrian access ways entering the enclaved area including suitable approved devices such as specially constructed koala-grids¹ and gates to prevent koalas from entering the area.

b) The design and specifications of the fencing, koala-grids and/or gates referred to in (ii) above being designed in consultation with a suitably qualified and/or accredited individual. Where the use of fencing is not considered necessary, sufficient justification in writing must be provided within the documentation supporting the DA.

c) Lands on which the fencing is to be installed must be managed in perpetuity by the proponent with access to Council afforded by way of formal easement.

d) The original DA for development of land to be enclaved providing the following plans to the satisfaction of Council:

- the precise location of the fencing
- details of conformity with (a) to (c) above.

e) The costs of providing and installing fencing, and maintenance thereof must be met by the proponent. No development works pursuant to a construction certificate being provided, are to be undertaken on the land to be enclaved, other than fencing approved as a consequence of (vii) above until the fencing referred to in (b) above is installed and operational.

(viii) Part 7 of the Plan applies to all lands that are within any area to be enclaved.

(ix) The balance of lands relating the DA and which are not to be enclaved, will be subject to the requirements of Part 6.4 of the Plan.

¹ Specifications to require use of 60mm tubular steel pipes at 200mm centres

When submitting my DA, what information do I need to provide to Council?

Use the Development Assessment Flowchart in Figure 6.1 to determine what information you are required to provide to Council to support your DA.



Mum and bub at Helens Park. Photo courtesy of NewsPix





"Mr Nymboida" the koala at Smiths Creek Reserve, Ruse.
Photo courtesy of Carla-Maree Simmons

PART SEVEN

COMPENSATION FOR LOSS OF KOALA HABITAT

Context: the loss of native vegetation is listed as a Key Threatening Process (KTP) and can be a contributing factor to koala population decline. For koalas, a number of issues arise with regard to compensating for habitat losses arising from development:

1. compensatory plantings take time before they can provide the food resource that the removed trees provided
2. proposals for compensatory plantings may not necessarily be in the most appropriate location in terms of longer-term koala management objectives
3. compensatory plantings cannot be guaranteed in perpetuity, particularly if undertaken on lands that do not have a secure conservation tenure
4. there is no supervision of planting to ensure that the planting succeeds over time

5. there are no standards by which compensation can be determined for the loss of habitat.

While controls can be put into place to attempt to address these issues, none will provide an efficient management regime to ensure the compensatory planting will be effective. If compensatory planting has to be accommodated as a last resort, then overall responsibility should be borne by a responsible authority, such as Council, to supervise such planting in the most appropriate location having regard to the requirements for koala management as set out in the Plan.

Overall objective: to provide a standardised approach to the compensation and offsetting of koala habitat loss with a transparent assessment process that enables loss to be quantified, and to belatedly provide a mechanism for effectively resourcing koala habitat rehabilitation and regeneration programs.

7.1 Compensation for loss of koala habitat – major development

(i) This section applies to any DA that relates to the subdivision of land into three or more lots and to which Part 6 applies whereby development consent results in the removal of PKFTs and/or shelter trees.

(ii) Where a proponent chooses to seek the removal of PKFTs or shelter trees in accordance with a DA, provision must be made to compensate for the loss of the associated habitat.

(iii) To ensure that the provision of compensation is:

- commensurate with the importance of the habitat approved to be removed
- applied in an area that most appropriately contributes to the long-term sustainable management of Campbelltown's koala population the proponent of the development shall agree to either:

(a) at the applicant's expense, enter into a legally binding agreement with Council to make a monetary contribution towards the Koala Habitat Rehabilitation Program detailed in Part 8 of the Plan, or

(b) at the applicant's expense, enter into a legally binding agreement with Council to undertake rehabilitation works in areas identified by the Koala Rehabilitation Program detailed in Part 8 of the Plan. This will include payment of a Compensation Guarantee in the form of a Bank Bond which will be released once the required works have been implemented in accord with the agreement. The purpose of the Compensatory Guarantee is to allow Council to implement the required works in the event that the proponent is unable or unwilling to comply.

(iv) The amount of the monies referred to in 7.1(iii)(a-b) above will be based on the value of the required 'compensation units' arising from the total number and size of PKFTs and shelter trees that will be removed, as follows:

(a) Compensation for loss of PKFTs that have a dbh between 20 – 25cm DBH will be at the rate of 80 compensation units for every cm of DBH (or part thereof).

(b) Compensation for loss of PKFTs and/or shelter trees that have a dbh > 25cm dbh but < 60cm will be at the rate of 150 compensation units for every cm of DBH (or part thereof).

(c) Compensation for loss of PKFTs and/or shelter trees that have a dbh of > 60cm will be at the rate of 250 compensation units for every centimetre of dbh (or part thereof).

(v) The value of a compensation unit as at the date of commencement of the Plan is \$1.00, this value to be adjusted annually using the CPI increase for the 12 months prior to the review date.

(vi) Council must establish a special trust fund into which the monetary amount determined as compensation for the purposes of 7.1(iii)(a) above can be placed, and from which only habitat rehabilitation or regeneration works identified through the provisions of Part 8 of the Plan can be funded.

(vii) Nothing in this Part prohibits the proponent from undertaking compensatory plantings and/or habitat rehabilitation measures on lands being the subject of the DA. However, such an action cannot otherwise be used to discount the obligations of the proponent for the purposes of this Part unless an agreement as outlined in 7.1(iii)(b) above is in place.

(viii) Development consent shall be conditional upon the

agreement referred to in 7.1(iii) above being registered and in place prior to issuing of a construction certificate.

7.2 Compensation for loss of koala habitat – minor development

(i) This section applies to any DA that does not relate to the subdivision of land into three or more lots and to which Part 6 applies whereby development consent results in the removal of PKFTs and/or shelter trees.

(ii) Where a proponent chooses to seek the removal of PKFTs and/or shelter trees in accordance with a DA, provision must be made to compensate for the loss of the associated habitat.

(iii) To ensure that the provision of compensation is:

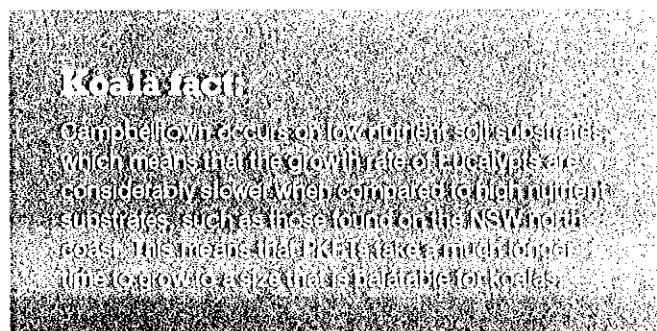
- commensurate with the importance of habitat approved to be removed
- is applied in an area that most appropriately contributes to the long-term sustainable management of the Campbelltown koala population.

the proponent of the development shall agree to compensate for the loss of any PKFTs and/or shelter trees at a ratio of no less than 20 replacement trees (or the monetary equivalent¹) for every one that is removed.

(iv) the location of the compensatory plantings shall be at the discretion of Council in the context of Part 8 of the Plan.

Note: Compensation case studies that explore hypothetical offsetting scenarios can be found on the following pages.

- 1 Monetary equivalent proposed as \$35 per replacement tree



Compensation Case study B

A property developer seeking development approval to subdivide a 5 ha land parcel in Ingleburn into a number of smaller allotments. The proposed development is classified as Major Development under the plan. The land is situated outside of a KMA and therefore both a VAR and KVAR are required. The VAR confirms the presence of PKFs but the KVAR establishes that koalas are not present on site.

The subdivision is conditionally approved with council requiring the retention of a number of the largest PKFs, but allowing removal of a total of nine PKFs across the site. The amount of compensation payable to council's koala habitat rehabilitation fund is calculated as follows:

| Tree species | Scientific name | DBH | Compensation units | Amount |
|-------------------------|--------------------------------|------|--------------------|-----------------|
| Grey Gum | <i>Eucalyptus punctata</i> | 45cm | 150 | \$6750 |
| Grey Gum | <i>Eucalyptus punctata</i> | 48cm | 150 | \$7200 |
| Grey Gum | <i>Eucalyptus punctata</i> | 28cm | 150 | \$4200 |
| Grey Gum | <i>Eucalyptus punctata</i> | 59cm | 150 | \$8850 |
| Blue-leaved Stringybark | <i>Eucalyptus agglomerata</i> | 32cm | 150 | \$4800 |
| Blue-leaved Stringybark | <i>Eucalyptus agglomerata</i> | 21cm | 80 | \$1680 |
| Forest Red Gum | <i>Eucalyptus tereticornis</i> | 80cm | 250 | \$20000 |
| Manna Gum | <i>Eucalyptus viminalis</i> | 22cm | 80 | \$1760 |
| Turpentine | <i>Syncarpia glomulifera</i> | 67cm | 250 | \$16750 |
| TOTAL | | | | \$71,990 |

Amount payable to council's koala habitat rehabilitation fund is calculated as follows: DBH in cm compensation units at a cost of \$1500 per unit.



PKFs at Ingleburn. Photo courtesy of Council.



Case study B - Example Ingleburn site

PART EIGHT

HABITAT REHABILITATION & RESTORATION

Context: additional koala habitat areas will assist in sustaining a free-ranging koala population in perpetuity. This habitat is ideally perceived to include the in-filling of gaps within and adjoining existing areas of preferred koala habitat, in addition to SLAs. It is important that resources are used effectively to gain this additional koala habitat and that it is available in perpetuity for the koala population. The best means of achieving this is for Council to take an overseeing role for all rehabilitation and/or revegetation works.

Overall objective: to provide a coordinated program of habitat rehabilitation and linkage creation.

8.1 Habitat rehabilitation

(i) Where necessary, Council shall coordinate the rehabilitation of koala habitat across all lands to which the Plan applies. Council will seek partners and funding to secure the rehabilitation.

(ii) Within the first 18 months of the Plan and in consultation with the KMC, Council shall prepare a Koala Habitat Rehabilitation Program (the Program) for lands to which the Plan applies. The Program must identify and prioritise largely un-vegetated areas with a secure conservation tenure and/or conservation agreement for habitat restoration and/or rehabilitation purposes.

(iii) As a component of (ii) above, Council will actively seek interest from government agencies and private landholders within KMPs and SLAs to have their land considered for rehabilitation purposes.

(iv) Council will use the funds obtained by the habitat compensation measures detailed in Part 7 of the Plan to resource the Program, together with other such funding sources as may be available from time to time.

(v) Habitat rehabilitation plans must be prepared for each rehabilitation project. Habitat rehabilitation plans that are prepared by a proponent in accordance with 7.1 (iv) (b) must be approved by Council prior to works commencing, and all habitat rehabilitation plans must include the following information:

- the total area proposed for rehabilitation
- description and condition of current vegetation cover
- the number of trees to be planted, location of plantings and planting densities
- details of the sourcing of all seedlings (demonstrating local seed stock will be used)
- a schedule of management, monitoring and maintenance activities to ensure establishment and ongoing protection and management of planting(s)
- the length of the proposed monitoring and management periods, the timing of key milestones and reporting requirements

- provisions for planting mortality replacements
- nominate responsible parties for the undertaking of all works and activities included in the Plan
- if the revegetation is to take place on other than public land, how the revegetation will be maintained in perpetuity for the benefit of koalas.

(vi) As a general rule, PKFTs must comprise no less than 25% of the tree species used for rehabilitation purposes.

(vii) A Council officer will be made responsible for overall planning, supervision, resourcing and coordination of revegetation works. This officer will liaise with the KMC regarding the Program.

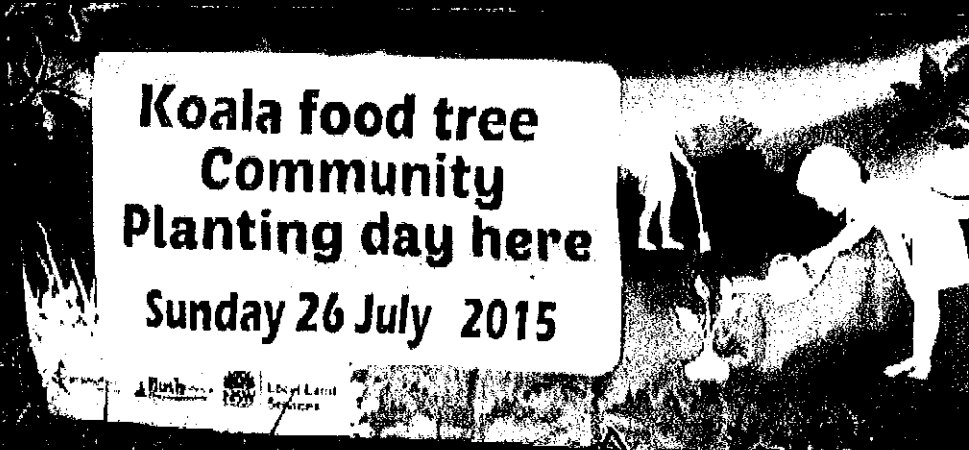
(viii) Where priority areas for koala habitat restoration are identified on land managed by Council, provision should be made in the relevant Plan of Management for this work.

Did you know that Council has a number of Bushcare groups operating in various locations throughout the Campbelltown LGA.

Interested in joining? For more information, contact Council's Bushcare Coordinator on 4645 4194 or email bushcare@campbelltown.nsw.gov.au



Koala food tree planting day, Smiths Creek Reserve, 26 July 2015.
Photo courtesy of Angela Taylor



**Koala food tree
Community
Planting day here**
Sunday 26 July 2015

PART NINE

COMMUNITY EDUCATION

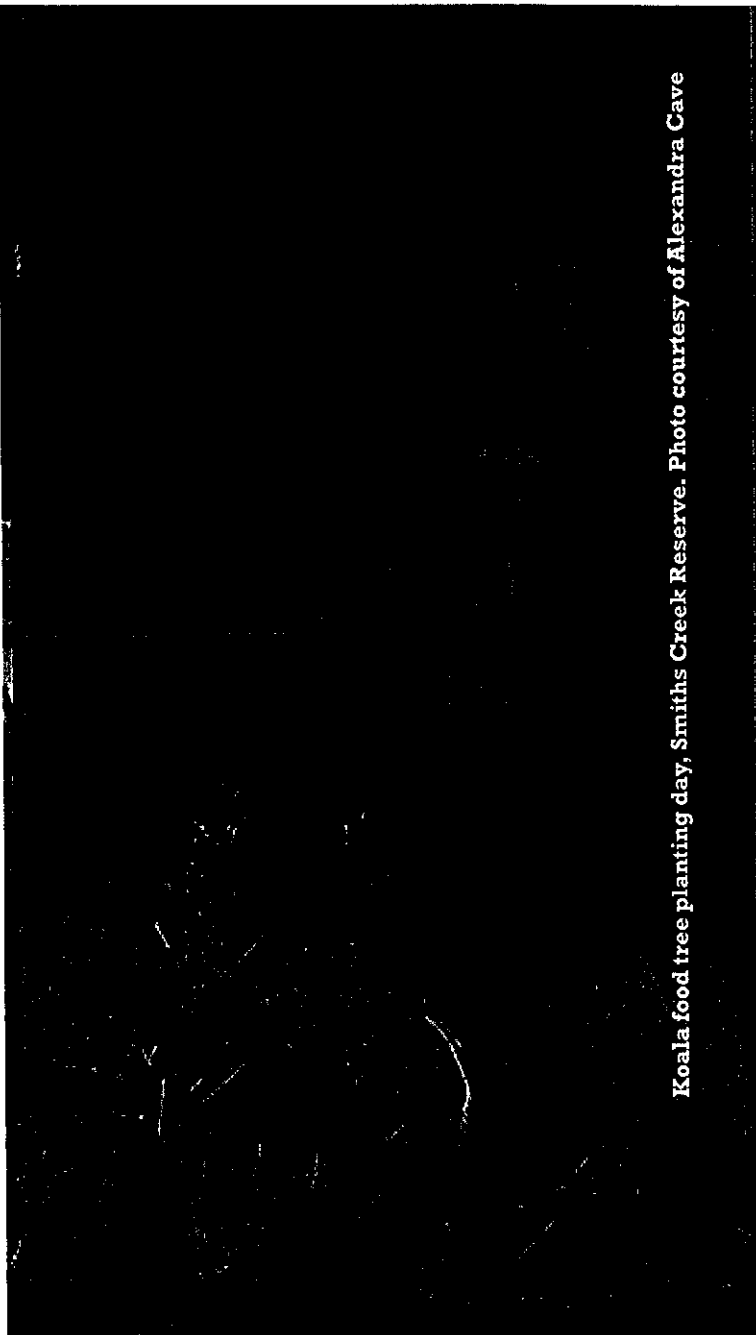
Context: while there is generally community support for koalas, there is limited appreciation of the threats they face and the measures required to ensure longer-term sustainable management of existing populations.

Overall objective: to increase the wider community's awareness of threats to koala habitat and populations, together with measures required to better manage the species and to facilitate active engagement of the community with koala management.

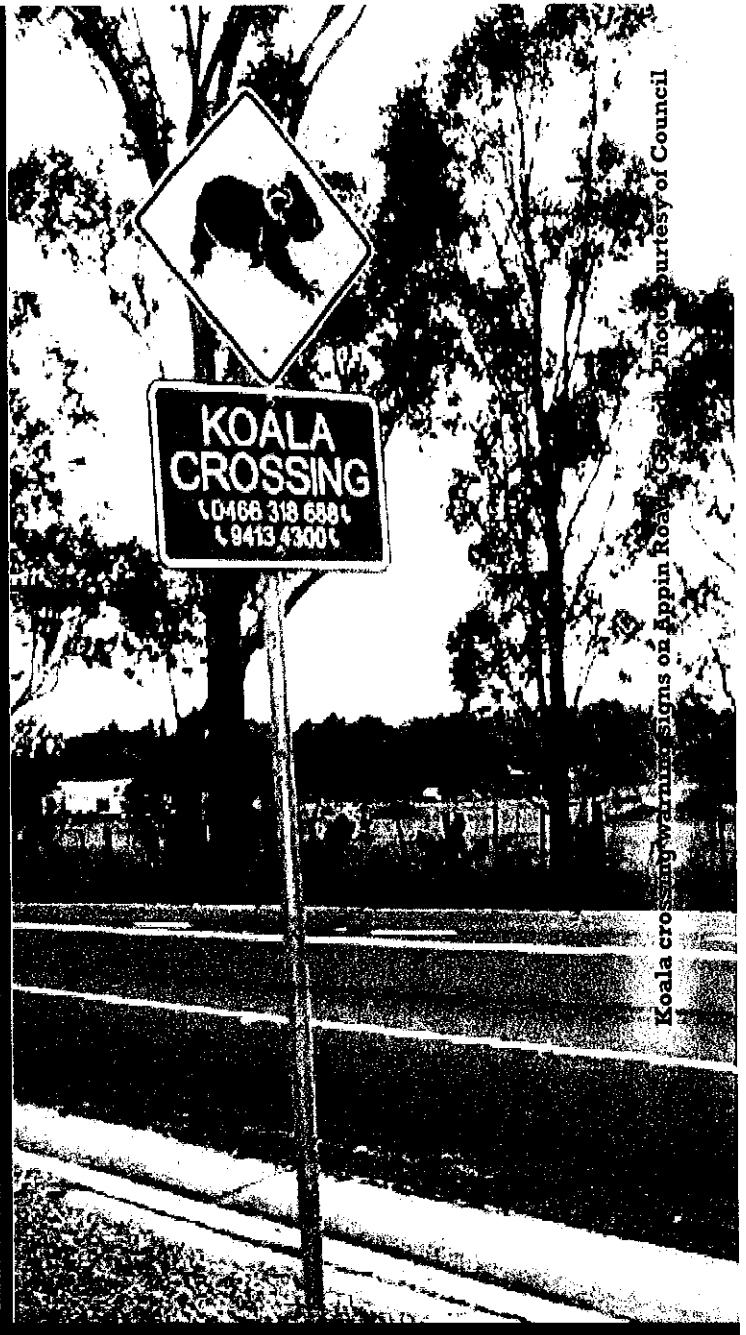
9.1. Education strategy

(i) In conjunction with the KMC, within the first 18 months of the Plan Council shall prepare a Koala Education Strategy aimed at raising awareness about the need for the involvement of the broader community in the management of the Campbelltown koalas. Measures may include, but are not limited to:

- a brochure aimed at visitors to the Campbelltown LGA
- a program targeted at providing information sessions at schools



Koala food tree planting day, Smiths Creek Reserve. Photo courtesy of Alexandra Cave



Koala crossing warning signs on Appin Road. Photo courtesy of Council

- signage on roads through areas known to be occupied by koalas
- regular workshops for the community on measures necessary to assist the koala management effort
- a web-based mechanism allowing or advising residents to record koala sightings and other incidents of interest to koala management
- a koala management page or pages on the Council website that provides access to the Plan, along with details of koala management measures and actions that residents,

landowners etc. can take to assist longer-term koala management efforts.

- (ii) In addition to the measures to encourage habitat regeneration on private lands, Council will promote discussions with private landholders about options for conservation of koala habitat on their lands, including offering incentive instruments such as voluntary Conservation Agreements to assist in conservation of koala habitat.

Have you seen a koala? Report the sighting to Council on 02 4645 4151 or email koalas@campbelltown.nsw.gov.au or head to our website at www.campbelltown.nsw.gov.au/koalas

PART TEN

MONITORING, REPORTING and REVIEW

Context: appropriate measures are required to inform stakeholder interests in the distribution, abundance and conservation status of Campbelltowns resident koala population(s), assess the effectiveness of the Plan's working provisions and if necessary, identify if and how they should be amended.

Overall objective: To ensure that the Plan remains relevant and that planning controls are regularly reviewed so as to achieve the vision and aims of the Plan.

10.1 Population monitoring

(i) Within and immediately adjoining the boundaries of three embedded plateau KMPs recognised for purposes of the Plan, Council will monitor the amount of habitat being utilised by koalas by reassessing the occupancy rate and/or levels of koala activity, ideally within the first year following commencement of the Plan, and thereafter at intervals of every two years.

(ii) For purposes of the monitoring program, a series of approximately 50 field sites at 500m intervals will be established as permanent monitoring points, the locations of which are known to Council.

(iii) Each monitoring event must involve an assessment of koala habitat use at each of the 50 sites that arise from those created by 10.1(ii) above.

(v) The minimum data set to be collected from each field site that is sampled for purposes of (iii) above must include either:

- a) a full measure of koala activity (ie application of SAT methodology applied in accord with Appendix D) from a central point located at the site coordinates, along with the number of koalas sighted in a 250m x 40m (1ha) transect, or
- b) a determination as to whether koalas are using the site based on 10 minute searches for koala faecal pellets around the base of and/or beneath the canopies of any PKFTs that are located within a 25m radius of the site coordinates (or other tree species if no preferred koala food trees are present).

(vi) A determination as to which of the two preceding options will be utilised will be made on the basis of resources available to Council at each monitoring event.

(vii) For the first monitoring event, coordinates for the centre of the site must be documented and the precise location permanently identified so as to enable it to be found for the purpose of subsequent monitoring events.

(viii) Monitoring and any associated data analysis must be undertaken by suitably qualified and/or accredited Council officers or other individuals who must also gather data from organisations such as the Macarthur Veterinary Group, WIRES and Sydney Wildlife on any koala incidents that may have occurred in the time period that has elapsed since the previous monitoring event.

(ix) As a component of every third monitoring event, Council will undertake a view of historical koala records using the methods described in Appendix C.

10.2 Performance indicators

(i) For monitoring purposes, the benchmark habitat occupancy rate to be achieved for koala populations inhabiting the three embedded plateau KMPs and adjoining lands should ideally average 45 - 50% of sampled field sites.

(ii) Notwithstanding the influence of events beyond the control of Council, the Plan can only be deemed successful if the occupancy rate estimated by the historical records analysis referred to in 10.1(ix) above is not significantly less than the estimate established by the monitoring program.

(iii) Generally, conclusions relating to changes in the occupancy rate within KMPs should only be undertaken at every third monitoring event (ie every six years) by examining both the occupancy trend over the intervening six year period and by a direct comparison to the occupancy estimate of the six years previous.

(iv) Any statistically significant reduction in either the occupancy rate or the number of field sites returning evidence of koala activity when compared to that estimated by the previous monitoring period, will warrant further investigation as to cause and so trigger a formal review of the Plan.

10.3 Reporting

(i) A report detailing the results of the field survey must be prepared by the person or organisation referred to above and forwarded to Council and the KMC within one month following completion of the field assessment.

(ii) Among other things, the report must include the following:

(a) a comparison of the extent of koala activity using baseline data from the initial monitoring event and that of any other surveys undertaken in accord with this Part, including consideration of the performance indicators

(b) a review of koala incidents obtained as a result of 10.1(v) above

(c) in relation to koalas and their habitat, a breakdown of the number and outcomes of development and/or rezoning applications that have been approved in accordance with Part 6 of the Plan

(d) the area of koala habitat rehabilitation achieved in areas identified for restoration according to the criteria outlined in Part 8

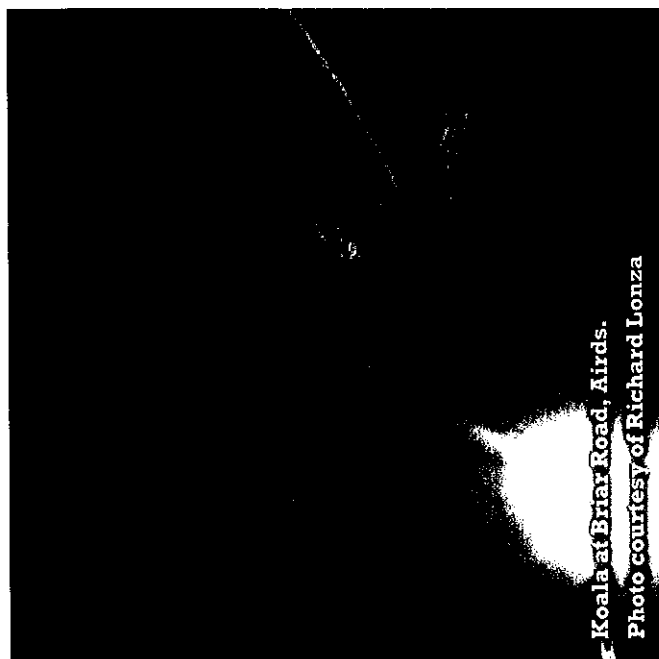
(e) any other observations and data of relevance to koala management

(f) recommendations for any amendment of the Plan by Council.

10.4 Review

(i) At every third reporting event, the KMC must undertake a major review of the Plan by considering the reports referred to in 10.3 above, along with any associated recommendations for amendment of the working provisions.

(ii) At every major review, the KMC will consider and evaluate the need to incorporate additional survey techniques such as use of specialised telephone applications, phone-in surveys and/or annual koala census days to augment the field survey component.





Sick koala in care. Photo courtesy of WCC

PART ELEVEN

KOALA WELFARE and ONGOING RESEARCH

Context: an important aspect of koala management within the Campbelltown LGA is the care and rehabilitation of koalas. This is undertaken in a voluntary capacity by organisations such as the Macarthur Veterinary Group, WIRES and Sydney Wildlife. There is a need for stronger ties and liaison with Council in the context of koala welfare and the management and rehabilitation of wild koalas. There is also a need to address the matter of the rescue, care and rehabilitation of the LGA's koalas.

Overall objective: Identification of koala welfare and research needs intended to improve and inform long-term management of the Campbelltown koalas.

1.11 Koala Care and Management

(i) To coordinate the reporting from the Macarthur Veterinary LGA, a direct link to the emergency and medical services within Sydney Wildlife Hospital Veterinary Group website will be provided through Council's website.

(ii) Within the first three months of the LGA, Council will require a formal submission from WILF & Sydney Wildlife Hospital Veterinary Group detailing Council's best practice policy and what the rescue, care and rehabilitation of a koala costs to the Campbelltown LGA.

(iii) Council will have a dedicated area of information public park, reserves and educational places within WILF or linked to such as donkey chow.



Core koala habitat at Smiths Creek Reserve, Ruse. Photo courtesy of Andy Attewell

11.2 Koala research

(i) Council will encourage further research, investigations and assessments into habitat use by the Campbelltown koalas, including further and ongoing refinement of the vegetation mapping layer which otherwise informs the Plan.

(ii) In collaboration with stakeholders, Council will encourage further and ongoing research into how best to reduce the potential for koala vehicle-strike and attacks on koalas by domestic dogs.

(iii) In collaboration with OEH, WSU and other stakeholders,

Council will encourage further and ongoing research into various aspects of koala disease and the genetic composition of the Campbelltown koalas.

(v) Council will establish permanent vegetation growth and koala use monitoring plots within any area replanted and/or rehabilitated for the purposes of improving habitat connectivity within the lands to which the Plan applies.

(vi) Council will continue to work closely with RFS on issues associated with fire management specifically in and around KMPs.

Did you know: the University of Sydney's Koala Health Hub at the Faculty of Veterinary Science in Camden is committed to koala care, management and research? The Koala Health Hub provides diagnostic services to koala care groups in NSW, free of charge.



Koala at Winbourne Place, Airds. Photo courtesy of Andy Attawell

PART TWELVE

OTHER THREATS

Context: the most significant threats to long-term koala population viability in the Campbelltown LGA are wildfire, incidental mortalities due to vehicle-strike and domestic dog attack, and habitat loss. While management of fire is outside of the control of Council, it is hoped that through the workings of the Plan, Council will be able to influence the management of fire to reduce the potential for negative impact, and effectively reduce habitat loss. The numbers of koalas being killed by vehicle-strike is also increasing commensurate with recovery of the Campbelltown koala population generally.

Overall objective: highlight the risks associated with fire and vehicle-strike through provisions intended to result in engagement with key agencies involved.

12.1 Fire management

(i) Council will encourage all relevant authorities and landowners to adopt a 'minimal use of fire' policy within KMPs identified by the Plan by way of:

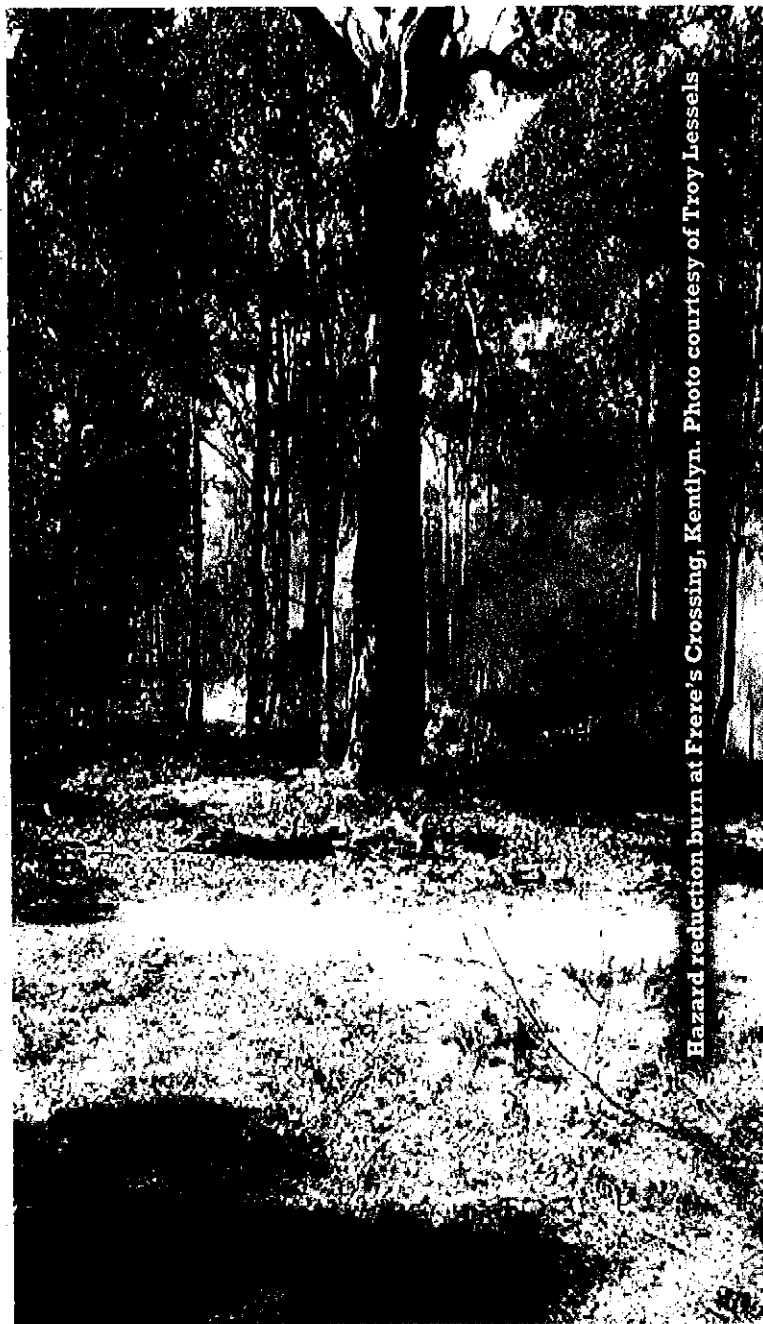
- (a) undertaking bush fire hazard reduction using mechanical means
- (b) extinguishing any bushfire at the first practical opportunity.

(ii) Council will ensure that maps indicating the location of core koala habitat areas within the Council LGA are made available to all RFS stations.

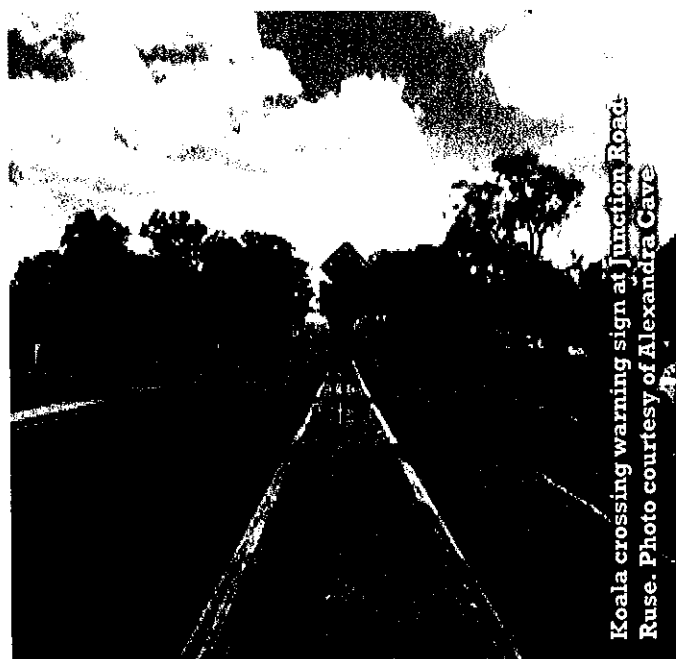
(iii) Council will instigate appropriate koala awareness training for RFS members, Council staff and others involved with the management of fire, assessment of DAs and provision of hazard reduction certificates.

(iv) Council will assist the RFS in conducting community education in respect to the processes required to manage bushfires and hazard reduction in KMPs.

(v) Council will assist in the preparation of protocols for land management agencies and the RFS to cooperate with the local



Hazard reduction burn at Frere's Crossing, Kentlyn. Photo courtesy of Troy Lessells



Koala crossing warning sign at Junction Road, Ruse. Photo courtesy of Alexandra Cave

wildlife carer/rehabilitation groups and OEH concerning fauna welfare issues following bushfires.

12.2 Vehicle-strike

- (i) Within the first six months of the Plan and in consultation with RMS, Council shall prepare a koala road-kill mitigation strategy for those roads within KMPs and Campbelltown LGA generally where koala road-kills are known to occur.
- (ii) The strategy referred to in (i) above must identify best-practice solutions and prioritise a five year program of works intended to reduce the risk of koala road mortalities.

**If you find an injured koala,
call the WIRES koala hotline
on 0466 318 688 or Sydney
Wildlife on 02 9413 4300**

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Appendices

- Appendix A - Schedule of management actions**
- Appendix B - Conformity with DPE/ OEH requirements for CKPoM compliance with SEPP44**
- Appendix C - Analysis of historical koala records in Campbelltown**
- Appendix D - Undertaking koala habitat assessments using Regularised Grid-based SAT (RG-bSAT) Sampling**
- Appendix E - Draft DCP provisions**

Appendix A: Schedule of management actions

| Action ID | Activity | Priority | Time to complete | Frequency | Internal Budget | Funding Source |
|--|--|----------|-------------------|-----------------|-----------------|-----------------|
| Roles and responsibilities | | | | | | |
| 1 | Establish of a KMC to guide the development of the plan, oversee the implementation of management activities, and to consider non-conforming DAs | H | < Six months | Quarterly | Internal | Council |
| 2 | Develop a koala-specific webpage on the Council website providing information on koalas relevant to the LGA | H | < One month | Ongoing updates | Internal | Council |
| 3 | Provision of effective mechanisms for community reporting of koala sightings (including telephone, email and website) | H | < One month | Ongoing | Internal | Council |
| Koala management | | | | | | |
| 4 | Preparation of koala habitat provisions for inclusion in the CLEP, 2015 to activate provisions of the plan | H | When plan adopted | 3 months | Internal | Council |
| 5 | Creation of an interactive koala habitat planning layer to support the koala habitat provisions | H | < Two years | 6 months | Internal | Council |
| 6 | Preparation of compensatory provisions for inclusion in the DCP for offsetting the loss of PKFTs and shelter trees | H | When plan adopted | 3 months | Internal | Council |
| Development of a koala habitat register | | | | | | |
| 7 | Develop an interactive DA register to enable the review of conditions of consent for past DAs approved within koala habitat | M | < Two years | 6 months | Internal | Council |
| 8 | Council to amend the Tree Removal Application under Section 78A of the EP&A Act in regards to PKFTs and shelter trees that triggers the requirements of the Plan | H | < One month | 3 months | Internal | Council |
| 9 | Council to update Section 149 Planning Certificates under the EP&A Act to include information on the presence of koala habitat | H | < Six months | 6 months | Internal | Council |
| 10 | Develop a monitoring program to randomly audit the compliance of DA conditions of consent for properties subject to this plan (and under approved IKPoMs) | H | < Six months | Ongoing | Internal | Council |
| Compensatory measures | | | | | | |
| 11 | Develop a Council-owned land register listing properties suitable for offsetting and compensatory PKFT plantings | M | < Six months | 6 months | Internal | Council |
| 12 | Maintain a register of landholders who are interested in rehabilitating koala habitat and developing the conservation value of their property | L | < Two years | Ongoing | \$10,000 | External grants |
| Habitat rehabilitation and restoration | | | | | | |
| 13 | Identify priority restoration sites for core koala habitat in order to target revegetation of strategic koala habitat corridor linkages | M | < One year | 6 months | \$40,000 | External grants |
| 14 | Letterbox drop property owners providing information on koala conservation | L | < Two years | Ongoing | \$5,000 | External |

| | | | | | | |
|---|---|---|-------------------|-----------|----------|-----------------|
| | agreements, targeting landowners in key koala HLAs as shown in Figure 5.3 | | | | | grants |
| 15 | Provide and support habitat restoration measures within in koala habitat, through direct delivery and conservation partnerships | M | < One year | Annually | \$15,000 | External grants |
| 16 | Investigate opportunities for the rezoning of core koala habitat on Council owned lands for environmental protection purposes | L | < Two years | 3 months | Internal | Council |
| 17 | Undertake koala community planting projects to develop environmental stewardship in urban parks and local reserves | M | < One year | Annually | \$10,000 | Council |
| Community education | | | | | | |
| 18 | Develop a koala awareness strategy to facilitate increased positive community engagement and awareness of koala conservation actions | M | < Six months | 3 months | Internal | Council |
| 19 | Provide community seminars and workshops to actively engage residents and stakeholder groups on koala related issues | M | < One year | Annually | Internal | Council |
| 20 | Develop koala education programs for primary schools, particularly for those areas in close proximity to core koala habitat | L | < Two years | Annually | Internal | Council |
| 21 | Install educational koala signage and plaques in local schools to encourage younger generations to actively engage on koala related issues | L | < Two years | Ongoing | \$5,000 | External grants |
| 22 | Develop a koala field ID guide for eco-tourism purposes to encourage education and promote koala conservation | L | < Two years | Annually | \$5,000 | External grants |
| Monitoring, reporting and review | | | | | | |
| 23 | Develop a koala population monitoring program involving the establishment of a series of monitoring sites within the LGA | H | < One year | Triennial | \$35,000 | External grants |
| 24 | Coordinate annual community citizen science transect-based koala searches of designated monitoring sites ¹ | H | < One year | Annual | \$15,000 | External grants |
| 25 | Annual report to Council on the implementation of management actions and performance indicators identified in the Plan | H | < One year | Annually | Internal | Council |
| 26 | Explore funding opportunities through various external grant programs for the implementation of management actions identified in this plan | H | When plan adopted | Ongoing | Internal | Council |
| Koala welfare and research | | | | | | |
| 27 | Keep informed of recent developments and news regarding koala health through regular liason with key research stakeholders | L | < Six months | Ongoing | Internal | Council |
| 28 | Explore opportunities with local utility contractors to provide cut PKFT branches to the Koala Health Hub at the University of Sydney's Faculty of Veterinary Science | M | < One year | Ongoing | Internal | Council |
| Other threats | | | | | | |
| 29 | Identify koala threat mortality hot spots through an up to date sightings, injury and | M | < One year | 6 months | Internal | Council |

¹ (based on the scientifically rigorous methodology as per NPWS Community Koala Surveys Bongil Bongil National Park program)

| | | | | | | | |
|------------------------------|--|---|-------------------|----------|----------|-----------------|--|
| fatality recording framework | | | | | | | |
| 30 | Install koala crossing warning road signage to improve road safety in key areas subject to high koala mortality | H | When plan adopted | 3 months | Internal | Council | |
| 31 | Contact NSW RMS to upgrade road signage to reflect reduced speeds (60km/hour), and enforce speed limits on state roads in koala habitat | L | < Two years | 1 month | Internal | Council | |
| 32 | Lobby NSW RMS to incorporate koala-friendly crossings (such as fauna overpasses and culverts) into state road designs in koala habitat (ie Appin Road upgrade) | H | < Six months | 3 months | Internal | Council | |
| 33 | Install signage in high-risk dog attack areas in koala habitat outlining leashed area restrictions to notify and educate dog owners | M | < Two years | 3 months | Internal | Council | |
| 34 | Letterbox drop property owners in high-risk dog attack areas to educate residents and promote responsible dog ownership | M | < Six months | 3 months | \$5,000 | External grants | |
| 35 | Implement appropriate regulatory tools and compliance measures in reserves subject to leashed area restrictions | L | < Two years | Ongoing | Internal | Council | |
| 36 | Develop an interactive internal mapping system to query history and extent of hazard reduction burns across the LGA to inform future burns in koala habitat | M | < One year | Ongoing | Internal | Council | |
| 37 | Provide RFS with core koala habitat planning mapping the subject of this Plan, to ensure exclusion from the operation of the 10/50 scheme | H | < Three months | 3 months | Internal | Council | |

Appendix B:

Conformity with DPE/ OEH requirements for CKPoM compliance with SEPP44

| Item | How the item is addressed in the CKPoM |
|---|---|
| Identification of authors | Authors and others associated with the drafting of the CKPoM are identified on Page <i>i</i> of the CKPoM. |
| Primary aims consistent with clause 3 of the SEPP and comply with clause 15(a) of SEPP 44 (identification, protection and management of koala habitat). | The primary aims and objectives are detailed in Part 3 of the CKPoM. |
| Additional aims | |
| Identify and list the koala food tree species in the study area, derived from <ul style="list-style-type: none"> a) SEPP 44 b) local sources c) field and community surveys. | Koala food tree species for the Campbelltown LGA are identified in supporting documentation; PKFTs are named in the definitions and acronym section of the CKPoM on page <i>vi</i> and <i>vii</i> . |
| To map koala habitat within the study area. | Mechanisms for categorisation of vegetation communities are identified in supporting documentation and in Part 5 (Koala management framework) of the CKPoM; Map of preferred koala habitat is included as Figure 5.1 of CKPoM. |
| To identify and reduce the threatening processes acting on the local koala population. | Threatening processes are identified in supporting documentation (ie ELA koala habitat study, 2014), mechanisms for their reduction are detailed in Parts 6 (Development assessment and control), 8 (Habitat rehabilitation and restoration) and 12 (Other threats) of the CKPoM. |
| To identify steps to reverse the current trend of koala population decline, for example <ul style="list-style-type: none"> • to identify and conserve koala habitat • to implement appropriate planning controls • to institute a long-term program of monitoring and reporting of koalas and koala habitat • to nominate areas for restoration programs. | No decline apparent; measures in CKPoM (all Parts) are specifically intended to enable long-term sustainable future for koalas in study area. |
| Background | |
| Physical environment - description of the physical aspects of the study area (climate, geology, soil types and their nutrient status, and topography) as it relates to koala habitat. | Part 1.1.2 of Part A (Background information) of CKPoM refers. |
| Biotic environment - description of the biotic environment of the study area including flora, fauna, feral animals and ecosystems as it | Part 1.1.2 of Part A (Background information) of CKPoM refers. |

| | |
|---|---|
| relates to koala habitat. | |
| History - summary of history of land-use, and include a current map of land tenure. History of koalas and koala habitat in the study area. | Supporting documentation refers, current map of land tenure is provided in Part 1 (Introduction) - Figure 1.1 of the CKPoM. |
| Regional status of koalas and koala habitat to identify potential linkages between koala habitat in the study area and neighbouring areas and the highest priority areas of koala habitat. | Supporting Documentation refers while details of key linkage areas within the broader study area, and extending into neighbouring areas is provided in Figure 5.3 of CKPoM. |
| A discussion of the existing planning instruments which are applicable to the protection of koala habitat (including where copies can be obtained) | Existing planning instruments covering the study area are outlined and discussed in Part 1.2 (Statutory context) of CKPoM. |
| Methodology | |
| a) Survey of the study area for koala habitat, including the following procedures: | |
| 1. vegetation survey to produce a vegetation map of plant associations | Supporting documentation and Appendix to CKPoM refer. |
| 2. community-based koala survey to provide records of both current and historical koala locations | Supporting documentation refers. |
| 3. field survey to determine which plant associations and tree species contain koalas. | Supporting documentation refers. |
| b) Maps of koala habitat, including | |
| 1. Potential koala habitat. This will be a map of all plant associations containing preferred koala food trees based on the list of trees generated for the study area. | A map of preferred and core koala habitat is provided in Figure 5.1 of the CKPoM. |
| 2. Core koala habitat. | An assessment of generational persistence has enabled areas of contemporaneous core koala habitat to be identified, the basis for which is detailed in the supporting documentation, and provided in Part 5 (Koala management framework) - Figure 5.1 of the CKPoM. |
| Threatening processes | |
| Identify and describe the threatening processes affecting koalas and koala habitat. | CKPoM Part A (Background Information) refers. |
| Current LEP zoning of koala habitat areas and the effects of activities which may be permissible under these zonings to the extent that they facilitate or contribute to threatening processes. | Part 1.1 of Part A (Background Information) of CKPoM refers. |
| The extent of these problems to address the importance of each in the study area. | CKPoM Part A (Background information) refers. |
| Management | |
| General management principles and policies for koala management. For example, koala protection or management should | Part B (Working provisions) of CKPoM refers. |

| | |
|--|---|
| extend over areas of fragmented habitat which support a koala population and identified links between koala habitat. | |
| Planning controls and regulation. The recommendations in Section 2.4 and 2.5 of the Department of Urban Affairs and Planning (DUAP) Circular No B35, should be applied. All areas mapped as koala habitat should be included in these legislative provisions. | Part 6 (Development assessment and control) of CKPoM refers. |
| Encourage land owners to enhance and protect koala habitat – proactive measures. | Part 9 (Community education) of CKPoM refers. |
| Threatening processes addressed by appropriate detailed management actions to negate or ameliorate threats. | Parts 6 (Development assessment and control) and 12 (Other threats) refer. |
| Koala welfare - management of sick and injured koalas placed in care for rehabilitation and release. The role that local koala care groups play in koala welfare and conservation should be identified and discussed. | Part 11 (Koala welfare and ongoing research) of CKPoM refers. |
| Research - identify areas requiring further research that will assist in the long-term management of koalas. | Part 11 (Koala welfare and research) of CKPoM refers. |
| Public education and information - strategies to educate and inform the public of the management and conservation of the local koala population. | Part 9 (Community education) of CKPoM refers. |
| Coordination - management recommendations should take a regional approach - neighbouring lands and include issues on all land tenures (including DoD, NPWS and Crown Lands). | Part 4 (Roles and responsibilities) of CKPoM designates Campbelltown City Council as lead agency. |
| Implementation - how the plan is to be implemented including time-frames and responsibilities. | Appendix A of CKPoM refers. |
| Review | |
| Formation of a steering committee to assist in overall implementation (eg establishing time-frames for implementation) and content and assigning responsibilities and resources. | Section 4.2 of CKPoM establishes a KMC to oversee/assist with implementation of the Plan. |
| Performance indicators - Detailed performance indicators, with incorporated timeframes to assess the success or failure to meet the aims of the Plan. These indicators will guide the monitoring program. Appropriate indicators should include rates of habitat loss and/or creation, feedback from community groups and achievement of deadlines. | Part 10 (Monitoring, reporting and review) of the CKPoM refers. |
| Monitoring - an ongoing program of monitoring of the koalas and koala habitat, be defined by the performance indicators. | Part 10 (Monitoring, reporting and review) of the CKPoM refers. |
| Reporting - reporting of the status of koalas in the study area and the LGA is required. | Part 10 (Monitoring, reporting and review) of the CKPoM refers. |
| Public exhibition: the views of the community should be obtained through public exhibition of a draft plan. Any comments should be collated and incorporated into the plan if appropriate. | CKPoM is to be placed on public exhibition for 28 days following Council resolution. |

Appendix C

Analysing the historical record: aspects of the distribution and abundance of koalas in the Campbelltown City Council Local Government Area 1900 – 2012.

Report to Campbelltown City Council
March 2016



Background

Analysis of historical fauna records can inform management and conservation decisions. The koala is an iconic Australian mammal and has been the focus of one national survey (Phillips 1990). While in NSW, at least three statewide surveys have also occurred (Gall 1978; Reed and Lunney 1990; Lunney *et al.* 2009). Analyses of historical koala records are increasingly being used to inform planning outcomes at the Local Government Area (LGA) level (Lunney *et al.* 1998; Phillips *et al.* 2007; Phillips and Hopkins 2010). The range parameters Extent of Occurrence (EoO) and Area of Occupancy (AoO) are two key measures pertaining to the spatial distribution of a species, the EoO being that area encapsulating the outermost limits of the area in which the species can be found, while the AoO is that area within the EoO in which the species actually occurs (Gaston 1997). The AoO is typically estimated by enumerating the number of occupied grid cells and is thus sensitive to sampling parameters such as study area and grid cell size.

As a consequence of databases in the public domain which invite contribution, coupled with a mandatory requirement in some instances to report species records, relatively large data sets are now available for use. However, the adhoc nature of data collection and associated reporting indirectly results in a suite of statistical issues which can make objective interpretation of such data problematical.

The boundaries of the Campbelltown LGA encompass an area of approximately 31, 200ha. This report is part of a process initiated by Campbelltown City Council to progress towards the adoption of a Comprehensive Koala Plan of Management (CKPoM) for the LGA. Herein an analysis of historical koala records for the LGA is undertaken, with a view to examining the following issues:

- (i) identifying any changes/trends in the geographic distribution of koalas within the Campbelltown LGA over time
- (ii) determining the extent to which the historical records may be capable of assisting/informing decisions relating to koala conservation by way of identifying important historical and contemporaneous source populations, the latter additionally qualifying as core koala habitat for the purposes of SEPP 44.

Knowledge gained from the preceding process in conjunction with data derived from habitat mapping and radio-tracking studies, has also been used to derive an indicative koala population estimate for the entire LGA.

Methods

An inherent problem associated with survey data such as historical koala records, is that they are typically observer-biased and do not reflect the results of a systematic survey effort. Hence, quantitative range parameters such as the Area of Occupancy (AoO) and concepts such as generational persistence could potentially miscalculate the full extent of any indicative change (positive or negative) and/or the locations of such things as source populations respectively, if existing bias cannot be accommodated; it is with such considerations and limitations in mind that the following methodological approach was developed.

Historical koala records were provided by Council, these being those previously collated by Ward *et al.* (2013) from Western Sydney University (WSU), and the NSW Office of Environment and Heritage (OEH) Wildlife Atlas databases for the time period 1900 - 2012. Once collated, records were sorted chronologically by koala generation (determined to approximate six years (Phillips 2000)) dating backwards from 2012. The resulting data set was then further partitioned in order to enable comparisons pre 1995 and post 1994 (the timeframes 1995 - 2000, 2001 - 2006 and 2007- 2012 approximating the time intervals for the three most recent koala generations respectively). This approach enables results to be considered in the context of International Union for Conservation of Nature (IUCN), Commonwealth and State-based conservation criteria which place weight on the concept of population change over a time period of three consecutive (taxon- specific) generations (WCUSSC 1994).

Extent of occurrence

The *EoO* was determined as the total area enclosed by a Minimum Convex Polygon (MCP) derived by connecting the outer-most koala records over time for each koala generation for which sufficient data was available. Three *EoOs* for the Campbelltown LGA were determined as follows:

- a) that encapsulating all known koala records over time (the historical *EoO*)
- b) that for the time period 1900 – 1994
- c) that for the three most recent koala generations 1995 - 2012.

Area of occupancy

Although the more useful of the two range parameters, changes in the *AoO* over time are harder to quantify because there is an increase in available records over the last

two decades. The following procedures were applied in order to minimise the influence of chronological bias.

A 2km x 2km (400ha) fixed-grid overlay constrained by the boundaries of the historical EoO was used to create a series of cells for sampling purposes. The 400ha grid cell size was considered the minimum necessary to accommodate spatial uncertainty in the data (use of different mapping datums, observer error, etc), while the actual number of records themselves became academic, the primary scoring mechanism being whether a koala record was either present or absent. Fifty percent of the grid cells were then randomly selected through each of 10 iterations for each time period examined, the number of cells within which koala records were present enumerated and converted to a proportion of the total area occupied. Differences between time periods were analysed using two sample *t*-tests. In order to deal with the disproportionately greater number of koala records in recent years, sampling iterations for the three most recent koala generations was based on a single suite of randomly selected records, the number being equal to that for all preceding generations.

Generational persistence

The records were also examined for re-occurrence over timeframes that were beyond the life spans of individual koalas. The term Generational Persistence Assessment (GPA) is used to describe this process; examining the data for repeated records of koalas within a localised area over overlapping generational time spans, and so identifying the presence of long-standing (20 years+) historical resident and/or source populations (ie core koala habitat as defined by SEPP 44). For the purpose of this report, "localised" was considered to include that area defined by the 2km grid cell around each koala record, with generational persistence inferred by the presence of records for each of the three most recent koala generations.

The proximity of some records to grid cell edges invariably warrants the need to include an appropriate buffer to areas of generational persistence, the size of which necessitates considerations of the koala home range size as follows:

- Buffer width (m) = square root of average adult female home range size (m²), modified to accommodate spatial overlap.

Estimating population size

Population size was estimated by intersecting the 1995 – 2012 EoO with underlying vegetation mapping in order to estimate the amount of preferred koala habitat. This result was then modified by the AoO (including bounds) to indicate the likely number of hectares currently occupied by resident koala populations. This value was then divided by a koala density estimate determined by reducing the average home size of an adult female koala by 50% to accommodate some spatial overlap (35%) with other females and breeding males (15%) respectively. An indicative population estimate can then be derived as follows:

$$N = [PKH \times AoO (\pm 95\% CL)] \times D/2$$

where:

N = population estimate

PKH = amount of available habitat (in ha) contained within the 1995 – 2012 EoO

AoO = record-derived occupancy estimate expressed as a proportion

D = mid-point of range of female koala home range size determined by Ward (2002).

Results

Koala records

A total of 1,600 koala records were contained in the dataset of Ward *et al.* (2014), of which 1,588 had a date reliably attributed to them; hereafter the results of analyses utilising only dated records are presented. The chronological distribution of these koala records is presented in **Figure 1**.

The earliest records of koalas in the Campbelltown LGA (ca 1900) occur at Campbelltown and in the area now known as Minto Heights. Through the 1960s to the 1980s, sporadic records appear in the Wedderburn area, Minto Heights – Kentlyn and between St Andrews and Ingleburn. The frequency of reporting of koala records gathers momentum from the late 1980s through to 2006, this time period coinciding with the first statewide survey (Gall 1978), thereafter the National Koala Survey (Phillips 1990; Reed and Lunney 1990) and most recently Dan Lunney's 2006 community-based koala survey for NSW (Lunney *et al.* 2009).

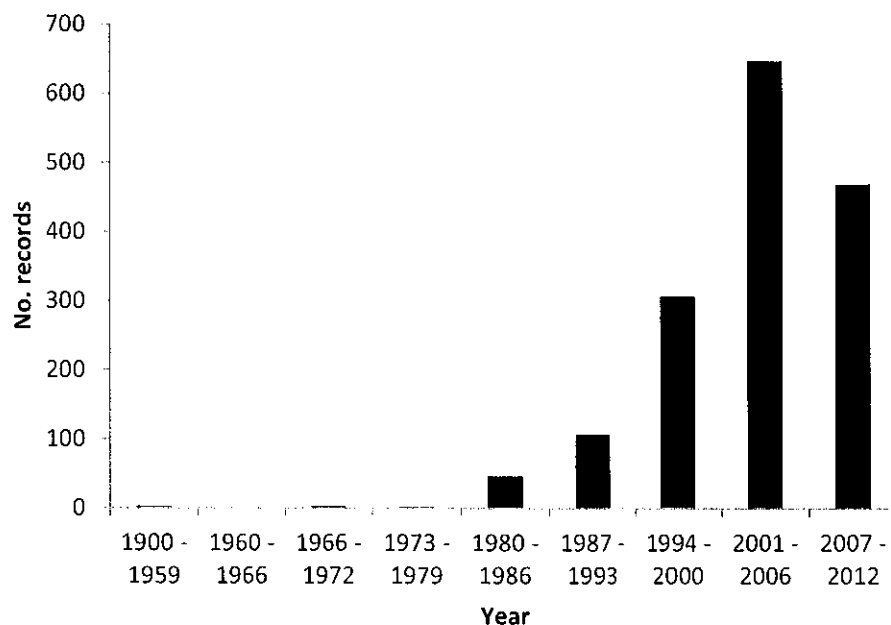


Figure 1: Chronological distribution of 1,588 koala records for the Campbelltown LGA over the period 1900 - 2012.

Extent of Occurrence

Available koala records reveal an historical *EoO* of approximately 15,225ha, this being the area captured by a MCP with vertices that intersect the outer-most koala records in the dataset for the time period 1900 - 2012 (Figure 2).

The records further imply that an *EoO* of this size has not always been the case, the time period 1900 -1994 being substantively smaller at approximately 63% (9,509ha) of this area (**Figure 3**). As might be deduced from this difference, the trend over the last three consecutive koala generations (1995 - 2012) appears to have been one of overall range expansion / recovery, the associated *EoO* estimated at 14,863ha (**Figure 4**).

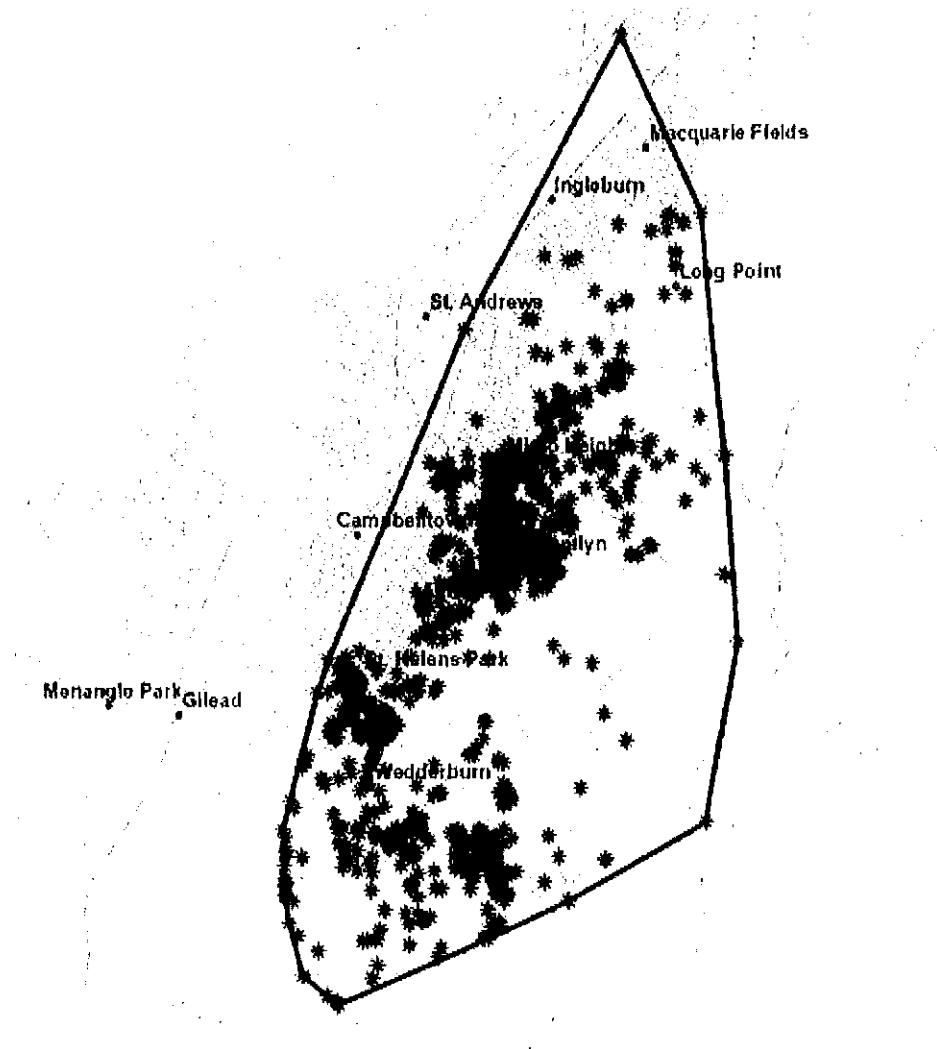


Figure 2: Historical EoO of koalas (red asterisks) in the Campbelltown LGA over the period 1900 - 2012.

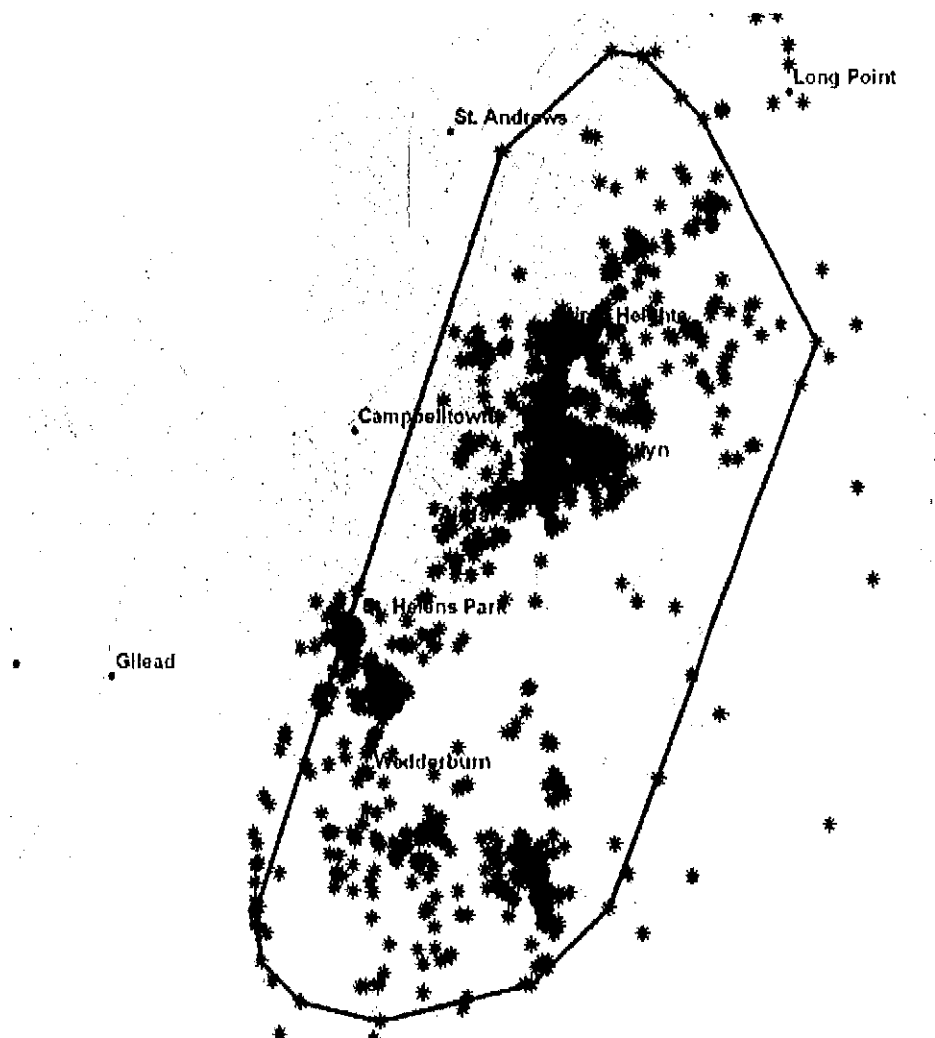


Figure 3: Historical EoO of koalas (red asterisks) in the Campbelltown LGA over the period 1900 - 1994 (Note: red asterisks outside of blue MCP indicate post 1994 records).

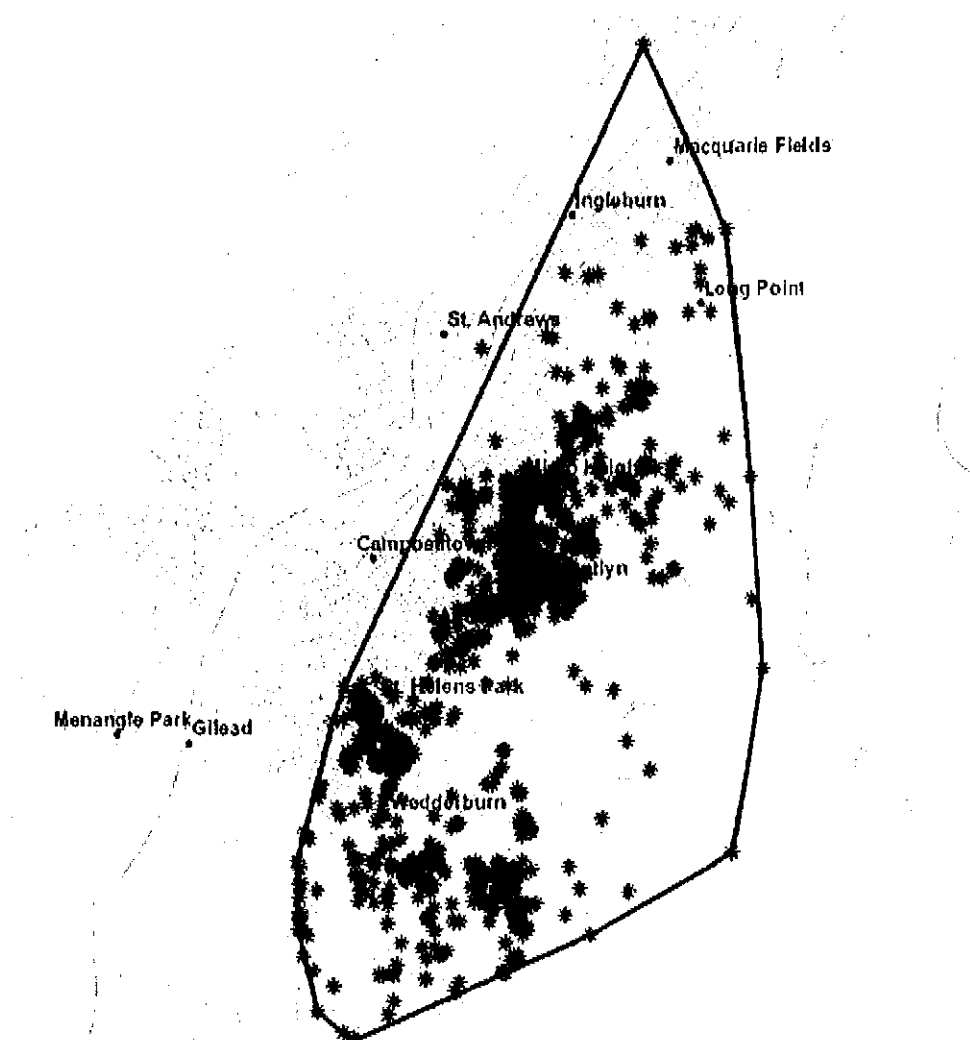


Figure 4: Historical EoO of koalas (red asterisks) in the Campbelltown LGA over the period 1995 – 2012 (Note single pre 1995 record in St Andrews).

Area of Occupancy

The occupancy rate estimated from the 163 records that comprise the entire subset of data for the time period 1900 - 1994 was compared to that of a single suite of 163 randomly selected records for the time period 1995 - 2012. Randomly sampling 50% of the grid cells within the historical EoO over 10 iterations returned the following results:

1900 – 1994

Mean AoO estimated at $41.23 \pm 7.39\%$ (SD) of available habitat.

1995 – 2012

Mean AoO estimated at $46.42 \pm 5.58\%$ (SD) of available habitat.

Analysis of the data associated with these two outcomes confirms that there has been a statistically significant increase in the extent of the study area being occupied by koalas over the last three koala generations [1900 - 1994 vs 1995 - 2012: $t = -2.16984$, 28_{df} , $P < 0.05$ (two-tailed test)].

Generational persistence

During the three koala generations from 1977 to 1994, the records indicate two areas of generational persistence, coinciding with the Wedderburn Plateau and Kentlyn – Minto Heights localities. This result (**Figure 5**) implies the presence of small and localised population cells over that time period.

The subsequent three generation subset (years 1995 - 2012) indicates a substantive increase in the area of generational persistence, with records from the aforementioned locations persisting through to 2012 (**Figure 6**). The most evident change when contrasted to that in Figure 6 is the increased number of grid cells along the interface of the Campbelltown urban environment where it abuts adjoining bushland areas.

Ward (2002) determined the size of female koala home range areas to vary between 11 – 61ha. Making allowance for estimated home range overlap of 50%, the midpoint of these estimates is $0.5 \times 36\text{ha}$ or $180,000\text{m}^2$, the square root of which is 424m.

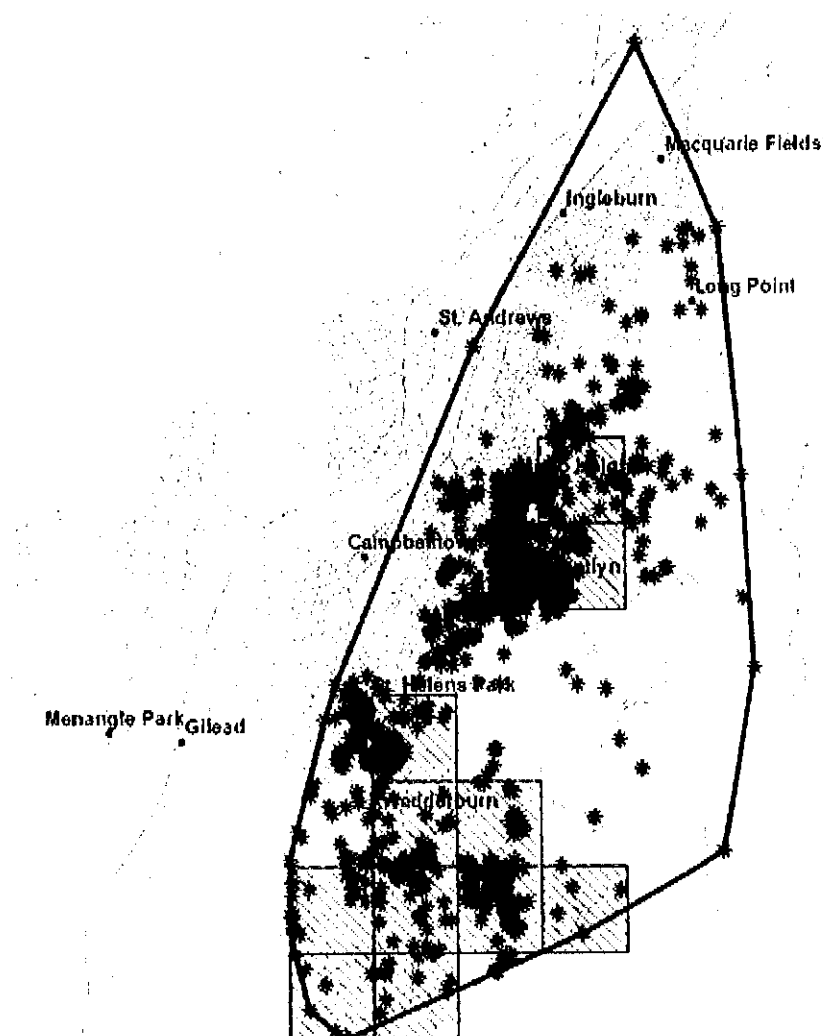


Figure 5: Areas of generational persistence (diagonally crossed grid cells): 1977 – 1994.

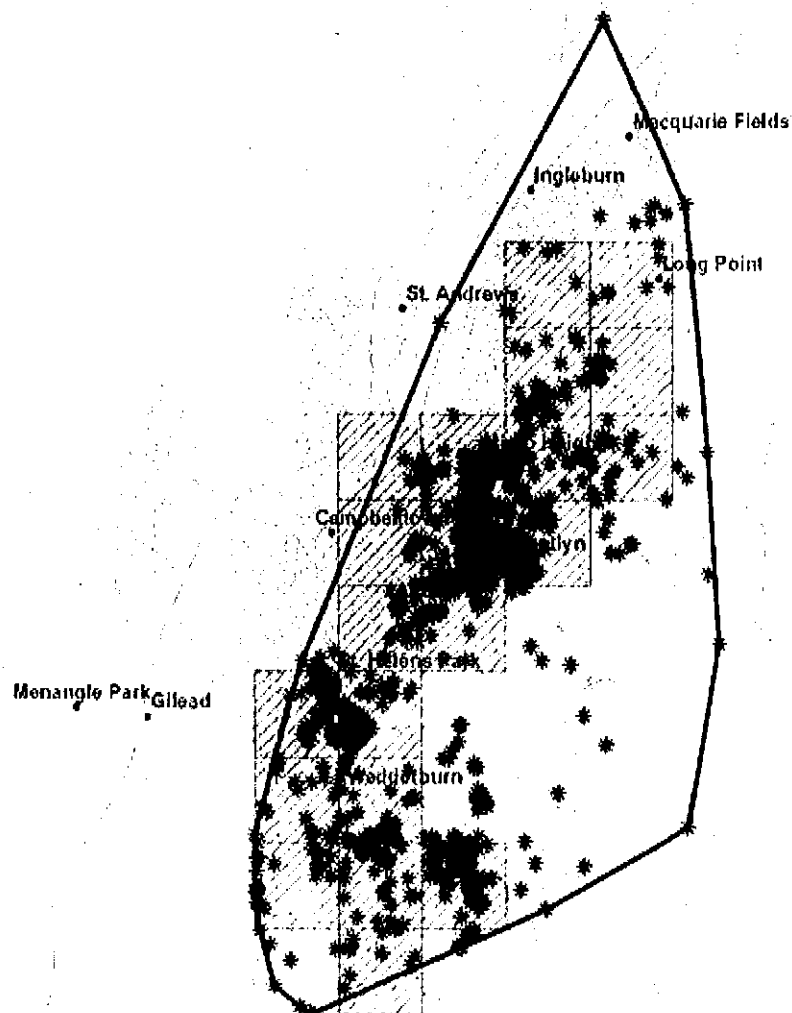


Figure 6: Areas of generational persistence (diagonally crossed grid cells): 1995 – 2012.

Estimating population size

The 1995 – 2012 EoO contains approximately 6,857ha of preferred koala habitat, $46.42\% \pm 3.09\%$ (95% CI) of which has been estimated as currently occupied by koalas. Using the modified home range size of 18ha, allows a population estimate for the Campbelltown LGA of 177 ± 12 (95% CI) koalas to be derived.

Key Outcomes

- The historical records indicate that koalas have a long history of occupation in the Campbelltown LGA. The population appears to have been on a recovery trajectory over at least the last three koala generations.
- The recovery trend is well supported by analysis of changes in the key range parameters EoO and AoO. There have been progressive increases in the EoO leading up to the mid 1990s, with that for the three last koala generations exceeding that of all generations before it. The current EoO for koalas in the Campbelltown LGA approximates an area of 14,000ha.
- Commensurate with the increase in the EoO, there has also been a statistically significant increase in the AoO. Optimal occupancy rates for free ranging koala populations are estimated to be approximately 50% of available habitat, a measure which already appears to be the case within the Campbelltown LGA.
- GPA implies the presence of two source populations in the Wedderburn and Minto Heights – Kentlyn areas up until the mid 1990s. Thereafter, the 1995 - 2012 GPA data alludes to both an expansion of these areas into adjoining bushland areas abutting localities of St Helens Park, Airds, Ruse and Long Point.
- A minimum buffer width of 425m is deemed necessary to effectively accommodate likely koala ranging patterns on peripheral GPA cells.
- Recovery and range expansion described herein accommodates neither complacency nor apathy in its outcomes. The estimated numbers of koalas comprising the Campbelltown koala population remain low such that a recovery, long-term sustainable management-themed CKPoM will be necessary.

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Appendix D

Undertaking koala habitat assessments using Regularised Grid-based SAT (RG-bSAT) Sampling

PREAMBLE

The ecology of koalas in the Campbelltown LGA is, among other things, influenced by the availability of, and access to preferentially utilised food tree species. The purpose of this appendix is to assist landholders and proponents of development to identify important habitat areas that are currently being utilised as part of normal koala ranging, socialising and feeding patterns. The overall approach is as follows:

STEP 1

Determine appropriate sampling intensities for the site to be assessed using the following table:

Table C.1 Sampling Intensity per Unit Area

| Area of land being subject of DA or rezoning application | <u>Initial</u> SAT sampling intensity | <u>High</u> SAT sampling intensity |
|--|---------------------------------------|------------------------------------|
| < 15ha | 250m intervals | 125m intervals |
| 15 - 50ha | 500m intervals | 250m intervals |
| > 50ha | 700m intervals | 350m intervals |

STEP 2

Overlay the proposed development site with a square grid the dimensions of which correspond to the “high SAT sampling intensity” specifications in the table above, then use the resulting grid-cell intersections to identify those points that fall on areas of land where 30 trees of any species that have a DBH ≥ 100 mm could theoretically be sampled within a radius approximately equal to that of 50% of the sampling intensity being utilised (eg 150m = 75m radius, 250m = 125m etc). Note that this approach requires areas of cleared land with scattered trees to be included for assessment purposes.

When overlaying the grid, ensure that adjoining areas of land are included to the extent that an overlap consistent with the relevant “initial SAT sampling intensity” interval has been achieved (ie provision is made to sample adjoining areas of habitat and so place the site into a broader koala management context).

STEP 3

a) Preliminary sampling of the site should be undertaken at intervals commensurate with the “initial SAT sampling intensity” specified in Step 1.

b) Sampling is to be undertaken at each sampling point using the Spot Assessment Technique (SAT) of Phillips and Callaghan (2011).

c) In the event that koala activity is recorded at any of the initial sampling sites, then the surrounding “high SAT sampling intensity” sites within the boundary of the land under assessment (or immediately adjoining areas) must also to be sampled where there is an activity level transition from high or medium use to that of low use.

STEP 4

In the absence of a suitable spatial modelling technique such as splining, all SAT sites where significant koala activity has been recorded must become the central point of a grid cell, the size of which must be commensurate with sampling intensity as follows.

- For 125m sampling intersections, the grid cell size will be 125m x 125m (1.56 ha)
- For 250m sampling intersections, the grid cell size will be 250m x 250m (6.25 ha)
- For 350m sampling intersections, the grid cell size will be 350m x 350m (12.25 ha)

All areas within a grid cell identified in Step 4 and that have an activity level of 10% or greater must be regarded as supporting a resident koala population for the purposes of this plan.

The overall process is illustrated in Figures 1 – 3, below.



Figure 1: Nominal study area – in this example, 300ha - comprising some cleared areas and a heterogeneous mix of vegetation communities.

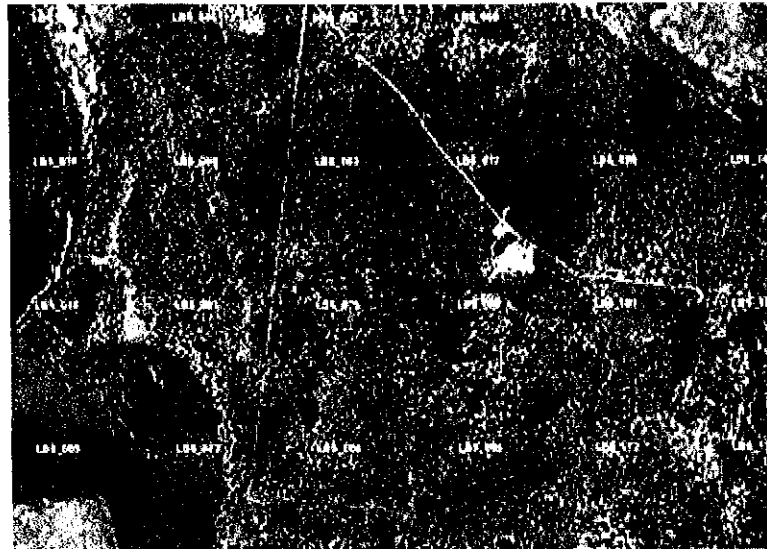


Figure 2: Study area overlain with a point-based, regularized grid at 350m intervals for sampling purposes, each grid cell intersection point that falls within an area of forest subsequently sampled for koala activity using the Spot Assessment Technique of Phillips and Callaghan (2011).



Figure 3: Once field survey has been completed, areas supporting significant koala activity (ie in this example, habitat areas surrounding LB5_038, 050,061,075 and 112) can be interpolated using thin-plate splining techniques and associated contouring to provide a more refined outcome. A coarser outcome producing the same result would be to make each of the aforementioned sites the centre of 12.25ha grid cells. In this image, the extent of significant koala activity is indicated by the outer orange line.

Appendix E

11.4

Design requirements for developments in core koala habitat

11.4 Design requirements for developments in core koala habitat

Objectives:

- To assist in the effective implementation of the Campbelltown Comprehensive Koala Plan of Management (CKPoM) for development within core koala habitat
- To facilitate development sympathetic to the local koala population, in order to minimize the impacts of development on koala habitat.

11.4.1 Management of core koala habitat

- a) Development applications for properties located in core koala habitat, and relating to a boundary adjustment, alterations, or additions to a lawfully erected building; and where no removal of native vegetation is proposed, are required to:
- i) be designed and located in such a way as to avoid any adverse indirect impacts to preferred koala food trees (PKFTs).
 - ii) incorporate fences in a way that allows for the movement of koalas through the property, either through:
 - the installation of koala-friendly fencing (that allows the movement of koalas)
 - incorporating structures that enables koalas to climb over fencing
 - retaining mature vegetation on either side of fences.
 - iii) confine domestic dogs to a dog run, or koala-proof fenced enclosure during peak koala activity levels, being between 6pm and 6am.
 - iv) design swimming pools with a graduated shallow edge, or fitted with a permanent flotation device to prevent koalas drowning.



Plate 11.4.1 - The protection of koala habitat is essential to provide for the long-term maintenance of a viable, free-ranging koala population in the Campbelltown LGA (Koala "Mr Nymboida" in Ruse. Photo courtesy of Carla-Maree Simmons).

Note:

Many koala populations in NSW now survive in fragmented and isolated habitat, while some areas in which koalas remain more common are increasingly subject to ongoing pressures, in particular clearing for agriculture, logging and urban expansion.

Campbelltown has one of the last, disease-free koala populations in the Sydney region. Therefore it is essential to put in place design measures that support the harmonious co-existence of the community with koalas.

