

Sub-Plan B: Koalas

Cumberland Plain
Conservation Plan

2022

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Acknowledgement of Country

The development of the Cumberland Plain Conservation Plan acknowledges more than 60,000 years of continuous Aboriginal connection to the land that makes up NSW.

This plan recognises that, as part of the world's oldest living culture, traditional Aboriginal and Torres Strait Islander owners and custodians of the Australian continent and adjacent islands share a unique bond to Country – a bond forged through thousands of years of travelling across lands and waterways for ceremony, religion, trading and seasonal migration.

Aboriginal peoples maintain a strong belief that if we care for Country, it will care for us. The area covered by the Cumberland Plain Conservation Plan is cared for by 3 Aboriginal groups: the Darug, Dharawal and Gundungurra. Others, such as the Eora, Darkinjung, Wiradjuri and Yuin maintain trade or other obligatory care relationships with the area. The Deerubbin, Gandangara and Tharawal Local Aboriginal Land Councils also have land holdings and responsibilities towards Aboriginal peoples living in the area.

This significant connection to Country has played an important part in shaping this plan.

For Traditional Owners, Country takes in everything within the physical, cultural and spiritual landscape – landforms, waters, air, trees, rocks, plants, animals, foods, medicines, minerals, stories and special places. It includes cultural practice, kinships, knowledge, songs, stories and art, as well as spiritual beings, and people: past, present and future.

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Executive summary

The Cumberland Plain Conservation Plan (CPCP) has been developed to meet requirements for strategic biodiversity certification under the *Biodiversity Conservation Act 2016* (NSW) and strategic assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

Sub-Plan B: Koalas is one of 2 sub-plans that will support the implementation of the CPCP. The full conservation program is provided in Sub-Plan A: Conservation program and implementation, which includes 26 commitments and 131 actions to achieve the plan's vision. Sub-Plan B outlines the conservation program to protect the group of koalas known in this plan as the 'Southern Sydney koala population'.

Koalas are highly valued by the community and are one of Australia's most iconic animals. They are listed as a threatened species under the *Biodiversity Conservation Act 2016* and the *Environment Protection and Biodiversity Conservation Act 1999*. The Southern Sydney koala population is estimated to be between 600 and 1,000 koalas, making it a significant regional population and the largest in the Sydney area. The Southern Sydney koala population includes koalas in Campbelltown Local Government Area (LGA) and the eastern section of Wollondilly LGA to the Southern Highlands.

In August 2020, the Office of the NSW Chief Scientist & Engineer released their '[Advice on the protection of the Campbelltown koala population](#)' (OSCE 2020) (PDF 4.8 MB). This was followed in 2021 by 'Advice regarding the protection of koala populations associated with the Cumberland Plain Conservation Plan' (OSCE 2021). We have considered both these documents in preparing the final CPCP.

Major threats to koalas include habitat loss and fragmentation (from urban development and agriculture), vehicle strikes, attack from domestic dogs, drought, bushfires, disease (such as chlamydia), and impacts to habitat and koala welfare associated with climate change.

The conservation program includes specific commitments and actions to protect the Southern Sydney koala population by addressing the impacts and potential risks to koalas from future development in the Wilton and Greater Macarthur growth areas. These commitments and actions were developed based on advice from the Office of the NSW Chief Scientist & Engineer (2020 and 2021) and the [NSW Koala Strategy 2018-21 \(PDF 2.8 MB\)](#).

A key outcome of the conservation program for koalas will be to establish the Georges River Koala Reserve east of Appin Road from Appin through to Long Point. This reserve will protect up to 1,830 hectares of existing koala habitat and enhance the connectivity of fragmented patches of koala habitat through restoration.

The NSW Government has committed \$114 million to deliver priority conservation actions for the first 5 years of the plan. This includes \$84 million for actions that will restore koala habitat; purchase land to establish future reserves; establish biodiversity stewardship sites; construct two koala crossings on Appin Road and install koala-exclusion fencing to protect koalas from vehicle strike and dog attacks.

As part of this upfront funding, we invested in the [NSW Koala Strategy 2018-21 \(PDF 2.8 MB\)](#) and will continue this investment through the [NSW Koala Strategy 2022 \(PDF 5 MB\)](#) and future strategies as they are developed. This partnership will deliver research, monitoring and conservation actions that will support the ongoing health and welfare of koalas in south-western Sydney.

Conserving Koalas in South Western Sydney to 2056

8 commitments

Highlights of the koala conservation program



Establish the Georges River Koala Reserve to protect up to

1,830 hectares of important koala habitat



3,360 hectares of koala habitat will be protected from development within the nominated areas



Fund research and koala health and welfare programs



Install **120** km of koala exclusion fencing to separate important koala habitat from new residential areas and along Appin Road

The Southern Sydney Koala Population

- Largest koala population in Sydney
- Around **600-1000** koalas
- The koalas in the Campbelltown LGA are the healthiest population in NSW

Introduction



Koala signage on Appin Road

Introduction

The Cumberland Plain Conservation Plan

Strategic conservation planning is a landscape-scale approach to assessing and protecting biodiversity upfront when planning for large-scale development. This approach has been used to develop the Cumberland Plain Conservation Plan (CPCP).

The CPCP covers much of the Cumberland subregion, which is home to a rich variety of plants, animals and their habitats, including the largest koala population in Sydney.

The CPCP has been developed to meet requirements for strategic biodiversity certification under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and strategic assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) in 4 new urban development areas (referred to in the plan as 'nominated areas'):

- [Greater Macarthur Growth Area](#)
- Greater Penrith to Eastern Creek Investigation Area
- [Western Sydney Aerotropolis](#)
- [Wilton Growth Area](#).

The government is planning major transport corridors to respond to the needs of the western Sydney area over the next 40 years. The CPCP will facilitate the development of some of the major transport corridors identified in [Future Transport Strategy 2056 \(PDF 54.9 MB\)](#), including:

- potential future extension of Sydney Metro Greater West south from Western Sydney Aerotropolis to Macarthur (except for those areas in the South West Growth Area)
- Western Sydney Freight Line
- Outer Sydney Orbital Stage 1
- M7 Motorway/Ropes Crossing Link Road.

The CPCP will support conservation of biodiversity in Western Sydney by creating new national parks and reserves (or adding to existing reserves), investing in biodiversity stewardship sites, and restoring native vegetation communities in the Cumberland subregion.

These actions will offset the impacts to biodiversity from developing Western Sydney's nominated areas and major transport corridors over the next 4 decades. They will improve ecological resilience and function in the Cumberland subregion and safeguard Western Sydney's natural environment over the long term and in a changing climate.

The CPCP provides more information on the scope of development in Western Sydney and its linkages with other NSW Government plans and strategies. These include the [Greater Sydney Region Plan—A metropolis of three cities \(PDF 16.0 MB\)](#) (GSC 2018a), [Western City District Plan \(PDF 10.0 MB\)](#) (GSC 2018b) and [Future Transport Strategy 2056 \(PDF 54.9 MB\)](#) (TfNSW 2018).

Purpose of Sub-Plan B: Koalas

Sub-Plan B is one of 2 sub-plans that support the implementation of the Cumberland Plain Conservation Plan. The other one is Sub-Plan A: Conservation program and implementation (see Figure 1).

Sub-Plan B outlines the conservation program for koalas including 8 commitments and 25 actions to protect and manage koalas and their habitat in south-western Sydney. These actions include establishing the Georges River Koala Reserve, ensuring connectivity of koala habitat, installing koala-exclusion fencing, restoring koala habitat and supporting koala health and welfare. Some of these actions have started ahead of the plan's approval as priority conservation actions (Figure 2). A total of \$84 million has been invested to begin these priority actions over the coming 5 years.

Structure of Sub-Plan B

Sub-Plan B has 4 parts:

1. The **introduction** provides an overview of the sub-plan and the conservation program for koalas.
2. The **Southern Sydney koala population** provides information on the distribution, dynamics and potential threats from proposed land use change to the population that informed the development of the conservation program for koalas.
3. The **conservation program for koalas** details commitments and actions to address the impacts and potential risks to the Southern Sydney koala population from planned development in the Wilton and Greater Macarthur growth areas.
4. The **implementation** section outlines roles and responsibilities relating to the conservation program, including governance arrangements for implementing the plan, and monitoring, evaluation, reporting and delivery.

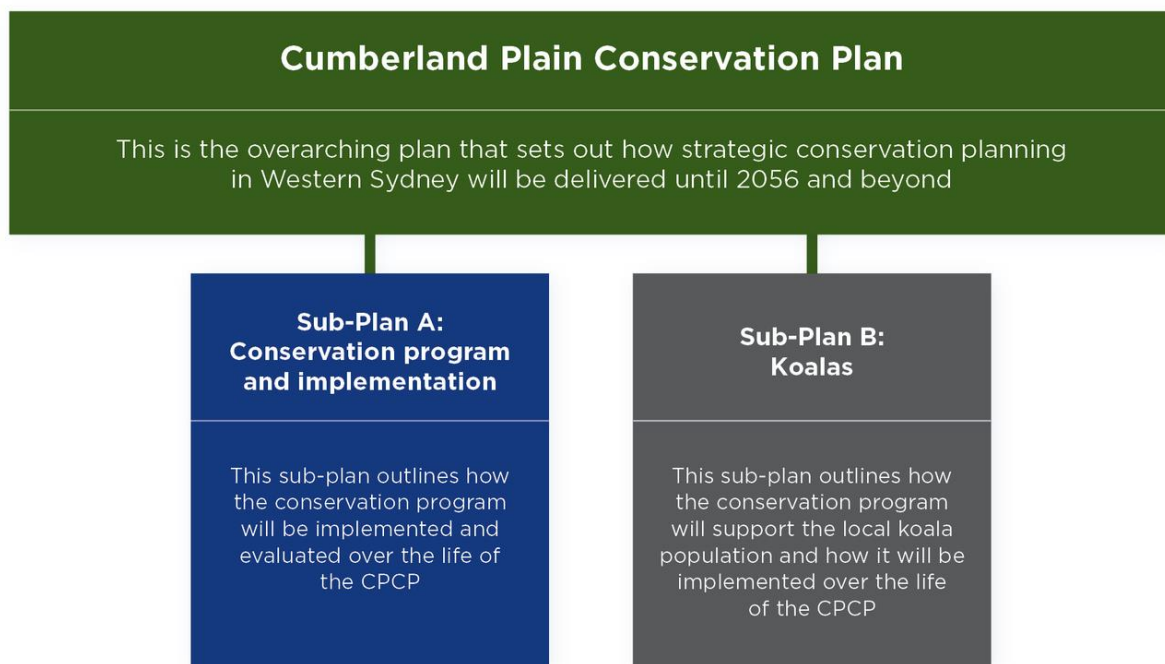


Figure 1. Hierarchy of the Cumberland Plain Conservation Plan and sub-plans

Priority actions for koalas (Year 1 to 5)



Figure 2. Priority conservation actions for koalas

Expert advice on protecting koalas

In August 2020 the Office of the NSW Chief Scientist & Engineer released an independent, expert report, [Advice on the protection of the Campbelltown koala population \(PDF 4.8 MB\)](#) (OSCE 2020). This report advised on the adequacy of the protection of koalas in the Greater Macarthur Growth Area through the CPCP's conservation program and its consistency with the NSW Koala Strategy 2018-21. The report included several recommendations that were incorporated into the draft CPCP before it was placed on public exhibition. See 'Appendix B: Recommendations from Office of the NSW Chief Scientist & Engineer (2020)' for further details.

Following a request from the NSW Government regarding the application of some of these recommendations, the Office of the NSW Chief Scientist & Engineer provided additional advice titled 'Advice regarding the protection of koala populations associated with the Cumberland Plain Conservation Plan' (OSCE 2021). This report provides 31 principles to be applied in the region for the protection of the Southern Sydney koala population, and an assessment of the protection measures proposed in the CPCP and how they relate to the principles.

We have incorporated these principles into the conservation program for koalas and many will be carried out as priority actions during the first 5 years of the CPCP. Further information on these principles and how they have been addressed in the CPCP is provided in our [Response to advice from the Office of the NSW Chief Scientist & Engineer 2021 \(PDF 2.3MB\)](#) published in November 2021.

Overview of the conservation program for koalas

The outcome for koalas

The commitments and actions that make up the conservation program for koalas aim to ensure persistence of the Southern Sydney koala population as nearby areas in Wilton and Greater Macarthur are developed.

The plan's outcome for koalas is that **'the condition of protected koala habitat is improved, connectivity between koala sub-populations is maintained, threats to koalas are managed and the koala population in South Western Sydney persists and thrives.'**

The conservation program will achieve this by implementing 8 commitments and 25 actions (see Figure 3). These koala-specific commitments and actions are listed in 'Appendix A: Commitments and actions relevant to koalas' and described in further detail in the section 'The conservation program for koalas' (page 16).

We will implement the commitments for koalas as a series of actions over the life of the CPCP. The effectiveness of these actions will be assessed through the evaluation program, which will include monitoring, evaluation and adaptive management to ensure the desired outcome for koalas is achieved. The evaluation program for koalas is described in the section 'Monitoring, evaluation and adaptive management' (page 41).

Alignment with existing programs

There are existing NSW government, local council and community programs that support koala conservation in south-western Sydney and across NSW.

The conservation program for koalas aligns with the recently released NSW Koala Strategy 2022 which aims to stabilise and then increase koala numbers over the longer-term, ensuring genetically diverse and viable koala populations across NSW. We have already invested \$230,000 in the previous koala strategy (2018 to 2021) for actions that will improve koala health and safety, support wildlife carers, and build knowledge to improve koala conservation (Commitment 23). We will continue to work closely with the Environment and Heritage Group to align our koala conservation actions with the current koala strategy and any future strategies.

NSW councils may prepare a koala plan of management under Part 3 of the State Environmental Planning Policy (Koala Habitat Protection) 2020. Once approved, a plan of management may trigger additional assessments for proposals on sites, depending on the location and the vegetation and habitat present. Campbelltown Council has an approved koala plan of management (developed in 2018) that has been considered during the development of the CPCP.

Other council and community programs will also support the delivery of the commitments and actions. For example, councils may assist with community education and engagement and local wildlife groups will help to deliver initiatives to improve care and rehabilitation outcomes for koalas.



Figure 3. Summary of the conservation program for koalas

Community and stakeholder engagement

Since 2018, the department has consulted with the community and stakeholders on the CPCP, including the protection of koalas. This has included consulting with local councils, landholders, environmental groups and the community.

Six months of engagement in 2019 was designed to inform stakeholders and seek preliminary feedback to help develop the draft CPCP. During this period, we sought community feedback on local conservation issues, including the protection of the Southern Sydney koala population.

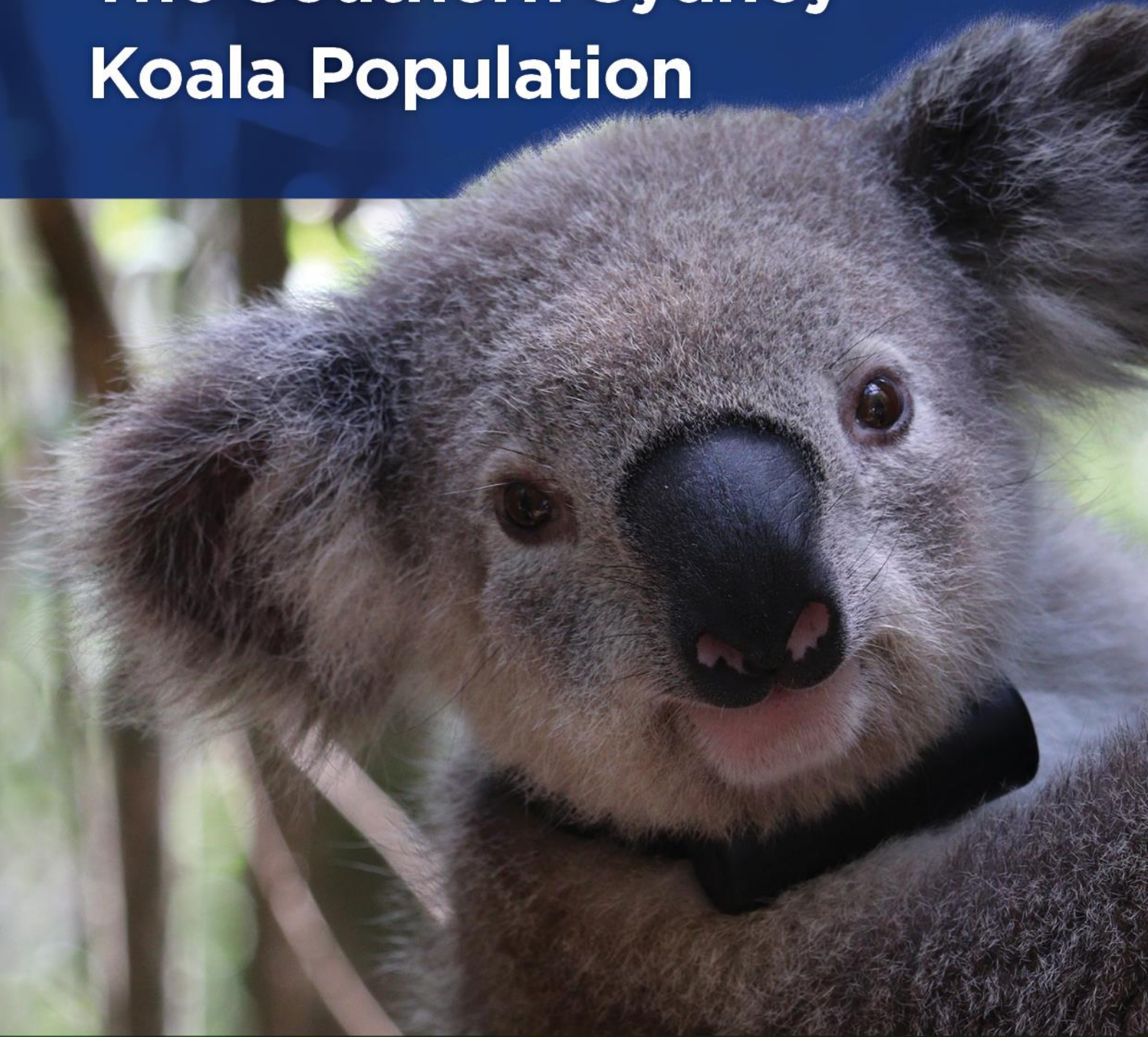
Feedback during the early engagement period showed a strong desire in the community to protect biodiversity, waterways and wetlands, with publicly accessible reserves being the preferred method to protect biodiversity in perpetuity. The Campbelltown and Wollondilly communities emphasised the importance of protecting the region's koala population by establishing a koala reserve, restoring koala habitat, retaining koala corridors and reducing roadkill.

Public exhibition of the draft CPCP ran for 9 weeks from 26 August to 2 November 2020. The exhibition aimed to raise awareness, seek feedback on the plan documents, and support the preparation of the final CPCP. A report on the public exhibition, including what we heard and responses to the feedback received, is available on the [department's website](#).

The key messages from the community and stakeholders regarding koalas were that greater protection is needed for east–west koala corridors, that koala-exclusion fencing has both benefits and impacts, and that the establishment of the Georges River Koala Reserve is strongly supported.

The NSW Government is committed to ongoing community engagement to finalise and implement the Cumberland Plain Conservation Plan. We are preparing a communication and engagement strategy that will be reviewed and updated every 5 years (Commitment 25, Action 6).

The Southern Sydney Koala Population



A Southern Sydney koala wearing a GPS tracking collar.

The Southern Sydney koala population

This section summarises the best available information for the Southern Sydney koala population, which has informed the development of the conservation program for koalas. This includes the threats and issues influencing the persistence of the population.

Koalas in NSW

Koalas are one of Australia's most iconic animals. However, their number and distribution have significantly declined in recent years. In 2016, the estimated koala population in NSW was around 36,000, which represents a 20% decline from just over 45,000 in 1996 (OSCE 2016). This decline has been more pronounced in locations where urban development has cleared more habitat and increased threats such as vehicle strikes and dog attacks.

The widespread bushfires in the summer of 2019–20 across south-eastern Australia had a significant impact on native plants and animals including koalas. In NSW the bushfires affected more than 1.9 million hectares (around 22%) of modelled high or very high suitability koala habitat in eastern NSW (DPIE 2021). This significant loss of habitat across NSW has made koala habitat in the CPCP Area even more important for the NSW koala population, as no habitat of the Southern Sydney koala population was burnt during this time.

The NSW Government has worked with the NSW Koala Strategy Expert Panel to develop actions for koala recovery after the fires. These actions are outlined in the [NSW Wildlife and Conservation Bushfire Recovery: medium-term response plan \(PDF 3.58 MB\)](#). The recovery plan details the government's response to the impacts of the 2019–20 bushfires on koalas, including actions to address the short- and medium-term issues generated by the fires. Actions included in the bushfire recovery plan will inform the adaptive management strategy for the CPCP and help deliver a coordinated and targeted response to support koala recovery efforts.

Koalas in the Cumberland subregion

Koalas once inhabited forests and woodlands on the fertile shale soils across the Cumberland subregion. Aboriginal history of the subregion speaks about koalas in Dreamtime stories and as a source of food (Lunney *et al.* 2015). Following the arrival of European settlers, who cleared land for agriculture and hunted koalas for their fur, the koala population declined dramatically in the Cumberland subregion.

The Cumberland Plain Assessment Report has mapped koala habitat across the CPCP Area including 'important koala habitat', which is required by the Biodiversity Assessment Method. This mapping is built on previous work of the department in mapping habitat around the Greater Macarthur Growth Area and Wilton Growth Area (OEH 2018).

The koala population in the Hawkesbury region were considered as part of the assessment of impacts on the broader Blue Mountains koala population. The Cumberland Plain Assessment Report concluded that there was no direct impact to koala habitat in Greater Penrith to Eastern Creek Investigation Area and the Western Sydney Aerotropolis.

Sub-Plan B therefore focusses on koalas in and around the Greater Macarthur Growth Area and the Wilton Growth Area. Collectively they are referred to in the CPCP as the Southern Sydney koala population. In Sub-Plan B we refer to 'koala habitat protected under the plan' to clearly differentiate from the 'important koala habitat' that has been mapped in the Cumberland Plain Assessment Report.

Southern Sydney koala population – The CPCP uses this term collectively to refer to the koala populations living in and around the Greater Macarthur Growth Area and the Wilton Growth Area. These populations are often referred to as the Campbelltown and Wollondilly populations.

Important koala habitat – Important koala habitat is the term used in the Cumberland Plain Assessment Report to describe primary, secondary and tertiary corridors. It is the area that is critical to the long-term viability of koalas (primary corridors) as well as the areas (if enhanced) that would support the population (secondary and tertiary corridors).

Koala habitat protected under the CPCP – Sub-Plan B uses this term to refer to koala habitat that has been included in the Cumberland Plains Conservation Plan's strategic conservation area or avoided land. It includes some areas of cleared land that may be restored to enhance koala corridors and habitat.

The Southern Sydney koala population

The Southern Sydney koala population is part of a regional population that stretches from Campbelltown through Wollondilly to Wingecarribee. The population occurs:

- east of Campbelltown and Wollondilly LGAs to the NSW east coast
- south from Holsworthy, where it connects with koalas in the Southern Highlands region
- an unknown distance west towards the Blue Mountains.

Within the area of the CPCP the population is found within and around the Greater Macarthur and Wilton growth areas with local koala populations in Campbelltown and Wollondilly LGAs.

The former Office of Environment and Heritage mapped the extent of koala habitat in the Campbelltown and Wollondilly LGAs in 2018 (OEH 2018). It also estimated densities of koalas in core habitat areas based on data collected from the Wollondilly koala population.

The habitat within this area has a low carrying capacity, so each koala may require more habitat to meet their life cycle requirements than in other areas across Australia (Close *et al.* 2017). It is estimated that between 600 and 1,000 koalas make up the population. The population is the only one out of 13 regional populations in NSW that is showing signs of recovery (Close, Ward & Phalen 2017). Koalas in the Campbelltown LGA are also the largest chlamydia-free population in NSW.

Koala movement corridors and habitat in south-western Sydney

Connectivity between important patches of koala habitat is critical to the continued presence of koalas in south-western Sydney. Koalas need large, connected areas of important habitat for feeding and breeding. Koala corridors facilitate dispersal of the population, and therefore gene flow, which protects against localised extinctions and inbreeding depression.

The Cumberland Plain Assessment Report maps existing primary and secondary koala corridors that were critical to the long-term viability of the koalas. Primary corridors are large, connected areas of good quality habitat with few gaps between the bushlands. Secondary corridors are smaller, or may not be continuous habitat, or may not connect at both ends to another koala habitat.

To achieve the goals and outcomes for koalas, the CPCP focuses on the protection, restoration and management of corridors that meet, or have the potential to meet, the requirements for koala habitat outlined by the Office of the NSW Chief Scientist & Engineer (OSCE 2020 and OSCE 2021). Safe koala habitat includes corridors with an average minimum width of 390 to 425 metres that are fenced to protect koalas from urban threats such as vehicle strike and include safe

crossings for koalas at Appin Road. Corridors that are identified as priority for protection through the CPCP include the Georges River and Nepean River as primary koala corridors, and Ousedale Creek as the most important east–west movement corridor in the Greater Macarthur Growth Area.

All koala habitat protected through the CPCP is part of the strategic conservation area and will be managed through planning controls. These controls will be applied through the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (referred to hereafter as Biodiversity and Conservation SEPP). This includes all remaining east-west corridors in the Greater Macarthur Growth Area and other areas of valuable koala habitat such as Allens Creek in Wilton Growth Area, and the Tahmoor and Bargo area west of Wilton.

Further information on koala corridors protected under the CPCP is in the section ‘Conserving koala habitat’ (page 25).

Threats to koalas

Koala populations in NSW are declining despite a range of initiatives to protect them (OSCE 2016). Threats to koalas associated with human activity include:

- habitat loss and fragmentation
- urban development (including dog attacks, swimming pools, light and noise)
- vehicle strike
- bushfires
- disease (particularly chlamydia)
- climate change (which increases drought and heatwaves and alters habitat quality).

The main cause of death for the koalas in south-western Sydney is vehicle strike and dog attack (OSCE 2020). Exposure to other threats including habitat fragmentation and land-use changes in the nominated areas may increase as development proceeds if the threats are not properly managed.

Habitat loss and fragmentation

Koalas need large, connected areas of habitat to ensure they have enough food and can breed successfully. Large, connected patches of habitat are vital to allow the animals to move away from threats such as fires and recolonise if necessary. Connected habitat should include multiple food tree species as koalas change their preferences throughout the year. Impacts to koala habitat include loss in the total extent of habitat, as well as fragmentation of the habitat. This can create remnant patches of habitat where koalas can become isolated from the main population.

Moving between these isolated patches of habitat or between scattered trees leaves koalas exposed to dogs and other threats. Smaller areas of habitat also leave koalas vulnerable to fluctuations in available food and water due to size and edge effects. Maintaining large, connected areas of habitat is integral to the survival of koalas and to buffer against the threats of increasing human activity.

Primary north–south corridors along the Nepean and Georges rivers are particularly important as they provide for movement and dispersion of the population. East–west corridors are also important for the Southern Sydney koalas as they provide a supporting role in allowing koalas to move across the landscape between the 2 rivers.

Vehicle strike

Koalas are highly mobile and typically move at night. As rural roads are generally not well lit, it can be difficult for road users to see them. Vehicle strike refers to a vehicle colliding with an animal as it attempts to cross a road. It usually results in the koala being injured or killed.

There are several known roadkill hotspots in the CPCP Area that require safe crossing points and fencing to stop koalas from wandering onto the roads. With more traffic on these roads likely in the future, there is a need for mitigation measures to minimise the risk of vehicle strike.

Urban development

Urban development that is near koala habitat can pose several threats to koalas. These threats can affect dispersing koalas, which travel through urban areas, as well as resident koalas living nearby. They include:

- domestic dog attack
- swimming pools
- light and noise
- habitat degradation due to land clearing, disturbance and inappropriate recreational use.

Without specific mitigation actions, threats to koalas near urban areas will increase as the population of Western Sydney grows. Koala-exclusion fencing is an effective way to separate koalas from the urban environment and is recommended by the Office of the NSW Chief Scientist & Engineer for the new release areas of Wilton and Greater Macarthur.

Bushfire

Bushfires can result in a direct loss of habitat, death or starvation of koalas due to food shortages. The bushfires in the summer of 2019–20 demonstrated the catastrophic impact of fires on local koala populations and their habitat, with a loss of 25% of suitable koala habitat in eastern NSW (EES 2020). Fortunately, there was no direct impact on the Southern Sydney koala population and their habitat. However, the effects of climate change will likely increase the risk of impacts to koalas from fire over time.

Disease

Chlamydia is a serious disease that can lead to koala infertility and death, though not all infected koalas are symptomatic. Koalas in the Campbelltown area are thought to be free of chlamydia, although the bacteria has been recorded further south in the Wollondilly koala population. Urban development can increase stress in koalas, which can in turn result in an increase in the number of koalas showing chlamydia symptoms (McAlpine *et al*, 2017).

Climate change

Climate change contributes to drought, heatwaves and altered habitat quality and will affect the Southern Sydney koala population. On average, Western Sydney experiences 10 to 20 hot days a year (with maximum temperatures above 35° C). However, by 2039 Western Sydney is predicted to experience an additional 5 to 10 hot days a year and an additional 10 to 20 hot days by 2070 (OEH 2018). Management of heat stress and declining habitat quality is likely to be needed for the Southern Sydney koala population.

The Conservation Program for Koalas



A Southern Sydney koala being monitored through the NSW Koala Strategy

The conservation program for koalas

The Cumberland Plain Conservation Plan will ensure that the condition of koala habitat being protected under the CPCP is improved, connectivity between koala sub-populations is maintained, threats to koalas are managed and the koala population in south-western Sydney thrives.

We have developed the conservation program to address impacts and potential risks to koalas in south-western Sydney that are associated with existing and planned development in the Wilton and Greater Macarthur growth areas. The conservation program for koalas takes a landscape-scale approach to protecting and managing koala habitat and includes a range of commitments that aim to mitigate specific threats to the Southern Sydney koala population. These commitments are divided into 5 categories as shown in Figure 4.

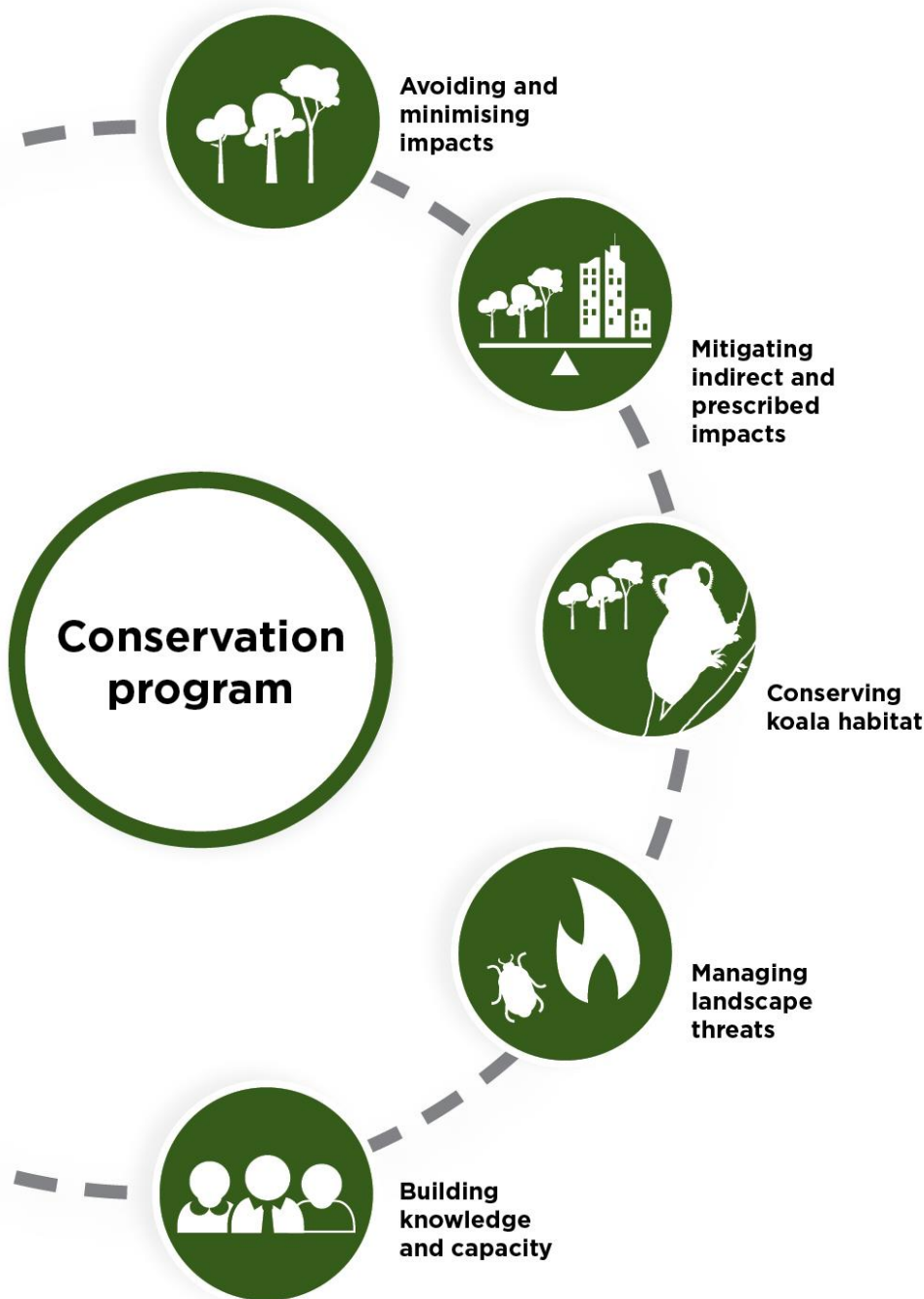


Figure 4. The conservation program and commitments



Avoiding and minimising impacts

Highlights

- Around 3,350 hectares of koala habitat has been avoided from impacts in the nominated areas.
- Around 8,200 hectares of koala habitat will be protected through planning controls to minimise future impacts.

This section describes the actions we have taken to avoid and minimise impacts to around 3,350 hectares of koala habitat in Wilton and Greater Macarthur growth areas.

Avoiding and minimising impacts is an important part of strategic conservation planning and is required under both the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The CPCP has applied landscape-scale avoidance to minimise the potential impacts of urban development on koala habitat the Greater Macarthur and Wilton growth areas.

Avoiding impacts to koala habitat

The certified - urban capable land in each nominated area is where future urban development may occur without any further biodiversity approvals under the BC Act or EPBC Act. Koala habitat in the Wilton and Greater Macarthur growth areas was mapped in 2018 (OEH 2018) and updated for the Cumberland Plain Assessment Report. By applying the avoidance criteria set out in Appendix B of the Cumberland Plain Conservation Plan, at least 2,910 hectares of the important koala habitat mapped in the assessment report has been avoided from the certified – urban capable land. This includes 1,665 hectares in the Wilton Growth Area and 1,245 hectares in the Greater Macarthur Growth Area.

In addition to this avoidance of important koala habitat (as mapped in the assessment report), the CPCP will protect additional areas of koala habitat in the avoided land that will be restored to enhance and support existing corridors. The total area of koala habitat that will be protected from impacts in Wilton and Greater Macarthur growth areas is 3,350 hectares.

Offsetting impacts to koala habitat

The Cumberland Plain Assessment Report determined that 242.1 hectares of important koala habitat will be impacted by future development in the Wilton and Greater Macarthur growth areas. These impacts will be offset by securing new conservation land to protect koala habitat in-perpetuity.

In February 2022 the Commonwealth Government raised the conservation status of koalas under the EPBC Act from vulnerable to endangered. This has increased the required offset target that the CPCP needs to meet to address impacts to koala habitat from 570 hectares (as assessed in the Cumberland Plain Assessment Report 2021) to 705 hectares. Through the plan we are aiming to protect more than twice this amount by establishing the Georges River Koala Reserve.

Protecting koala habitat

The strategic conservation area represents areas of regional biodiversity significance that have been identified to have the greatest potential to deliver long-term conservation outcomes for biodiversity within the Cumberland subregion. It will be used to select and prioritise suitable conservation land.

Koala habitat will be protected through the application of planning controls on avoided land and the strategic conservation area. In total, over 8,000 hectares of koala habitat will be protected by these controls in the lands covered by the CPCP. The development controls will be implemented through a new chapter in the Biodiversity and Conservation SEPP. One of the objectives of the controls is the protection and enhancement of koala habitat and corridors.

The planning controls require development consent for the clearing of native vegetation and requires a consent authority to consider the impact of the proposed development on the biodiversity values of the avoided land and/or the strategic conservation area before granting development consent.

As part of its assessment, the consent authority must consider whether the site supports koala habitat and the role of the site as a koala corridor. These development controls will not apply to land owned by local Aboriginal land councils (LALCs) or under claim by LALCs.

A ministerial direction made under section 9.1 of the *Environmental Planning and Assessment Act 1979* aims to protect land with high biodiversity value from the impacts of development. The ministerial direction will require a planning proposal to demonstrate that it protects or enhances biodiversity, including native vegetation, threatened ecological communities, threatened species and their habitats, koala habitat and corridors, and matters of national environmental significance.

The ministerial direction will also prevent rezoning of avoided land or the strategic conservation area to urban development zones, ensuring that urban development in precincts is confined to certified - urban capable land identified through the CPCP.

The avoided land and the strategic conservation area are not certified as part of the biodiversity approvals sought through the CPCP. This means that any development in these areas needs to seek approval through the relevant biodiversity legislation. In cases where essential infrastructure may be required on avoided land, development will be managed through the 'Cumberland Plain Conservation Plan Guidelines for Infrastructure Development', which includes requirements to consider impacts on koala habitat and maintain functional koala corridors.



Mitigating indirect and prescribed impacts

Highlights

- Install koala-exclusion fencing, including gates and grids between koala habitat and urban land, along Appin Road and the Georges River Koala Reserve where needed
- Provide locations for safe koala crossings of Appin Road
- Introduce planning controls where exclusion fencing is not feasible to mitigate indirect impacts to koalas.

This section describes how the conservation program will manage threats to koalas by constructing exclusion fencing and applying development controls to koala habitat in avoided land in the nominated areas and the strategic conservation area. Urban threats to koalas include habitat loss and fragmentation, vehicle strike, domestic dog attack and drowning in swimming pools.

Indirect and prescribed impacts to koalas are often associated with human activities and urbanisation. They are impacts that occur through actions other than the direct clearing of native vegetation. Prescribed impacts are listed in the Biodiversity Conservation Regulation 2017 and comprise:

- impacts on habitat features including caves, cliffs, crevices, rock formations, human-made structures, and non-native vegetation
- impacts to areas of habitat connectivity
- changes to water bodies and hydrological processes
- wind turbine strikes (not relevant to this project)
- vehicle strikes.

Assessment of prescribed impacts on koalas and other biodiversity are covered in Chapter 24 of the Cumberland Plain Assessment Report.

Koala-exclusion fencing

Commitment 7 Actions 1 to 5

The NSW Government has committed to constructing koala-exclusion fencing in the Wilton and Greater Macarthur growth areas to protect koalas from increasing urban threats such as vehicle strike, dog attacks and drowning in swimming pools. Around 40 kilometres of this fencing will be constructed as part of the priority conservation actions in the first 5 years of the CPCP. Further funding over the life of the plan will allow us to roll out the fencing in stages as new development occurs.

Koala-exclusion fencing will be installed between koala habitat protected under the CPCP and new urban release areas to separate koala habitat from certified urban-capable land. The 2 most common designs for koala-exclusion fencing are described in case study 1 below.

Fencing will provide for east–west connectivity between Georges River and Nepean River, via the Ousedale Creek corridor. Koala-exclusion fencing will also be installed along the western alignment of the Georges River Koala Reserve where existing urban development is a threat to the koala population. Fencing will be installed along sections of Appin Road where it passes through

koala habitat, and 2 fauna crossings will be constructed to allow movement across Appin Road. For any given location, the final alignment and design of the koala-exclusion fencing will be informed by site-specific assessments including engagement with landholders and stakeholders.

A feasibility study, due for completion in late 2021, will identify priorities for the first stage of fencing in the first 5 years and provide recommendations for future stages of the fencing program.

Where koala habitat cannot safely support koalas due to narrow corridor widths (see 'Other koala corridors' on page 30), fencing will be installed to prevent koalas from entering the unsafe habitat. Any koalas found in the unsafe areas will be relocated. These areas of habitat will still be protected from future development through planning controls, and the option to provide koalas access to these areas can be considered over time, informed by monitoring and evaluation data.

Exclusion fencing is most effective when it is intact and koalas cannot pass under, over or through the fence. Tree branches falling on the fence can provide access across the fence or cause damage to the fence. The Office of the NSW Chief Scientist & Engineer recommends locating the fence 3 metres from trees to prevent damage to maintain its effectiveness and minimise damage from falling branches.

In some circumstances, installation of exclusion fencing may not be practical or necessary due to:

- land topography and access constraints that make it difficult or hazardous to install and maintain fences, or that provides a natural barrier to protect koalas from urban threats
- waterways or creeks
- cultural values or heritage sites
- where negative impacts to koalas would be likely (such as dead ends where koalas and other wildlife may not be able to escape from threats).

Where koala-exclusion fencing is not practical or is not yet installed between koala habitat and certified – urban capable land, specific development controls will apply to the certified – urban capable land to mitigate impacts to koalas and their habitat. These controls will be applied through a state-led development control plan or mitigation measures guidelines for the area. For further information, see the section 'Development controls' on page 23.

As per recommendations from the Office of the NSW Chief Scientist & Engineer (OSCE 2020), Asset Protection Zones will be located on the urban side of the fence and not within koala habitat. An Asset Protection Zone is a cleared and maintained buffer zone between a bushfire hazard and nearby buildings.

Fencing along Appin Road will be built in partnership with Transport for NSW (see Box 1). Transport for NSW will be installing fencing on Appin Road in the Gilead area and may fund additional fauna fencing as part of other major road upgrades during the life of the CPCP. We will be consulting with Transport for NSW to complete the remaining sections of Appin Road south of Gilead. We will also be responsible for installing koala-exclusion fencing around the urban areas.

Gates and grids will be included in the fence to support landholder access, maintenance and to assist fauna to escape during bushfires. Where exclusion fences cross existing or planned linear infrastructure such as gas and electricity lines, appropriate access will be provided.

The feasibility study will identify the maintenance and monitoring requirements for the fence and provide an estimate of the ongoing maintenance costs. The long-term roles and responsibilities for maintaining the fence will be resolved in consultation with the appropriate land managers.

Case study 1: Design of koala-exclusion fencing

The feasibility study for the koala-exclusion fencing, which will be completed in late 2021, will inform the alignment and design of the fence. The fence design will be based on best-practice examples and informed by consultation with experts, land managers and the Koala Working Group.

Transport for NSW has previously installed a 'floppy-top' fence along Wilton Road in south-western Sydney. The fence is topped with an angled and unsecured section that bends under a koala's weight, preventing them from climbing over.

'Slippery-top' fencing is an alternative design. This type of fence was recently installed over a 4.5-kilometre koala roadkill hotspot along Picton Road in south-western Sydney. A 60-centimetre strip of steel or heavy plastic sheeting tops the fence on the side of the koala habitat. The sheeting prevents koalas getting a grip to climb over the top section.



Slippery top koala fencing along Picton Road

Box 1. Koala-exclusion fencing on Appin Road

Transport for NSW is primarily responsible for funding and implementing mitigation measures to reduce vehicle strikes involving koalas and other animals along major roads. Fencing delivered under the CPCP aligns with fencing to be delivered as part of the proposed upgrade and safety works on Appin Road.

Appin Road upgrade (Rosemeadow to Mount Gilead)

Two Reviews of Environmental Factors have been released for the upgrade and safety improvements of Appin Road between Rosemeadow and Mount Gilead. The upgrade will support new housing at Mount Gilead and improve safety and access for local residents and through-traffic. Lendlease will deliver the upgrade under a voluntary planning agreement with the NSW Government as part of the Figtree Hill residential development (a separate development proposal not part of the Cumberland Plain Conservation Plan). The NSW Government will also provide part-funding for the road works under the Housing Acceleration Fund program. Koala conservation actions for the Figtree Hill development, including fencing, will form part of the voluntary planning agreement, and are outside the scope of the CPCP.

As part of the Appin Road upgrade, fauna-exclusion fencing will be installed to reduce the current levels of roadkill on Appin Road. This fencing will secure koalas from vehicle strike and direct koala movement to the south and south-west and within primary habitat corridors mapped by the department's Environment and Heritage Group.

The Appin Road upgrade includes fauna exclusion fencing and/or barriers at suitable locations on either side of Appin Road. While the fauna exclusion fencing is mostly on the eastern side of Appin Road opposite the Mount Gilead development, there will be koala-exclusion fencing along the western side of Appin Road at Noorumba Reserve.

Fencing along Appin Road, to be delivered by the CPCP, will complement the Transport for NSW fencing.

Appin Road safety improvements (Mount Gilead to Appin)

Transport for NSW has prepared a detailed design for safety improvements between Mount Gilead and Appin. The \$50-million package is funded by the Australian Government to improve safety on Appin Road and support affordable housing in the Greater Macarthur Growth Area.

The safety works will include installing koala-exclusion fencing along Appin Road at areas of potential or known habitat. As part of the fencing strategy, grids would be installed at driveways to maintain access for property owners. The fencing is scheduled to be installed in 2022.

The CPCP will fund installation of koala-exclusion fencing on both sides of Appin Road between Mount Gilead and Appin Village in all areas not fenced by Transport for NSW through their planned upgrade (Commitment 7, Action 4).

Fauna crossings

Commitment 7 Action 8

Vehicle strike on Appin Road is a well-known threat to the Southern Sydney koala population. Safe fauna passage across this busy road will be constructed during the first 5 years of the CPCP at 2 locations. Koala-exclusion fencing along Appin Road will direct koalas to these safe crossing points. In combination, the fencing and the fauna crossings will provide safe passage for koalas to move east–west between the Georges and Nepean rivers, and to move north–south between the Georges River Koala Reserve and koala habitat to the south.

Ousedale Creek corridor underpass

Through the CPCP, the department has funded Transport for NSW to undertake preliminary assessment and design of a koala underpass near the intersection of Appin Road and Brian Road, north of Appin township. This underpass will provide east–west connectivity between the Georges and Nepean rivers via the Ousedale Creek corridor.

A feasibility study has been completed to confirm the location and preliminary design of the underpass. Transport for NSW is now preparing detailed design plans and an environmental impact assessment of the underpass.

Kings Falls Bridge underpass

The department has also funded Transport for NSW to carry out detailed design work to augment the existing Kings Falls Bridge (where Appin Road crosses the Georges River). The fauna crossing will be designed to allow dry passage for koalas and other fauna under the bridge. This underpass will facilitate improved north–south connectivity for koalas, helping them to move from the Georges River Koala Reserve to koala habitat in the south.

Upper Canal crossing

The department is working with Water NSW to investigate a potential crossing at the western end of the Ousedale corridor to improve koala movement across the Upper Canal. If feasibility investigations conclude that a crossing is warranted, the project will proceed to design, environmental assessment and construction. The proposed crossing would improve east–west koala movement from the Georges River through the Ousedale corridor to the Nepean River.

Development controls

Commitment 5 Actions 1 and 2

Koala-specific development requirements will be implemented in Wilton Growth Area by a State-led development control plan and in Greater Macarthur Growth Area by the Cumberland Plain Conservation Plan Mitigation Measures Guidelines. These controls align with policy recommendations and best practice to mitigate indirect and prescribed impacts to koalas and their habitat. Development controls include pre-construction and precinct design measures.

The koala-specific development controls are included in Appendix E of the CPCP which lists measures to mitigate impacts to threatened species and ecological communities in nominated areas where koala habitat is adjacent to development.

All certified – urban capable land adjacent to koala habitat will be subject to precinct design guidelines including:

- designing subdivisions, perimeter roads and Asset Protection Zones to reduce impacts to koala habitat
- signage to raise awareness of koala presence

- restrictions on where koala feed trees can be planted.

Where a koala-exclusion fence is not installed between koala habitat and certified urban-capable land, additional development controls will apply. These include:

- pre-construction surveys and tree-felling protocols before removing vegetation
- temporary fencing around construction sites
- dog-proof fencing on residential lots and public dog recreation areas
- speed limits and traffic calming measures.

The department will provide ongoing support to local councils in the application of DCP controls and the mitigation measures guidelines including sharing knowledge, maps and data.

Managing dogs in conservation land

Commitment 7 Action 7

Urban development in proximity to koala habitat increases the threat of domestic dog attacks on koalas. Dog attacks are considered a key threat to koalas in NSW and reported by the Chief Scientist & Engineer as one of the main causes of mortality for the Campbelltown koala population. (OCSE 2020, page 31)

The department will work with local councils, National Parks and Wildlife Service and Office of Strategic Lands to manage threats posed by dogs on all public land identified for koala protection under the CPCP. This may include installing signs, fencing areas so they are not publicly accessible, and introducing requirements to ensure all publicly accessible areas remain dog free or require dogs to be on a leash.

Requirements for dog-proof fencing in public recreation areas and for residential lots are included in the draft Wilton Development Control Plan and the Mitigation Measures Guideline for Greater Macarthur Growth Area.



Conserving koala habitat

Highlights

- Establish the Georges River Koala Reserve to secure north–south koala movement along the Georges River
- Secure priority koala habitat in the Cumberland subregion, including the east–west habitat corridor along Ousedale Creek
- Restore up to 80 hectares of koala habitat in the Georges River Koala Reserve and other priority areas.

This section describes how the conservation program will protect koala habitat to support the Southern Sydney koala population while offsetting habitat loss.

The conservation program will establish new conservation land to protect koala habitat in perpetuity. Conservation land includes new reserves, additions to existing reserves, and new biodiversity stewardship sites. Ecological restoration of koala habitat will expand and improve the condition of degraded habitat and facilitate koala movement by improving the connectivity between remnant patches of habitat. All these actions will contribute to meeting the offset target for koalas of 705 hectares.

The Office of the NSW Chief Scientist & Engineer (OCSE 2020) recommends the protection of koala corridor habitat and key movement corridors. The CPCP encompasses 2 primary north–south corridors along the Georges River and the Nepean River, and several east–west corridors connecting the Georges River with the Nepean River.

Further recommendations for the dimensions of corridors to ensure their functionality were provided by the Office of the NSW Chief Scientist & Engineer in 2021 (Appendix 2 of OSCE 2021). The report recommends an average minimum width of 390 to 425 metres to ensure safe koala movement along these corridors. This includes a buffer of 30 metres where fenced and up to 60 metres in areas where fencing is not feasible, which will be implemented through the development control plans for the region. (OCSE 2021, page 36)

Establishing the Georges River Koala Reserve

Commitment 10 Actions 1 to 5

The conservation program will establish the Georges River Koala Reserve as a priority action. It comprises the most important north–south koala movement corridor along the Georges River between Appin and Long Point (Figure 5).

This north–south corridor has high-fertility shale and shale-influenced transition soils that support preferred koala feed trees. The reserve will allow movement of koalas between Campbelltown and the Southern Highlands and promote gene flow between these local populations. The north–south movement corridor that makes up the proposed reserve is consistent with the recommended widths for a functional koala corridor as specified by the Office of the NSW Chief Scientist & Engineer (OSCE 2021, Principle 5).

The establishment of the Georges River Koala Reserve was recognised by the Office of the NSW Chief Scientist & Engineer as essential to the persistence of the Southern Sydney koala population. (OCSE 2020). The reserve will protect and manage up to 1,830 hectares of koala habitat while continuing to provide local communities with access to public space for low-impact recreation. It may also support opportunities for education and koala-based tourism.

The Office of Strategic Lands is the NSW agency responsible for managing government-owned land. It has been acquiring land in the Georges River corridor since the 1980s under the Regional Open Space program. The NSW government currently owns around 1,195 hectares within the proposed reserve.

The reserve will be established and gazetted in stages (see Figure 5) commencing from Year 1 of the CPCP. In partnership with the Office of Strategic Lands, we are aiming to transfer and reserve the first lots of government-owned land for the Georges River Koala Reserve by year 2.

Stage 1 of the koala reserve consists of up to 1,105 hectares of land between Appin and Kentlyn, which will be reserved by year 10. Stage 2 comprises up to 725 hectares of land between Kentlyn and Long Point that will be added to the reserve by year 20. Both stages will use NSW Government-owned land as a priority to establish the koala reserve, with additional land being purchased over the next 20 years for inclusion in the reserve. Additional land purchases will be at market value on a voluntary basis in consultation with affected landholders. The Office of Strategic Lands will manage the land purchase program for the reserve.

After land is purchased, the Office of Strategic Lands will establish biodiversity stewardship agreements to generate biodiversity credits. The sale of these credits will help cover costs associated with future management of the reserve. These credits will be purchased and retired by the department as biodiversity offsets under the CPCP.

Once land has been purchased and stewardship agreements are in place, ownership and management of the reserve will be transferred to the NSW National Parks and Wildlife Service and it will be gazetted under the *National Parks and Wildlife Act 1974* (NSW). Land within Stage 1a of the reserve will be transferred to National Parks and Wildlife Service by the end of year 1 of the CPCP. Stage 2 will form additions to the gazetted reserve over time.

Georges River Koala Reserve Concept Plan

Commitment 10 Action 6

A concept plan for the new reserve will be prepared in consultation with National Parks and Wildlife Service and the Office of Strategic Lands. The Georges River Koala Reserve Concept Plan will provide a strategic plan to ensure interim land management decisions contribute to the long-term goals and objectives for the future reserve.

The concept plan will identify existing koala habitat and locations where habitat can be restored, as well as land management activities to ensure conservation and protection of koalas. The concept plan will consider options for passive recreation that can be compatible with koala conservation, as well as other management considerations such as safe access points, fencing (including koala fencing) and fire trails.

Restoration in the Georges River Koala Reserve

Commitment 10 Action 5

In the first 5 years of the conservation program, the NSW Government will focus on restoring koala habitat in the proposed Georges River Koala Reserve. Up to 80 hectares of government-owned land in the reserve will be targeted for restoration of koala habitat.

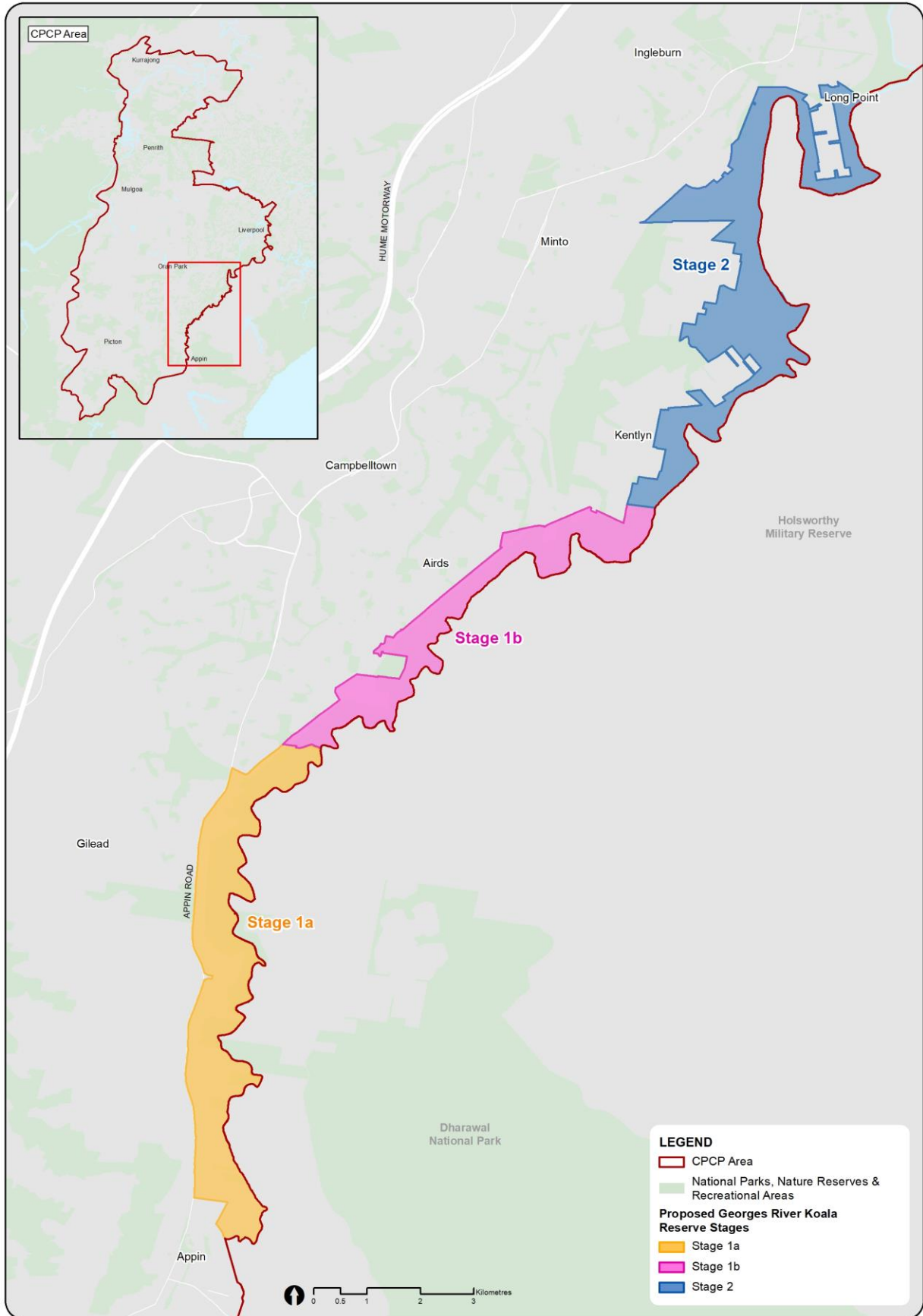


Figure 5. Proposed staging of the Georges River Koala Reserve

The higher fertility shale and shale-influenced soils provide an opportunity to restore plant community types that are preferred by the Southern Sydney koala population, including *Eucalyptus molucanna* (grey box), *Eucalyptus punctata* (grey gum), and *Eucalyptus crebra* (narrow-leaved ironbark trees) and other species.

Further information on the restoration program can be found in the section on 'Ecological restoration of koala habitat' on page 33.

Protecting koala movement corridors

Commitment 12 Actions 1 to 5

In addition to the Georges River koala movement corridor, the CPCP seeks to protect several other key movement corridors in the Greater Macarthur and Wilton growth areas (see Figure 6 and Figure 7). Actions to improve the connectivity of koala habitat across south-western Sydney are aligned with advice from the Office of the NSW Chief Scientist & Engineer (OSCE 2020 and OSCE 2021).

Maintaining the integrity of koala movement corridors across these growth areas is key to delivering the plan's outcome for koalas, which is to improve the condition and connectivity of koala habitat and ensure that the Southern Sydney koala population persists and thrives.

Nepean River koala corridor

The CPCP acknowledges the importance of the Nepean River as a primary north–south koala corridor as acknowledged by the Office of the NSW Scientist & Engineer (OSCE 2020 and OSCE 2021). The koala habitat along the Nepean River has the potential to provide vital refuge if a catastrophic event occurred at the Georges River. The CPCP has protected all habitat along the Nepean River as avoided land (within the Wilton and Greater Macarthur growth areas). The section of the Nepean corridor in between Wilton and Greater Macarthur is included in the strategic conservation area.

The Nepean River and Cataract River form the longest koala corridor in the CPCP, extending around 31 kilometres through the Wilton and Greater Macarthur growth areas (see Figure 7). Mapping and measurement undertaken following the 2021 advice from the Office of the NSW Chief Scientist & Engineer resulted in some additional areas of avoided land being added to the corridor to meet the recommended corridor width. The resulting average width of 393 metres along the eastern side of the river (Biosis 2021) meets the recommended minimum width for a functional koala corridor (390 to 425 metres).

The koala corridor on the northern side of the Nepean River in Wilton Growth Area (see Figure 7) is 5.7 kilometres in length and narrower with an average width of 313 metres (Biosis 2021). Additional avoided land was included in this corridor where possible, however due to existing infrastructure and land zoning, the minimum recommended corridor width cannot be achieved for this section of the river.

The Nepean River corridor in the Gilead area was included in the corridor assessment to ensure the full extent of the corridor within Greater Macarthur Growth Area was assessed. However, this section of the corridor is excluded from the CPCP and the corridor assessment is indicative only. This section of corridor through Gilead will be finalised through future rezoning of the area, but will remain consistent with the advice from the Office of the NSW Chief Scientist & Engineer.

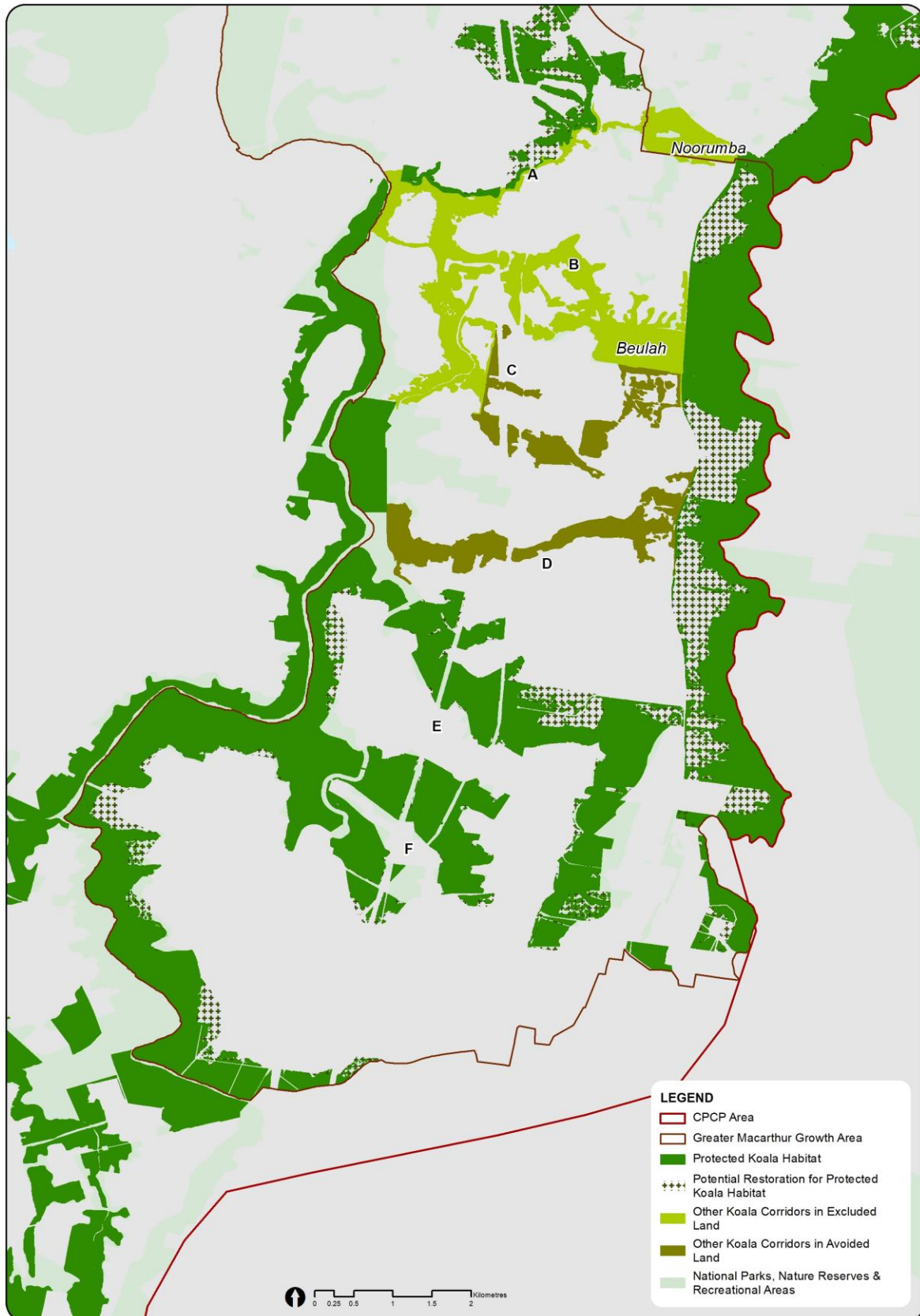


Figure 6. East-west corridors connecting the Georges River to Nepean River

A: Menangle Creek to Noorumba; B: Woodhouse Creek to Beulah; C: Nepean Creek to Beulah; D: Mallaty Creek to Georges River; E: Ousedale Creek to Appin North; F: Elladale Creek and Simpson Creek to the colliery.

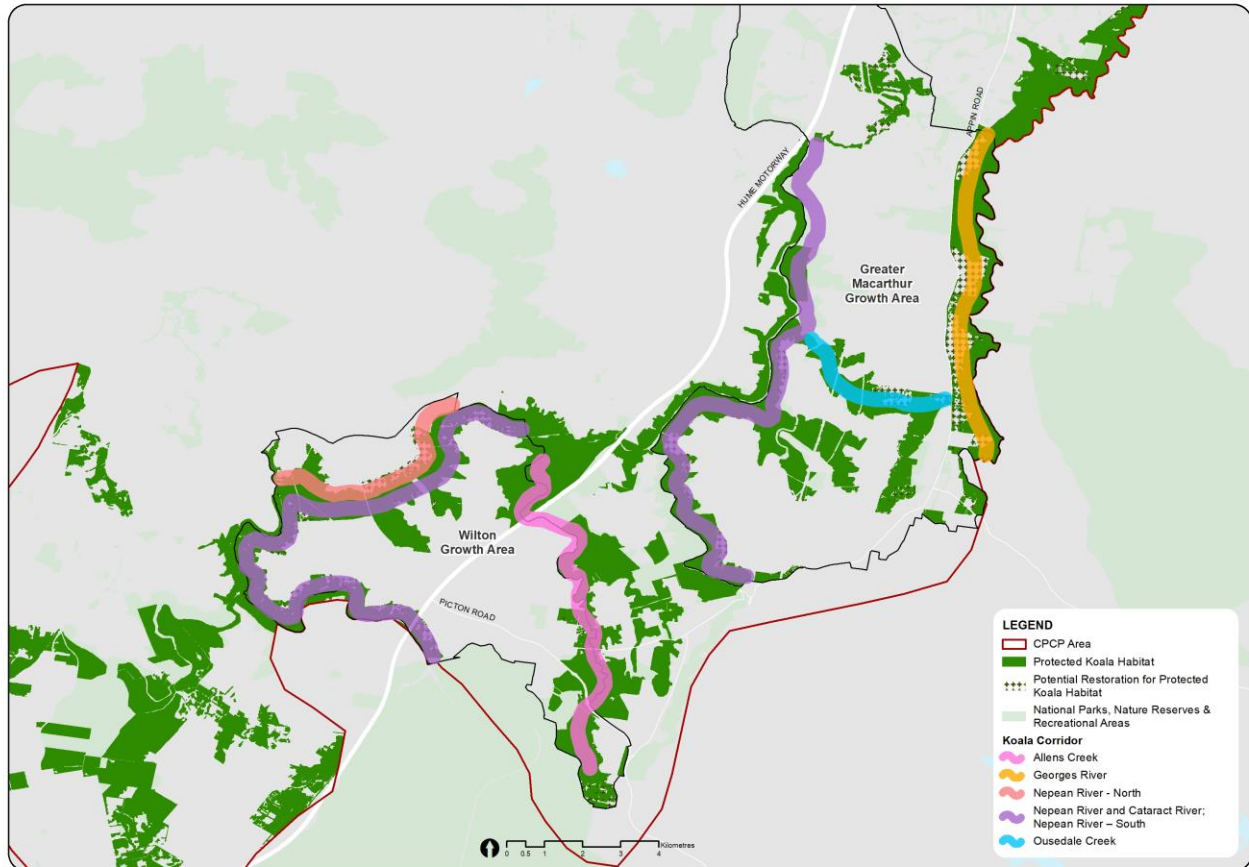


Figure 7. Koala corridors assessed for functionality

Ousedale Creek koala corridor

Under the CPCP we will be protecting and enhancing through restoration the Ousedale Creek to Appin North corridor (Corridor E; Figure 6) for east–west koala movement. Corridor E is recommended by the Office of the NSW Chief Scientist & Engineer (OSCE 2020) as the most suitable for koala movement because of the condition and width of the existing vegetation. The Ousedale corridor meets the recommended corridor width with an average width of 598 metres (Biosis 2021).

Securing and enhancing the Ousedale corridor will begin in the first 5 years of the CPCP. This includes fencing along the boundary with certified-urban capable land and restoring key locations to improve habitat condition within the corridor. Transport for NSW is completing the design of a fauna crossing to facilitate safe movement for koalas and other fauna under Appin Road and into the Ousedale corridor (Commitment 7, Action 8).

Other koala corridors

East–west connectivity between the Georges and Nepean rivers is important for the dispersal and long-term resilience of the Southern Sydney koala population. However, scientific advice from the department’s Environment and Heritage Group and the Office of the NSW Chief Scientist & Engineer suggests that some of the east–west corridors in the Greater Macarthur Growth Area are too fragmented and not wide enough to support koalas over the long term. The Office of the NSW Chief Scientist & Engineer recommend an average width of 390–425 metres for a safe koala corridor (OSCE 2020, OSCE 2021). All corridors protected by the CPCP (shown in Figure 7) have been assessed for width and functionality (Biosis 2021).

The Nepean Creek to Beulah corridor (Corridor C) and Mallaty Creek to Georges River corridor (Corridor D) are not considered wide enough for safe koala movement. We will relocate koalas and install fencing to exclude koalas from these corridors. The existing vegetation in these corridors is mapped as avoided land and will be covered by planning controls applied through the Biodiversity and Conservation SEPP.

The western half of Corridor C falls within the area covered by the Gilead development and is subject to the voluntary planning agreement being negotiated with Lendlease. The department is liaising with Lendlease to ensure a consistent approach to koala corridors. Once the final zonings for this area are known we will review the proposed fencing if needed.

Elladale Creek and Simpson Creek (Corridor F) does not go all the way through to the Georges River, but will remain accessible to koalas as it is a large intact area of habitat that is safe for koala movement. Through the CPCP we will fence around the edge of the habitat to separate it from future urban development.

The 2 most northern corridors (Corridors A and B) are subject to a voluntary planning agreement for development at Mount Gilead. Decisions about fencing these corridors are subject to this agreement and are outside the scope of the CPCP. The implications of this development and its final agreed koala conservation actions, including fencing and koala crossings, will be considered as part of the adaptive management process.

Through the CPCP we are committed to protecting at least one east–west corridor for koala movement (Ousedale Creek). If we can widen additional corridors through restoration and support them with a safe crossing point of Appin Road, they may be considered for koala movement in the future.

The Allens Creek corridor runs for around 10.5 kilometres north to south on the edge of Wilton Growth Area (see Figure 7). The topography along the creek is not steep and it is considered that koalas can cross the channel and use the full extent of the habitat. The average width of functional habitat available is 857 metres (Biosis 2021).

Secure additional priority areas of koala habitat

The strategic conservation area includes approximately 27,200 hectares of land in Western Sydney of which around 25% is koala habitat (outside the Georges River Koala Reserve). This includes locations such as Allens Creek, Elladale Creek, Tahmoor and Bargo. Protecting and restoring koala habitat within the strategic conservation area will help support the viability of the Southern Sydney koala population. Koala habitat outside the Georges River Koala Reserve will be prioritised for protection in reserves and stewardship sites as part of the broader program to secure conservation lands and offset biodiversity impacts from future development.

The strategic conservation area is identified as land that has the greatest potential to deliver long-term conservation outcomes for biodiversity in the lands covered by the CPCP. The area includes large patches of native vegetation with good connectivity to other such patches, or areas with the potential to enhance connectivity that directly offset impacts to koalas and other threatened species and ecological communities from development under the CPCP (see map in Sub-Plan A).

Planning controls will be applied across the strategic conservation area to minimise impacts on this land before it is secured as conservation land (either a reserve or stewardship site).

Establishing reserves and biodiversity stewardship sites

Establishing new conservation lands to protect koala habitat will include both reserves and biodiversity stewardship sites. The Office of Strategic Lands will manage the land purchase program, which will include funding for long-term land management through establishing biodiversity stewardship agreements or equivalent direct funding for land that is suitable for future reserves. This approach will ensure that adequate funding is available for long-term management by National Parks and Wildlife Service, councils or other land managers. The purchase of land will occur over the life of the CPCP and the complexity of the purchase process will depend on the number of lots and landholders we need to negotiate with for each reserve proposal.

Biodiversity stewardship sites provide permanent protection for threatened species and ecological communities, including koalas, while enabling private or public landholders to continue living on and using their land as they currently do. The NSW Government does not need to purchase land to establish a biodiversity stewardship site. Instead, a landholder enters into a biodiversity stewardship agreement with the NSW Government, and can generate biodiversity credits and earn income from trading these credits. The landholder receives support from the Biodiversity Conservation Trust, including an annual payment from funds held and invested on their behalf. These funds allow them to undertake the management actions required by the agreement.

More details about the reserve and biodiversity stewardship programs and their implementation are provided in Sub-Plan A.

Case study 2 provides information on a biodiversity stewardship site in Douglas Park, which is managing koala habitat and other important biodiversity values. This site was established as part of the Growth Centres Biodiversity Certification and provides an example of how similar stewardship sites may be established under the CPCP.

Case study 2: St Mary's Towers biodiversity stewardship site

St Mary's Towers biobank site is located on the Nepean River at Douglas Park in the Wollondilly LGA. It was established in 2010 under an agreement between the landowner and the NSW Minister for the Environment (a biobank is a historic type of agreement similar to a biodiversity stewardship agreement).

The site contains Cumberland Plain Woodland and Shale Sandstone Transition Forest that provides habitat for koalas and a range of other threatened species. Allens Creek flows next to the property, making it part of an important koala corridor between the Nepean and Cataract rivers.

St Mary's Towers is divided into 10 management zones according to vegetation type, vegetation condition and management objectives. The actions required under the biobank agreement include managing grazing, weeds, use of fire, stressors created by human activity, erosion, feral animals, and replanting of native plants. While the agreement was being established, the former Office of Environment and Heritage provided advice and support to the landowner, which included identifying and costing the proposed management actions.

Management of the land has generated credits worth more than \$1.7 million. The landholder received \$1 million and more than \$500,000 was deposited into a trust, which is used to deliver management actions. The credits from this biobank site were purchased under the Growth Centres Biodiversity Offset Program.

Source: OEH 2017, Conservation achievements: St Mary's Towers biobank site

Ecological restoration of koala habitat

Commitment 13 Actions 1 to 6

Koala habitat in south-western Sydney is highly fragmented. Ecological restoration, which helps degraded and damaged ecosystems return to a more natural state, will help to improve connectivity and expand the total area of koala habitat in the area.

The Southern Sydney koala population prefers feeding on trees such as *Eucalyptus molucanna* (grey box), *Eucalyptus punctata* (grey gum), *Eucalyptus crebra* (narrow-leaved ironbark) and *Eucalyptus agglomerata* (blue-leaved stringybark). These species are found on nutrient-rich soils derived from Wianamatta shale. Due to historical clearing for agriculture, these vegetation types were largely removed from the landscape and only fragmented patches of koala habitat remain.

To enhance the connectivity between patches of koala habitat and augment and strengthen existing primary and secondary koala corridors, the Office of the NSW Chief Scientist & Engineer (OSCE May 2021) recommends that native vegetation on shale-based Blacktown soil landscapes should be a priority for restoration.

We propose to restore up to 80 hectares of land in the first 5 years of the CPCP to infill cleared areas in the Georges River Koala Reserve. There is also an additional 420 hectares of cleared or degraded koala habitat within avoided land in Wilton and Greater Macarthur growth areas that has potential to be restored over the life of the plan.

A restoration working group will be established once the CPCP is approved to guide the development of a restoration implementation strategy and implementation of restoration activities in line with the strategy. This group, as well as the Koala Working Group, will assist with identifying and prioritising restoration sites.

In line with the recommendation of the Office of the NSW Chief Scientist & Engineer (OSCE 2020), the restoration implementation strategy will outline the approaches we are taking to ensure the restoration is sustainable in the long term and considers genetic diversity. Sub-Plan A provides further information about the ecological restoration program and its implementation.



Managing landscape threats

Highlights

- Undertake coordinated weed management in and around conservation lands including koala habitat
- Coordinate pest-control actions across the conservation lands
- Manage fire to support biodiversity on conservation land including koala habitat.

This section describes how the conservation program will reduce and manage landscape threats, including those threatening koalas and their habitat.

In addition to habitat loss, increased urbanisation brings increased threats to biodiversity, including from fire, weed invasion, pest animals and disease. Reducing and managing threats to an area's biodiversity in a strategic and coordinated manner will be critical for achieving the objective of the CPCP to improve ecological function and resilience. Delivering commitments to manage these threats will also benefit the Southern Sydney koala population and their habitat.

Managing weeds

Commitment 15

The conservation program will focus on reducing priority weed species within reserves and stewardship sites, including koala habitat, to reduce threats to land secured through the CPCP. It will target weeds that have the most impact – exotic vines and scramblers such as bridal creeper (*Myrsiphyllum asparagoides*), African olive (*Olea europaea* subsp. *cuspidata*), African lovegrass (*Eragrostis curvula*) and other exotic perennial grasses. Participation in the Sydney Weeds Network will help inform the implementation of weed control activities in the area covered by the CPCP, including the preparation of a weed control strategy.

Managing pest animals

Commitment 16

The conservation program also includes coordinated control activities to manage priority pest animals within reserves, stewardship sites and surrounding lands. This will mitigate against threats from feral animals such as foxes and deer, which are a threat to koalas and their habitat in peri-urban areas. The actions also include the establishment of a pest animal working group to guide the implementation of pest animal control activities under the CPCP (Commitment 16, Action 1).

Managing fire

Commitment 17

The CPCP commits to managing fire in strategic locations in the Cumberland subregion to support the maintenance of biodiversity values on conservation lands within the CPCP Area. The conservation program will develop and implement a fire management strategy that will support the management of biodiversity and koala habitat on conservation lands established through the CPCP. It aims to manage fire regimes in conservation lands to maintain and enhance biodiversity over time and manage current and emerging bushfire risks. Sub-Plan A provides further information on actions to manage landscape threats.



Building knowledge and capacity

Highlights

- Raise awareness of the Southern Sydney koala population and provide opportunities for local communities to participate in koala conservation and management
- Research and monitor the health of the Southern Sydney koala population
- Build capacity in the rehabilitation sector to support koala health and welfare.

This section describes how the conservation program is investing in the [NSW Koala Strategy 2022 \(PDF 5 MB\)](#) to deliver research, monitoring and conservation actions which will support the ongoing health and welfare of koalas in south-western Sydney.

The NSW Koala Strategy 2022 sets out the first 5 years of the government's commitment towards doubling the number of koalas in NSW by 2050. Over \$193 million will support a new conservation program and build on the achievements and groundwork of the previous NSW Koala Strategy 2018-21.

The actions that the CPCP will invest in through the updated strategy include:

- research to better understand the impacts of chlamydia on koala populations and to identify management options
- research to better understand the links between koala stresses (for example, between heatwaves and chlamydia).
- research to address knowledge gaps related to koala population demographics, life history and ecology
- delivering training and technical resources needed by wildlife carers and veterinarians in line with the NSW Volunteer Wildlife Rehabilitation Sector Strategy.

Raise awareness and community participation

Commitment 20 Actions 1-4

The local community in south-western Sydney are already actively engaged in ensuring the protection of the Southern Sydney koala population. The CPCP must ensure that future communities that move into the new urban areas are also aware of the koala population and have the knowledge to continue protecting them.

A targeted stakeholder and community engagement program will raise awareness about the presence of koalas and the threats they face. It will also provide opportunities for local communities to participate in koala conservation and management.

The CPCP will fund 3 full-time community education officers to work in partnership with councils and other stakeholders to implement the education and engagement implementation strategy. This initiative will help deliver on-ground conservation actions for koalas and community education on the Southern Sydney koala population. Further engagement will occur by investing in the NSW Koala Strategy 2022.

Research to support koalas

The conservation program will invest in the NSW Koala Strategy 2022 to support research priorities identified in the [NSW Koala Research Plan 2019–28 \(PDF 881 KB\)](#) including identifying key threats and innovative mitigation measures, demographics, life history and ecology of the koalas in south-western Sydney. It will involve collaboration with external research organisations, local councils and the community.

Research on demographics, life history and ecology

Commitment 22 Action 2

We need to better understand the koalas in parts of south-western Sydney such as Tahmoor, Bargo and Silverdale. Improving our knowledge of koala ecology will help strengthen the conservation program and help us manage the Southern Sydney koala population. The conservation program is investing in research to address knowledge gaps related to koala population demographics, life history and ecology. This will be delivered as part of the NSW Koala Research Plan.

All data collected through the program and relevant research outcomes will be analysed against triggers for adaptive management specified in the NSW Koala Monitoring Framework. We will make the information public within 3 years.

Research on key threats and mitigation measures

Commitment 23 Action 1

Chlamydia is a key threat to the Southern Sydney koala population that may increase over the life of the CPCP. Some koalas in the Wollondilly LGA have contracted the disease, while those in the Campbelltown LGA remain chlamydia-free.

Through the NSW Koala Strategy, we will be supporting research priorities identified in the NSW Koala Research Plan including the key threat of chlamydia. Research protocols for vaccine trials will be established through these partnerships. The proposed vaccine trial will be informed by the 2021 disease monitoring program of NSW Koala Strategy 2022. It is likely there will be a chlamydia incursion in Campbelltown at some point in the future and investigating a vaccination trial will ensure we are ready for this.

Monitoring koalas in south-western Sydney

Commitment 23 Actions 1-2

Through the NSW Koala Strategy we are investing in monitoring of koalas in south-western Sydney as part of the [NSW Koala Monitoring Framework \(PDF 1.1 MB\)](#) and in line with recommendations and principles of the Office of the NSW Chief Scientist & Engineer (OSCE 2020 and OSCE 2021).

The NSW Koala Monitoring Framework provides a structure for long-term koala monitoring in NSW and sets goals and procedures that will be used to monitor the Southern Sydney koala population over the life of the CPCP. A detailed program for monitoring this koala population, including threats to their persistence and the effectiveness of the plan's koala health and welfare actions will be developed as part of the plan's evaluation program. This will help inform a management regime that balances genetic diversity/movement corridors with the risk of chlamydia entering the Campbelltown population. Monitoring outputs should also increase understanding of the genetic fitness of the Southern Sydney koala population.

The first disease surveys along the likely path of incursion were done in 2018. These have been repeated and extended using new technology in 2021 (thermal imagery from drones and detection dogs), funded by the early implementation program for the CPCP. Tissue and scat samples were collected during the 2021 surveys for disease assessment and chlamydia testing. The Southern Sydney koala population has been designated as a site for the state-wide genomic sequencing program in partnership with the University of Sydney to survey the population.

To ensure the integrity of the Campbelltown population, koalas that are captured or handled as part of a monitoring program, or those that are rehabilitated and released back into the Campbelltown population, will be vaccinated against chlamydia. If a joint vaccine for chlamydia and koala retrovirus is available, this will be used. Koalas with no microchip or other identifying features that are captured will have a tissue sample taken for genetic analysis, with the tissue samples lodged with the NSW Koala Biobank.

Supporting koala health and welfare

Commitment 23 Action 1

The conservation program will invest in the NSW Koala Strategy 2022 to build capacity in the koala rehabilitation sector to support koala health and welfare in south-western Sydney. It will do this by delivering training and technical resources to wildlife carers and veterinarians in line with the [NSW Volunteer Wildlife Rehabilitation Sector Strategy](#).

Through this strategy the NSW Government, in partnership with Sydney University, has allocated \$1.5 million over 3 years to Taronga Zoo for professional development to improve veterinarians' and veterinary nurses' skills in wildlife care. The program also helps upgrade technical resources to handle, triage and treat wildlife.

We will contribute further funds to this strategy from year 2 of the CPCP to continue strengthening the NSW wildlife rehabilitation sector. This action is designed to improve the skills and resources to better rehabilitate sick and injured koalas. The funding will improve access to resources, veterinary services, transport and facilities for koalas in south-western Sydney.

Implementation



Koala exclusion fencing on Picton Road protects koalas from vehicle strike.

Implementation

The CPCP will be implemented over 35 years to deliver its vision, objectives, and intended outcome for koalas. This includes delivering commitments and actions specific to koalas.

The earlier sections of this document provide detail on the koala conservation program and actions to be implemented. This section summarises the governance structure, delivery partners, monitoring, evaluating and reporting, and adaptive management required to implement the program to conserve the Southern Sydney koala population.

These sit within the broader implementation and assurance framework, which includes:

- clear governance arrangements supported by an evaluation program
- a reconciliation accounting process to track development impacts and offsets secured
- conservation land selection steps to guide the selection and acquisition of offsets
- adaptive management steps to be implemented through the NSW planning system if offsets are not in line with development impacts.

See Sub-Plan A for further details on these.

Governance

The governance structure for implementing the Cumberland Plain Conservation Plan identifies accountable parties and sets a framework for roles, responsibilities, resourcing and milestone reporting. This includes the department, which is responsible for implementing the CPCP and meeting regulatory requirements, and agency partners such as Transport for NSW. It also includes an executive implementation committee. The committee comprises executive-level representatives from agencies with statutory responsibility for the CPCP including the department's Environment and Heritage group, the Australian Department of Climate Change, Energy, the Environment and Water, and Transport for NSW.

The conservation program for koalas will be overseen by the same governance structure as the CPCP. It includes the Koala Working Group, which provides expert advice and supports implementation of the priority actions for koalas including fencing and restoration. Guidance on monitoring koalas will be provided by an expert panel established through the NSW Koala Strategy.

Figure 7 illustrates the roles and responsibilities for delivering the conservation program for koalas, including government agencies, delivery partners and other stakeholders.

The Koala Working Group

Commitment 7 Action 6

The department has established the Koala Working Group comprising koala experts from across government agencies to support implementation of the koala commitments, including consistency with the objectives of the NSW Koala Strategy.

The group provides advice on:

- location and design of the koala-exclusion fencing and fauna crossings
- advice about providing appropriate koala movement corridors
- priority locations and approach for koala habitat restoration
- monitoring and evaluation of the koala commitments, including advice to support adaptive management

- community and stakeholder engagement for the koala commitments and actions
- research and management actions relating to koalas.

The group was established in 2020 to guide early planning for koala-exclusion fencing and koala habitat restoration. The group has been established for an initial 3-year period and will be extended, as required.

The Koala Monitoring Expert Panel

The Koala Monitoring Expert Panel has been established under the NSW Koala Strategy to provide guidance on monitoring koalas for disease and genetics, and to provide advice on specific techniques such as acoustic monitoring. The panel will provide expert advice where required to guide the monitoring of koalas in south-western Sydney. The panel was involved in guiding the recent disease survey of the koala population in May and June 2021.

Delivery partners

Delivery partners will support the implementation of the conservation program for koalas. They include government agency teams such as the NSW Koala Strategy team in the department’s Environment and Heritage Group, the NSW Office of Strategic Lands and the Biodiversity Conservation Trust (see Figure 8). Other partners may include community-based wildlife volunteer organisations.

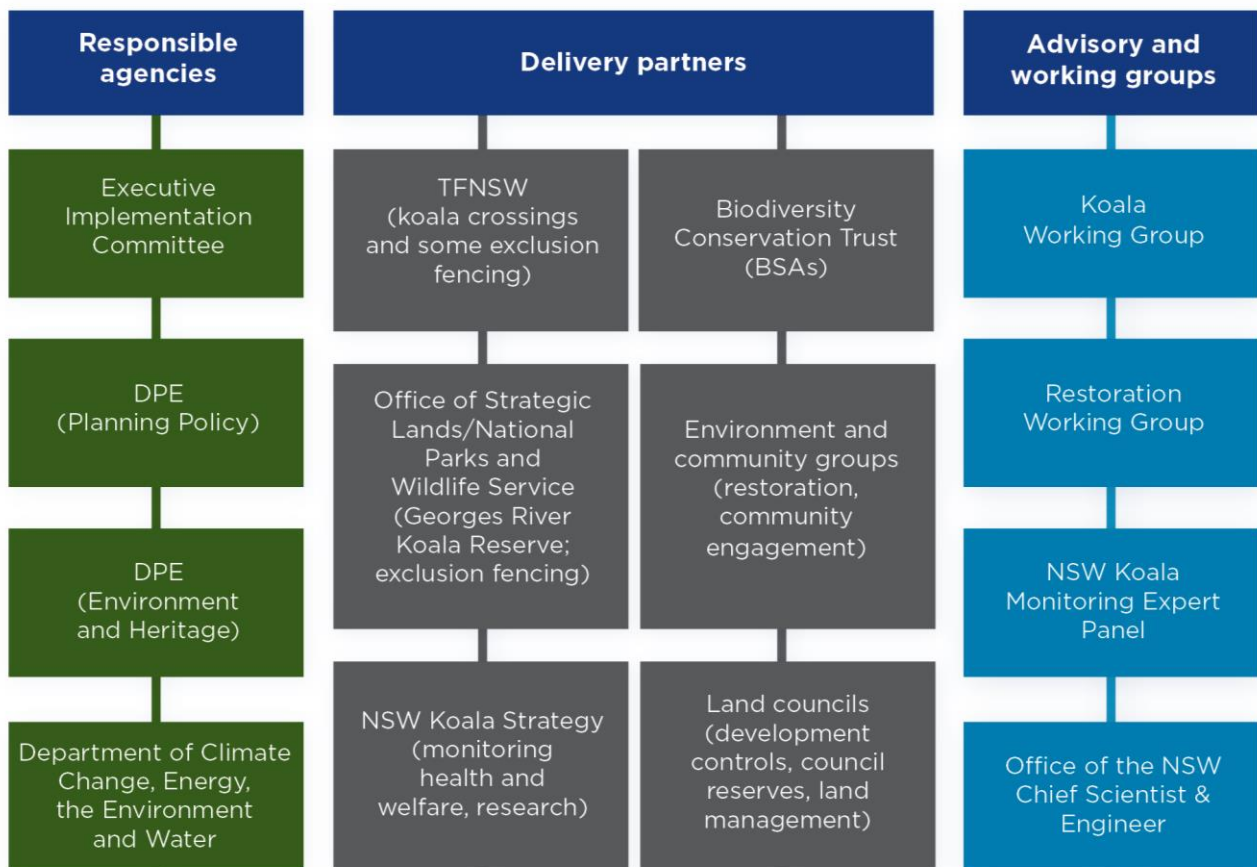


Figure 8. Roles and responsibilities for delivering koala conservation actions

Monitoring, evaluation and adaptive management

The CPCP will establish an adaptive management framework to account for major changes that cannot be forecast by the risk management process and implementation planning. This includes an evaluation program to track the progress and effectiveness of the conservation program over the life of the CPCP.

A monitoring program for koalas will gather and monitor data on koala populations, genetics and health to inform assessments of the status and viability of the Southern Sydney koala population. The department's Environment and Heritage Group will lead this program as part of the NSW Koala Strategy and in accordance with the NSW Koala Monitoring Framework. The Koala Monitoring Expert Panel will provide guidance on the monitoring program.

Monitoring will also be conducted to evaluate of the effectiveness of mitigation actions, including for example:

- predator threat monitoring (including at the entrances of bridges and underpasses)
- infrastructure integrity (holes in fences)
- movement trackers (predators)
- location sensors (movement of koalas through landscape)
- and the effectiveness of underpasses for koala safety.

All data collected from monitoring will be used to inform and improve implementation decisions, such as the prioritisation and re-prioritisation of actions to ensure the outcome for koalas is met. Koala research programs funded under the CPCP will also contribute information and insights to improve the program and resulting outcome for koalas.

Monitoring will also target koala safety and movement over time and as increasing urbanisation occurs. It will be particularly important to understand the effectiveness of actions to maintain the integrity of koala movement corridors across the landscape and identify where external circumstances may exacerbate threats or contribute to unintended outcomes.

The CPCP commits to protecting the Ousedale east–west corridor for koala movement in line with advice from the Office of the NSW Chief Scientist & Engineer (OSCE 2020). If additional corridors can be widened through restoration and connected to a safe fauna crossing of Appin Road, they can be considered for koala movement later.

Advice from the Koala Working Group will be sought, as needed when considering any implications for achieving the outcome for koalas, particularly in relation to the protection of koala movement corridors. Until then, any koalas found in the unsafe areas will be relocated. The option to provide access to these areas can be considered over time, informed by monitoring and evaluation data.

The evaluation program will link to the NSW Koala Strategy and the NSW Koala Monitoring Framework and will include key evaluation questions and key performance indicators to guide the monitoring and evaluation program for koalas.

The evaluation approach for the CPCP will encompass project level monitoring, evaluation and adaptive management (for example, the koala monitoring and research projects) and at the broader program level for koalas under the plan.

The broader program level evaluation will consider information collected through landscape-level indicators for biodiversity, such as the improvement in koala habitat quality and extent, progress toward the gazettal of the Georges River Koala Reserve, and the effectiveness of development controls to mitigate indirect impacts to koalas.

Figure 9 illustrates the evaluation and adaptive framework for koalas under the CPCP. See Sub-Plan A for further details on the evaluation program.

Reporting on outcomes for koalas

The department will publish annual updates on the progress of the commitments and actions, including koala-specific actions. Every 5 years a comprehensive independent review will be commissioned to evaluate the effectiveness in delivering outcomes, including progress toward achieving the plan’s outcome for koalas.

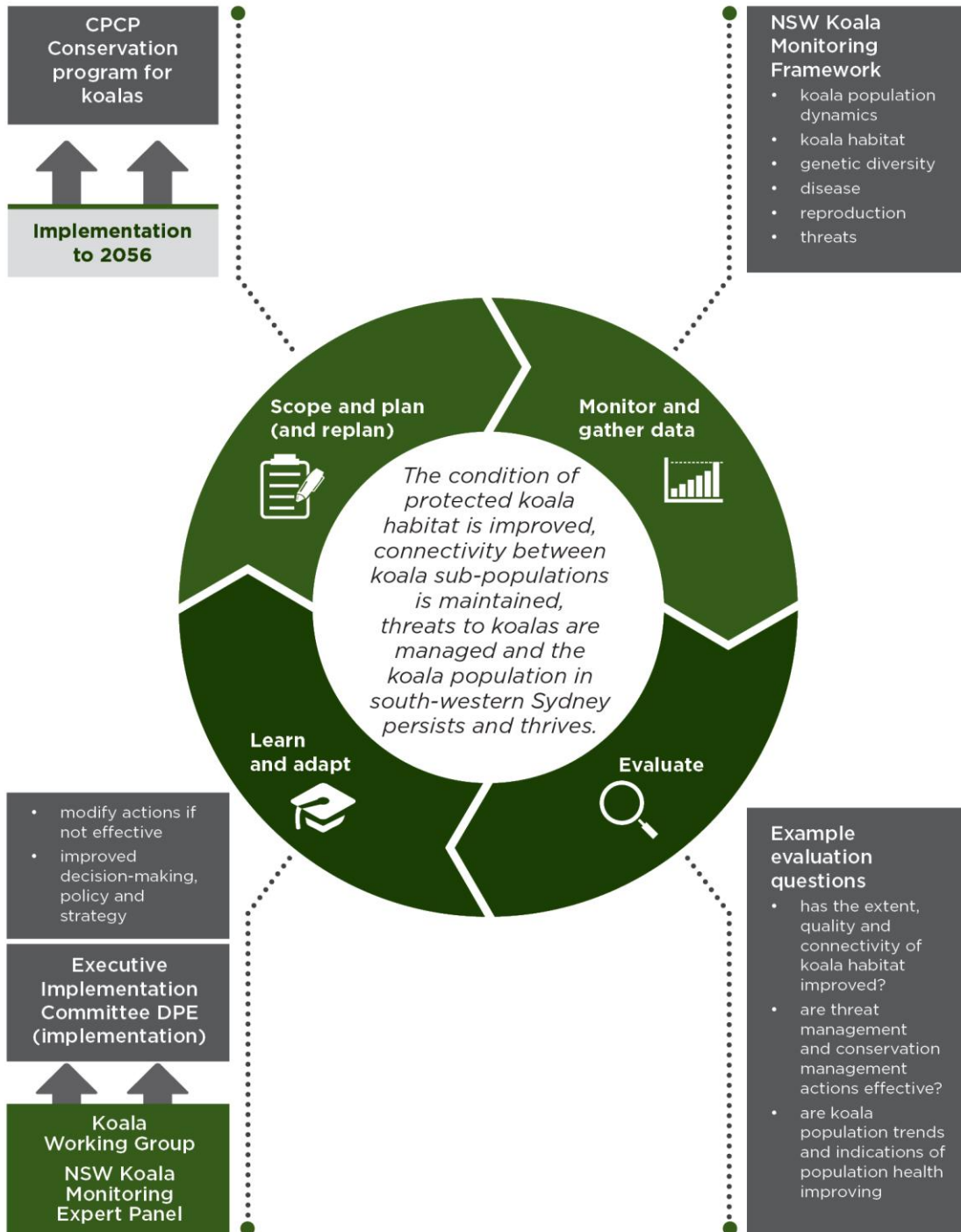


Figure 9. The outcomes and governance framework for koalas

Appendices



Ironbark trees along the Nepean River koala corridor

Appendix A: Commitments and actions relevant to koalas

Conservation program

Mitigating indirect and prescribed impacts

Commitment 5

Mitigate indirect and prescribed impacts from urban and industrial development; infrastructure; and intensive plant agriculture on threatened ecological communities, species and their habitat. This includes meeting specific mitigation requirements for threatened ecological communities, species and their habitat in accordance with Appendix E of the CPCP.

Actions

1. Incorporate development controls in the state-led development control plans where they apply to relevant nominated areas, setting out development controls that need to be addressed by neighbourhood plans and development applications to mitigate indirect and prescribed impacts on threatened species. This includes:
 - a. specific controls that apply to the nominated areas to mitigate indirect and prescribed impacts on specific threatened species or ecological communities or other environmentally sensitive areas in accordance with Appendix E of the CPCP
 - b. a common set of development controls to mitigate indirect and prescribed impacts across the 4 nominated areas that inform general biodiversity protection as listed in Chapter 15 of the Cumberland Plain Assessment Report

(Before start of CPCP).
2. Introduce Cumberland Plain Conservation Plan Mitigation Measures Guidelines consistent with Appendix E of the CPCP to address indirect impacts in Greater Macarthur Growth Area and Greater Penrith to Eastern Creek Investigation Area (**Year 1**).

Commitment 7

Mitigate indirect and prescribed impacts from urban, industrial, infrastructure development on the Southern Sydney koala population to best-practice standards and in line with advice from the Office of the NSW Chief Scientist & Engineer, in accordance with Appendix E of the CPCP.

Actions

1. Install koala-exclusion fencing, including gates and grids, between koala habitat that can safely support koalas and urban land within the Greater Macarthur Growth Area and Wilton Growth Area, except where exclusion fencing is not feasible or necessary due to slope, heritage or water courses:
 - a. Manage impacts to fences by locating koala-exclusion fencing at least 3 metres from any trees where practical (measured from canopy).
 - b. Apply koala specific mitigation actions in accordance with Appendix E.
 - c. Where fencing must cross existing or planned linear infrastructure such as gas and electricity transmission, consider appropriate access treatments such as gates to ensure the integrity of the koala-exclusion fencing.

- d. Fence off koala habitat corridors that are too narrow to safely support koalas and relocate koalas out of the unsafe corridors if needed (Commitment 12 Action 1f).
 - e. Address the requirements of the Cumberland Plain Conservation Plan Guidelines for Infrastructure Development as essential infrastructure for EPBC Act approval in the avoided land (**Life of CPCP**).
2. Complete a feasibility study on the koala-exclusion fencing to help inform the design, locations and construction of the fencing and identify fencing priorities for the first 5 years (**Year 1**).
 3. Install koala-exclusion fencing along the western alignment of the Georges River Koala Reserve where existing urban development is a threat to the koala population (**Years 1 to 20**).
 4. Install koala-exclusion fencing in the vicinity of koala habitat, along both sides of Appin Road between Rosemeadow and Appin to mitigate koala vehicle strikes at roadkill hotspots. Fencing along Appin Road will be in addition to planned fencing works to be delivered by Transport for NSW (**Years 1 to 5**).
 5. Undertake targeted stakeholder and community engagement to support the delivery of koala-exclusion fencing (**Years 1 to 3**).
 6. Establish a koala working group with representation from relevant government agencies to support implementation of the koala commitments and actions. The working group will support implementation of the koala sub-plan by providing advice to inform:
 - a. alignment, staging, and design of the koala-exclusion fencing and fauna crossing, including advice about providing appropriate koala movement corridors
 - b. priority locations and approach for koala habitat restoration
 - c. monitoring and evaluation of the plan's koala commitments, including providing advice to support adaptive management based on monitoring and evaluation data
 - d. community and stakeholder engagement for the koala conservation commitments and actions
 - e. research and management actions relating to koalas

(Before start of CPCP).
 7. Work with local councils, National Parks and Wildlife Service and the Office of Strategic Lands to ensure the threats posed by dogs on all public land identified as protected koala habitat under the CPCP are managed:
 - a. For land that is not publicly accessible, this will include the installation of signs and/or fences.
 - b. For land managed as a reserve or for recreation, this will be achieved by incorporating requirements in a relevant plan of management

(Life of CPCP).
 8. Provide safe fauna crossings, based on current best-practice design, across Appin Road and other linear infrastructure by:
 - a. installing a koala underpass under Appin Road, near the intersection with Brian Road to support east–west koala movement from the Georges River to the Nepean River
 - b. augmenting the existing Kings Falls Bridge at the Georges River by constructing a bench adjacent to the bridge abutments, to allow dry passage for koalas (and other fauna) under Appin Road, supporting north–south koala movement from the Georges River Koala Reserve to the southern koala habitat

- c. investigating options for enhancing koala movement across the Upper Canal
- d. addressing the requirements of the Cumberland Plain Conservation Plan Guidelines for Infrastructure Development as essential infrastructure for EPBC Act approval in the avoided land

(Years 1 to 5).

Conserving flora, fauna and habitat

Commitment 10

Establish a reserve to protect the north-south koala movement corridor along the Georges River between Appin and Long Point.

Actions

1. Transfer and reserve lots identified for early transfer to National Parks and Wildlife Service as the first stage in establishing Georges River Koala Reserve **(Years 1 to 2)**.
2. Reserve additional areas of the Georges River Koala Reserve between Appin and Kentlyn using NSW Government land as a priority and by purchasing additional land (Stages 1a and 1b) **(Years 1 to 10)**.
3. Reserve additional areas of the Georges River Koala Reserve between Kentlyn and Long Point using NSW Government land as a priority and by purchasing additional land (Stage 2) **(Years 1 to 20)**.
4. Restore up to 80 hectares of cleared land for koala habitat in priority areas including the Georges River Koala Reserve to strengthen the north–south koala corridor **(Years 1 to 5)**.
5. Restore additional koala habitat within the Georges River Koala Reserve to strengthen the north–south koala movement corridor **(Years 6 to 25)**.
6. Work with National Parks and Wildlife Service, the Office of Strategic Lands and other key stakeholders to prepare a concept plan for the Georges River Koala Reserve **(Year 1)**.

Commitment 12

Protect koala corridors in the Cumberland subregion, including those along the Georges River, Nepean River, Cataract River and Ousedale Creek.

Actions

1. Apply development controls to koala habitat protected under the CPCP and ensure safe, functional corridors for koala movement (consistent with advice from the Office of the NSW Chief Scientist & Engineer) including:
 - a. the north–south koala corridor along the Georges River (as per Commitment 10)
 - b. the north–south koala corridor along the Nepean and Cataract rivers
 - c. the east–west corridor along Ousedale Creek between the Georges and Nepean rivers
 - d. Elladale Creek and Simpsons Creek as an area of functional koala habitat.
 - e. the north–south koala corridor along Allens Creek
 - f. excluding koalas from east–west corridors that do not meet the minimum requirements for a functional koala corridor (Corridor C: Nepean Creek to Beulah, and Corridor D: Mallaty Creek to Georges River)

(Before start of CPCP).

2. Restore koala habitat in the Georges River and Ousedale Creek corridors to ensure they meet requirements for safe and functional koala movement corridors, consistent with advice from the Office of the NSW Chief Scientist & Engineer (as per Commitment 13) (**Life of CPCP**).

Commitment 13

Deliver and support ecological restoration activities in conservation land including ecological reconstruction of up to a maximum of 25% of the plan's offset target for native vegetation (Commitment 8).

Actions

3. Deliver ecological restoration (including reconstruction) to restore koala habitat in the Georges River Koala Reserve and other priority locations in the strategic conservation area including along Ousedale Creek and around Appin (**Life of CPCP**).

Build knowledge and capacity

Commitment 20

Provide opportunities for the residents of Western Sydney to learn about and actively participate in biodiversity conservation including koala conservation.

Actions

4. Invest in the NSW Koala Strategy to raise awareness of the Southern Sydney koala population and encourage community participation in koala conservation in Western Sydney (**Year 1 onwards**).

Commitment 22

Invest in research priorities that will support the implementation of the CPCP and help to deliver the plan's outcomes.

Actions

3. Support NSW Government programs for threatened species research in Western Sydney including:
 - a) research on threatened species impacted by the CPCP in the Cumberland subregion through the Saving our Species program
 - b) research that increases knowledge of population demographics, life-history and ecology of the Southern Sydney koala population, as part of the NSW Koala Strategy's NSW Koala Research Plan (**Year 2 onwards**).

Commitment 23

Support rehabilitation measures to help maintain koala health and welfare.

Actions

1. Invest in the NSW Koala Strategy and other potential partners to implement the koala health and welfare program in south-western Sydney with key deliverables including:
 - a) monitoring of koalas including key threats and the effectiveness of mitigation measures as part of the NSW Koala Monitoring Framework
 - b) designating the koalas in south-western Sydney as one of the dedicated monitoring sites for the NSW Koala Strategy
 - c) providing enhanced training in wildlife treatment for veterinarians
 - d) providing grants for community wildlife organisations for resources and carer recruitment and training

- e) establishing health and welfare programs to protect koalas from threats including vehicle strike, fire, disease and climate change

(Year 1 onwards).

- 2. Koalas that are captured and/or handled as part of a monitoring program will be vaccinated against chlamydia and have a tissue sample taken for genetic analysis, with the tissue samples lodged with the NSW Koala Biobank **(Year 1 onwards)**.

Appendix B: Recommendations from Office of the NSW Chief Scientist & Engineer (2020)

The information in this appendix was prepared in late 2020 in response to advice received from the first expert panel established by the Office of the NSW Chief Scientist & Engineer (OSCE 2020).

For the department's response to the more recent advice from the Office of the Chief Scientist & Engineer (OSCE 2021) please refer to the report [Response to advice from the Office of the NSW Chief Scientist & Engineer 2021](#) which was published on the department's website in November 2021.

Recommendation 1: Georges River Koala Reserve

The Georges River Koala Reserve should be protected and revegetated as set out in the draft Cumberland Plain Conservation Plan, ensuring that revegetation is undertaken in such a manner as to ensure long-term sustainability (i.e. species are planted to maintain genetic diversity and minimise kinship to ensure reproduction).

Connectivity and threats should be considered within this corridor.

Fencing should be placed on Appin Road and a connectivity structure be developed with the bridge over the Georges River

Analysis and response

'The Georges River Koala Reserve should be protected and revegetated...'

The CPCP commits to establish a reserve to protect the north–south koala movement corridor along the Georges River between Appin and Kentlyn. Commitment 10 includes specific actions outlining the staging of the reserve including restoration¹ of up to 80 hectares of land within the new reserve.

'...ensuring that revegetation is undertaken in such a manner as to ensure long-term sustainability (i.e. species are planted to maintain genetic diversity and minimize kinship to ensure reproduction)'

The CPCP commits to 'undertake ecological reconstruction of 25% of the offset target for native vegetation in areas secured for conservation within the Cumberland subregion' (Commitment 13). This includes an action to develop a restoration implementation strategy that will:

- provide a clear purpose for undertaking restoration, including how the CPCP will meet its restoration target for impacted native vegetation communities
- ensure the long-term sustainability of restoration considers genetic diversity in what is planted
- identify restoration potential of land within priority sites
- provide guidance on restoration expectations at priority sites
- identify opportunities for landholders to undertake active restoration as part of a biodiversity stewardship agreement
- identify and potentially fund restoration on land adjacent to conservation land established by the CPCP
- develop a seed-procurement approach
- determine any research needs.

¹ The NSW Chief Scientist & Engineer's uses the term 'revegetation' while the CPCP uses the term 'restoration'. These terms can be used interchangeably, and the intent is the same.

‘Connectivity and threats should be considered within this corridor.’

Connectivity within the north–south corridor along the Georges River is a priority for the CPCP to prevent further fragmentation of habitat that would limit koala movement and the function of the corridor. Therefore, the CPCP has committed to establishing the Georges River Koala Reserve and restoring habitat within it to ensure connectivity (see commitments 10 and 13).

Threats will be managed in this corridor in the same way as they will be managed across the whole of the CPCP Area (through koala-exclusion fencing and additional controls).

Monitoring will ensure that the commitments and actions are effectively managing threats to koalas in south-western Sydney. Commitment 23 gives several actions regarding health and welfare, including ‘monitoring of koalas including key threats and effectiveness of mitigation measures as part of the NSW Koala Monitoring Framework.’

‘Fencing should be placed on Appin Road and a connectivity structure be developed with the bridge over the Georges River.’

Fencing of Appin Road is identified at Action 4 in Commitment 7:

‘Install koala-exclusion fencing, in the vicinity of koala habitat, along both sides of Appin Road between Rosemeadow and Appin, to mitigate koala vehicle strikes at roadkill hotspots. Fencing along Appin Rd will be in addition to planned fencing works to be delivered by Transport for NSW.’

Providing dry passage for koalas under the Kings Falls Bridge is identified at Action 8 in Commitment 7:

‘...augmenting the existing Kings Falls Bridge at the Georges River by constructing a bench adjacent to the bridge abutments, to allow dry passage for koala (and other fauna) under Appin Road, supporting north–south koala movement from the Georges River Koala Reserve to the southern koala habitat.’

Recommendation 2a: Connectivity

Within the Greater Macarthur Growth Area covered in the draft Cumberland Plain Conservation Plan:

- the Ousedale Creek to Appin North Corridor (E) should be secured as the east–west corridor to connect the Georges River Reserve and Nepean Corridors. A suitable crossing structure (such as a culvert) should be constructed at Appin Road
- the Mallaty Creek to Georges River Corridor (D) should be fenced if feasible and protected in the event that suitable land cannot be purchased to finalise corridor E.
- If a crossing at E cannot be progressed, then an underpass across Appin Road should be developed at Corridor D. The measures to protect the corridors as in c) in the ‘Analysis and response’ below should be applied
- if a crossing at Corridor E is secured and a crossing at Appin Road for Corridor D not pursued, then a decision would need to be made based on the risk/benefits of maintaining the koalas and mitigation measures in Corridor D without a crossing at Appin Road
- the habitat in Corridor F should be protected including with exclusion fencing to minimise risks from threats, and with monitoring of risks to avoid a population sink.

Analysis and response

The east–west corridors are referenced in Action 1 of Commitment 12.

The Ousedale corridor has been selected as the priority corridor for protection through the CPCP as it supports vegetation in good condition and meets the corridor width recommended by the Office of the NSW Chief Scientist & Engineer (approximate width 598 metres). Securing and enhancing the Ousedale corridor will begin in the first 5 years of the CPCP. Restoration in key locations will improve the condition of habitat within the corridor.

All east–west corridors within the CPCP Area will be protected as avoided land and protected by the application of planning controls through the Biodiversity and Conservation SEPP as noted in Action 1 of Commitment 12:

‘Apply development controls to koala habitat protected under the CPCP and ensure safe, functional corridors for koala movement (consistent with advice from the Office of the NSW Chief Scientist & Engineer) including:

- a. the north–south koala corridor along the Georges River (as per Commitment 10)
- b. the north–south koala corridor along the Nepean River
- c. the east–west corridor along Ousedale Creek between the Georges River and Nepean River
- d. Elladale Creek and Simpsons Creek as an area of functional koala habitat
- e. the north–south koala corridor along Allens Creek
- f. excluding koalas from east–west corridors that do not meet the minimum requirements for a functional koala corridor (Corridor C: Nepean Creek to Beulah, and Corridor D: Mallyat Creek to Georges River).’

Corridors that are not considered safe for koala movement due to their narrow width will be fenced to exclude koalas as noted in point 1e of Commitment 12:

Recommendation 2b: Habitat

Habitat within identified corridors should be:

- protected (especially from development creep)
- widened through revegetation (average size 390 to 425 metres)
- include a buffer on either side of the corridor habitat that is at least 30-metres wide from the corridor to the exclusion fence with feed trees permitted in this buffer area
- include, between the buffer area and the urban areas, koala-proof fencing to prevent the movement of koalas out of the corridor into urban areas (with trees more than 3 metres from the fencing to avoid damage) and the movement of domestic dogs (amongst other potential threats) into the corridor
- for sites where exclusion fencing is infeasible due to steep terrain, then additional buffer width should be used (buffer approximately 60 metres), with a traffic speed limit of 40 km/h and predator/dog monitoring
- asset protection zone is outside the exclusion fencing, within the development footprint.

Further, connectivity structures within corridors should also be assessed including local roads and other infrastructure (for example, the Upper Canal).

Analysis and response

As above, the CPCP commits to protecting koala corridors by mapping them as avoided land and applying planning controls to protect habitat through the Biodiversity and Conservation SEPP (Commitment 12 Action 1).

Commitment 7 includes a range of actions designed to mitigate indirect and prescribed impacts on koalas including koala-exclusion fencing, community and stakeholder engagement, working with councils and other land managers to manage domestic animals, and providing safe fauna crossings at Appin Road (at Ousedale corridor and Kings Falls Bridge) and the Upper Canal (under investigation).

Recommendation 3: Monitoring and adaptive management

Monitoring should be undertaken to enable adaptive management of the koala population in the proposed Mount Gilead Stage 2 development and in the draft Cumberland Plain Conservation Plan. This monitoring should:

- be consistent across the region to ensure data and adaptive management strategy outcomes are comparable
- include trigger levels that enable actions for adaptive management, such as increased vehicle strikes, increased dog attacks or disease prevalence. As part of the planning process, targets should be set to gauge success
- align with best practice and the NSW Koala Monitoring Framework (as part of the NSW Koala Strategy) and data made available through the SEED portal and any tissue samples provided to the NSW Koala Biobank
- be funded by developers through the establishment of a monitoring trust
- monitor the movement of koalas in the region and understand use of the corridors and connectivity structures. The NSW Government should investigate the development of implantable sensor technologies, such as through the NSW Smart Sensing Network.

Analysis and response

The CPCP commits to 'support rehabilitation measures to help maintain koala health and welfare'. Commitment 23 includes an action to invest in the updated NSW Koala Strategy 2022 and other potential partners to implement the koala health and welfare program in south-western Sydney. One of the key deliverables of this program will be:

'monitoring of koalas including key threats and effectiveness of mitigation measures as part of the NSW Koala Monitoring Framework'.

Funding arrangements for the CPCP are outlined at Commitment 24 including specific actions such as establishing a trust and levying developers through a new Regional Infrastructure Contribution.

Recommendation 4: Disease prevention

Koalas that are captured and/or handled as part of a monitoring program or those that are rehabilitated and released back into the Campbelltown population should be vaccinated against chlamydia. If a joint vaccine for chlamydia and koala retrovirus is available, this should be used. Koalas with no microchip or other identifying features that are captured should have a tissue sample taken for genetic analysis, with the tissue samples lodged with the NSW Koala Biobank.

Analysis and response

The CPCP commits to this through Action 2 of Commitment 23:

'Koalas that are captured and/or handled as part of a monitoring program will be vaccinated against chlamydia and have a tissue sample taken for genetic analysis, with the tissue samples lodged with the NSW Koala Biobank.'

References



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