

Cumberland Plain Conservation Plan

Response to advice from the Office of the NSW Chief Scientist & Engineer 2021

Protection of koala populations associated
with the Cumberland Plain Conservation Plan

December 2021

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www.dpie.nsw.gov.au

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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 custodially 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 local 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, kinship, knowledge, songs, stories and art, as well as spiritual beings and people past, present and future.

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Ousedale Creek near its junction with the Nepean River is a steep incised gorge.



Introduction

The Cumberland Plain Conservation Plan (the Plan) seeks to avoid and minimise negative impacts to biodiversity and offset residual impacts on biodiversity from future development in the Wilton and Greater Macarthur growth areas, the Western Sydney Aerotropolis and the Greater Penrith to Eastern Creek Urban Investigation Area. The Plan also covers several major transport corridors in Western Sydney.

The Plan takes a landscape approach to offsetting these impacts and includes a range of specific conservation measures for koala habitat in the Wilton and Greater Macarthur growth areas, where koala populations in Campbelltown and Southern Highlands overlap (the southern Sydney koala population¹).

In April 2020, an independent expert panel formed by the Office of the NSW Chief Scientist & Engineer published its report, *Advice on the protection of the Campbelltown Koala population*. The draft Plan's conservation program developed specific commitments and actions to protect the southern Sydney koala population based on the recommendations in this report (found in [Sub Plan B: Koalas](#)).

In April 2021, the Minister for Planning & Public Spaces and Minister for Energy & Environment sought advice regarding the application of the Office of the NSW Chief Scientist & Engineer's recommendations and the adequacy of the Plan's koala-specific measures to support a long-term strategic landscape-scale outcome for koalas across the Wilton and Greater Macarthur growth areas.

A second independent expert panel chaired by the NSW Deputy Chief Scientist & Engineer Dr Chris Armstrong was established to provide this advice. The expert panel comprised Associate Professor Mathew Crowther (the University of Sydney), Dr Ben Moore (Western Sydney University) and Dr Martin Predavec (former Principal Scientist, NSW Department of Planning, Industry and Environment).

The panel provided updated advice to the department in May 2021. It included 31 principles to be applied in the region for the protection of the Southern Sydney koala population. It also includes an assessment of the Plan's proposed protection measures and how they relate to the principles. The department supports all 31 principles.

This document outlines how we have considered the 31 principles during the development of the final Cumberland Plain Conservation Plan, particularly the identification of koala corridors.



¹ The Cumberland Plain Conservation Plan uses the term 'Southern Sydney koala population' to refer to the two populations residing in the Campbelltown and Wollondilly local government areas. The Office of the NSW Chief Scientist & Engineer refers to this population as the south-western Sydney koala population.

Response to the principles



Principles for habitat and connectivity

1. Strategic planning

Habitat protection should be enabled through forward planning and commitments at a regional scale and over the lifetime of the development.

The Plan takes a landscape-scale approach to assessing and protecting biodiversity while planning for future urban development. Through the Plan we have identified and protected upfront the most important habitat for species' population viability and connectivity. The Plan removes these areas from future development and will help protect them by incorporating them into local and regional plans to guide future development in the nominated growth areas.

The Plan's conservation program comprises 26 commitments designed to improve ecological resilience and protect biodiversity over the 35-year life of the Plan.

2. Protected and connected

Retain, increase, restore and protect koala habitat, reducing fragmentation and increasing connectivity. The habitat should support the movement of koalas such that dispersing koalas can move through the landscape, can breed to ensure genetic diversity, and can access and persist in refugia in times of stress, bushfire, drought, or other threats.

The conservation program has been designed to maintain and improve the resilience of koala habitat at a landscape scale. It aims to retain existing koala habitat and increase koala habitat through restoration. The restored habitat will improve connectivity and mitigate threats to the koala population associated with fragmented

habitat patches. We will protect koala habitat in perpetuity by applying planning controls across the strategic conservation area and establishing new reserves and biodiversity stewardship sites.

The conservation program for koalas also addresses additional threats and impacts from development to support the resilience and persistence of the Southern Sydney koala population over the long term and in response to climate change.

3. Avoid dead ends and population isolation

Ensuring (as far as possible) that the habitat has multiple connections can help prevent the formation of dead ends and population sinks and ensure that koalas (and other species) have routes to move through the landscape.

The Plan aims to create functional koala corridors. Following the most recent advice, we reviewed our koala habitat and corridor mapping and the specific sites identified by the panel as dead ends and corridors. We have addressed these specific examples of dead ends and islands through changes to the mapping and the proposed fence alignment. Where we have identified dead ends, we will use fencing to prevent koalas from accessing those areas while protecting the vegetation.



Cleared land in the Georges River Koala Reserve will be replanted to create future koala habitat.

4. Corridors provide habitat

The term ‘corridor’ should not be misinterpreted to mean that its only function is a thoroughfare and the provision of connectivity. Not all identified corridors are suitable to provide connectivity for koalas, but the habitat should be protected for biodiversity values and amenity in the region, as well as protected koala habitat in some cases.

Functional koala corridors previously identified by the Office of the NSW Chief Scientist & Engineer (2020) will be protected as koala and fauna habitat. However, some corridors have been identified as not suitable for safe koala movement as they do not meet the requirements of a functional koala corridor. For example, they may not meet the average minimum width of 390 to 425 metres.

The Plan will protect the corridors identified by the Office of the NSW Chief Scientist & Engineer as a priority. These are the north-south corridor in the Georges River Koala Reserve and the east-west Ousedale Creek corridor.

In line with the latest advice from the Office of the NSW Chief Scientist & Engineer 2021, the koala corridor along the Nepean River has also been protected from urban development to secure future koala movement. All the remaining east-west corridors in the Plan Area will be protected as habitat for other species but will be fenced off to exclude koala movement. We may protect additional corridors through other planning processes in the surrounding areas outside the Plan Area.

5. Corridor widths

Corridors should be widened where feasible through revegetation to an average minimum width of 390 - 425 metres, include a buffer on either side (30 metres wide where fenced and wider to approximately 60 metres where fencing is not feasible), and trees should be 3 metres from the fence (to prevent tree branch damage to the fence).

We have completed a thorough review of all koala corridors to ensure they meet the recommended widths for functional koala habitat².

² Cumberland Plain Conservation Plan Functional Koala Corridors by Biosis for NSW Department of Planning, Industry and Environment, September 2021



This included reviewing the alignment and widths of koala corridors and any areas of concern (such as dead ends) highlighted by the expert panel.

We used koala suitability mapping from the NSW Koala Strategy 2018–2021 and slope data to inform the draft mapping of koala corridors. This mapping was verified in the field and we made adjustments to the corridors in some places. This resulted in amendments to the mapping of avoided land and certified land, particularly along the Nepean River where koala habitat is constrained in some places.

All corridors now meet the average width recommended by the Office of the NSW Chief Scientist & Engineer, except for a very small area where we deemed it not feasible due to existing development and zoning.

6. Larger area, shorter edges

Revegetation should be targeted to widen habitat units and corridors where feasible and aim to reduce the edge-to-area ratio of habitat ('fingers' or areas between strips of habitat could be infilled with vegetation).

We have completed a thorough review of all koala corridors to ensure they meet the recommended widths for functional koala habitat³. Following the review and considering the latest advice from the Office of the NSW Chief Scientist & Engineer (2021), we have widened the corridors where feasible to support a functional corridor for koalas in the future. This means we have removed some areas from the mapped certified land and included these in the adjacent land to be avoided. We will incorporate these mostly cleared areas into the strategic conservation area and target them for future revegetation.

7. Habitat buffers separate from asset protection zones

Buffer zones in corridors/habitat should be separate from asset protection zones (APZs), with APZs on the urban side of the exclusion fence.

We have incorporated this principle into the mapping of the urban-capable and avoided lands, with adjustments to corridor widths made where necessary. The Plan has ensured that buffers are located within the avoided land and that the APZ is located within the certified urban-capable land as per the recommendations shown in Figure A1 of the May 2021 advice.

The planning for the koala exclusion fencing will incorporate this principle, with all or the majority of the APZ being located on the urban side of the fence.

³ Cumberland Plain Conservation Plan Functional Koala Corridors by Biosis for NSW Department of Planning, Industry and Environment, September 2021

8. Target shale soils

Where possible, revegetation should target relatively higher quality soils to produce higher quality habitat – shale-based ‘Blacktown soil landscape’ is preferred to ‘Hawkesbury sandstone landscape’.

Restoration efforts through the Plan will focus on those communities that we need to offset. These include Shale Sandstone Transition Forest and Cumberland Plain Woodland – both of which typically occur on shale soils. We are preparing a restoration strategy to guide revegetation (ecological restoration) of koala habitat and threatened ecological communities. We will incorporate this advice into the strategy.

9. Earlier planting leads to more mature trees

Early implementation of koala habitat planting and restoration can lead to trees being at a more mature stage by the time they are needed. Areas that will improve connectivity and nutrition (based on soil type) should be prioritised.

The NSW government has provided funding to achieve some early restoration of koala habitat in the strategic conservation area. We are using this funding to prioritise planting and restoration of up to 80 hectares of cleared and degraded land in the Koala Reserve over the next four years. Early planting will include a mix of trees, shrubs and groundcovers with the priority being preferred koala food trees. Once the Plan is approved there will be a longer-term restoration program that will build on these early restoration efforts.

10. Prevent degradation of habitat

Early protection and active management will prevent the degradation and loss of existing habitat over time during development – engage community and stakeholders to protect habitat.

The Strategic Conservation Planning State Environmental Planning Policy (SEPP) will include planning controls to protect koala habitat in avoided land and the strategic conservation area. These controls are designed to avoid or

minimise impacts of development on biodiversity values and support the protection, expansion and restoration of koala habitat.

We are using early implementation funding to purchase lands and secure priority corridors. This includes establishing biodiversity stewardship agreements in koala habitat within the strategic conservation area.

When the final Plan is released, we will launch an education and engagement program to help the community and landowners in Western Sydney better understand the important role they can also play in conservation and encourage them to protect their local koala habitat.

11. Plan for climate change

Consider water sources, soil types, tree varieties, and well connected refugia.

The conservation program aims to support species resilience. Part of this is ensuring the actions in the Plan are implemented in a way that recognises the impacts of climate change. The Plan supports programs that help threatened ecological communities, species and their habitats adapt to climate change in the Cumberland subregion. This includes funding research to identify the most at-risk species and ecological communities and identifying priority locations (such as refugia) to support persistence and adaptation of species and ecological communities in the subregion. We have partnered with Western Sydney University to develop and begin the research strategy for the Plan.

We have mapped all major riparian corridors as avoided land. The only riparian areas that have not been avoided for development are first and second order streams where there is no vegetation. This is in response to public feedback during the exhibition period.

Securing connected habitat at a landscape scale is a primary objective of the conservation program and forms the basis of the selection of lands for the strategic conservation area.



Principles for fauna crossings for linear infrastructure

12. Safe movement

Infrastructure that will cut across a designated corridor should include underpass or overpass structures to enable the movement of koalas along the corridor. Any infrastructure (such as roads) that cross, or might have an impact on, the corridor should be designed to be sympathetic to the protections of the corridor and to enable safe access across or under the linear infrastructure.

We are working with Transport for NSW to minimise impacts to koala corridors and threatened ecological communities. This includes collaborating on the design of major transport corridors such as the Outer Sydney Orbital (OSO).

Future infrastructure will be designed to minimise impacts on threatened species and koala movement corridors including at Wianamatta Regional Park and South Creek (OSO Stage 1), and in the Appin area (OSO Stage 2).

We are working with Transport for NSW and WaterNSW to design suitable structures to allow safe passage across Appin Road and the Upper Canal (see the response to principle 14).

We have developed the 'Cumberland Plain Conservation Plan Infrastructure Guidelines' which are designed to avoid or minimise impacts on biodiversity from infrastructure activities over the life of the Plan.



A concrete culvert allows fauna to cross safely under Picton Road at Wilton.



Kings Falls Bridge at Appin Road will be retrofitted to allow safe koala passage under the bridge.

13. Fencing underpasses

Suitable fencing and connecting habitat should be put in place early enough through the process so that it is complete by the time the infrastructure is constructed.

Koala safety is a priority of the Plan. We intend to have fencing constructed at the same time as the construction of all underpasses. Restoration of vegetation to ensure supporting habitat and safe movement near of the underpasses will also be a priority where practical.

We are working with Transport for NSW to prepare environmental assessments and detailed survey work on the proposed Appin Road underpass. The timing of construction is not yet confirmed and is dependent on other Transport for NSW construction projects. We will construct a short section of fencing as part of the underpass project to direct koalas towards a safe crossing of Appin Road.

14. Underpass design

Construction of connectivity structures for roads – overpasses, underpasses (including road bridges) or culverts, with associated exclusion fencing, cattle grids, gates to prevent koalas entering the roadway. Design underpasses to maximise the likelihood of koala use – look to the latest evidence, include attributes such as clear line of site, avoidance of predator death traps, keep dry, and include furniture such as logs for koalas, the bigger the better.

We are working with Transport for NSW to design a suitable underpass structure at Appin Road based on previous experience in other parts of NSW. We have completed a feasibility study. The proposal is for a 2.4 metre by 2.4 metre box culvert with a clear line of sight, including clear line of sight and log furniture. The final dimensions of the culvert may change subject to detailed design assessment.

The proposed passage under Kings Falls Bridge will comprise one or two retrofitted ledges to provide dry passage with log furniture where required. A feasibility study is underway.

We are also working with WaterNSW to ensure safe koala passage across the Upper Canal water pipeline at Ousedale Creek. A feasibility study will begin late this year.

Principles for threat mitigation

15. Exclusion fencing

Maintaining a separation between koalas and threats using exclusion fencing should be a priority, and where this is not feasible (e.g. steep terrain), fallback measures to reduce risk (e.g. vehicle speed limits) and monitoring should be undertaken. Fencing should be adaptively managed with design, location and maintenance evaluated.

We will construct koala exclusion fencing as part of implementing the plan to protect the southern Sydney koala population. A feasibility study for the proposed fencing is underway.

In areas where fencing is not feasible (due to creek crossings or heritage constraints for example), a larger buffer will apply (at least

60 metres). Consistent with advice from the Office of the NSW Chief Scientist & Engineer (2020), koala-specific development controls will apply to this land to mitigate threats before construction, during construction, and in the design and operation of development. In addition, certain koala controls will also apply to either all certified urban-capable land regardless of exclusion fencing or on certified land adjacent to koala habitat.

The fencing of Appin Road will be a priority over the first 5 years, with fencing around urban-capable lands to be constructed as they are developed. We have started a community engagement program and through this we will be consulting with stakeholders and the community about the purpose and location of the fencing.



The fencing of sections of Appin Road will be a priority for the early years of the Plan.

16. Spatial and temporal planning for threats

Threat mitigation and reducing stressors should be enabled through forward planning and commitments at a regional scale and over the lifetime of the development.

The Plan identifies actions to address 5 key landscape threats to threatened species and threatened ecological communities across Western Sydney. These actions are:

- managing and controlling the extent of weeds
- managing emergent pest species
- managing bushfire risk
- managing key diseases
- supporting climate change adaptation.

We will be introducing programs for mitigating each of these threats at a landscape scale, which we will implement over the life of the Plan.

17. Reducing impacts from construction

Ensure processes are in place to protect koalas during construction and operational phases of the development (e.g. an onsite ecologist present through the duration of pre-clearance surveys and clearing works, koala and wildlife relocation protocols, tree-felling protocols, and education programs for construction workers).

The development control plan (DCP) template developed through the Plan comprises koala-specific controls to mitigate threats to koalas during pre-construction, development design, and construction. Pre-construction controls include the requirement for a koala survey and assessment prior to clearing (including translocation if required), a tree-felling protocol for clearing, and controls for site hygiene. Also included is a control for temporary fencing for onsite koala habitat protection, and construction-specific traffic mitigation measures.

Pre-construction koala controls apply where koala exclusion fencing is not installed. Construction traffic calming measures apply to all certified land and mitigate threats to all fauna.

18. Sensitive urban design

Urban design should include traffic calming measures, planning of greenspace, avoid koala feed trees in the urban footprint, ensure domestic dogs are secured in neighbourhood backyards, and fauna sensitive design.

The DCP template (see principle 17) provides development controls for koala-sensitive precinct design. This includes traffic calming measures, avoidance of koala feed trees in urban land, and requirements for dog-proof fencing.

Although the DCP template includes controls that require dog containment fencing be considered in development design, the regulation and containment of dogs in backyards is beyond the scope of the NSW planning system and may be regulated by council's guidelines. We are establishing a council working group as part of the Plan's governance and this is one of the issues that can be raised through that forum.

19. Avoid stressors that repel koalas

Some effects of increasing urbanisation can increase koala stress levels, which in turn can lead to changed patterns of behaviour, avoidance of exposed habitat, and increased propensity to disease. Utilise approaches to reduce these effects including buffers.

The Plan incorporates many mitigation measures designed to reduce impacts and stress on koalas resulting from increased urbanisation. This includes application of advice from the Office of the NSW Chief Scientist & Engineer on 30 metre buffers, the use of exclusion fencing where feasible to separate koalas from urban areas and roads, and the use of development controls where fencing is not feasible.



Principles for disease management

20. Avoid chlamydia incursion

Much of the koala population within the Cumberland Plain Conservation Plan area appears to be free of *Chlamydia pecorum* infection. Planning and delivering protection measures should be progressed to maintain this disease-free status as much as possible, and to respond to it should it emerge.

The NSW Government is currently updating the NSW Koala Strategy 2018-2021. The department will partner with the updated Strategy to fund the Plan's commitments around monitoring the status and health of koalas in southern Sydney. We have established a disease monitoring program in the Campbelltown koala population (see principle 21) under the NSW Koala Monitoring Framework.

The framework details actions that will be triggered if *Chlamydia* enters a *Chlamydia*-free location such as Campbelltown.

Through the monitoring framework, we are working to understand more about the genetic fitness of the Campbelltown koala population. The Campbelltown koala population has been designated as a site for the statewide genomic sequencing program (conducted by the University of Sydney and partners). Tissue samples were collected in May and June 2021. Tissue and scat samples were also collected for disease assessment. This will help to inform a management regime that balances genetic diversity and movement corridors with the risk of *Chlamydia* entering the Campbelltown population.



Monitoring will help us to understand more about the health and genetics of koalas in the Campbelltown area. Photo: Sarah Pulling/Bear Hunt Photography



21. Identify koala routes and monitor for disease

There is a need to have a monitoring stream that targets *Chlamydia* entry into, and potentially within, the Campbelltown population. This should target specific locations where the Southern Highlands population may intersect.

The Campbelltown population was monitored under the NSW Koala Strategy 2018–2021 and it is intended that this will continue with new funding. The first surveys along the likely path of disease incursion were done in 2018. These have been repeated and extended using new technology (thermal imagery from drones, detection dogs) in 2021, funded by the Plan’s early implementation program. This survey work will help gain a greater sample size and more robust estimate of *Chlamydia* prevalence.

22. Vaccine trials

The Campbelltown koala population may be a good place to conduct a vaccination trial, given its *Chlamydia*-free status. Given the early stage development of the vaccination, a trial could be conducted on the interface between the two populations (the Campbelltown and the northern Southern Highlands populations). Vaccines are still unproven so are not yet a basis for management.

The need for a vaccine trial was informed by the 2021 disease monitoring program of the NSW Koala Strategy 2018–2021 (see principles 20 and 21). It is likely there will be a *Chlamydia* incursion at some point in the future and it makes good sense to start investigating a vaccination trial in readiness for this.

23. Adaptive management for disease

There should be the development of monitoring that matches triggers for actions: actions should be commensurate to the detection level.

See the responses to principle 22 for disease management and principle 28 for adaptive management.

We intend to reinforce these methods with the adaptive management approach in the updated Koala Strategy. We will use both active and passive adaptive management informed by monitoring and local circumstances to assist in managing the complexity inherent in koala conservation work.



Principles for adaptive management

24. Baseline data set

Baseline data are required to better understand the status of the population(s), including numbers, distribution and how they functionally use the landscape.

Monitoring data from previous koala surveys in the Campbelltown area has helped inform the koala protection measures in the Plan. We intend to fund ongoing site-specific monitoring of the Campbelltown–Wollondilly populations under the updated Koala Strategy to increase understanding of the koala population numbers, trends and distribution, use of different vegetation types, genetics and disease status. We will capture data under the NSW Koala Monitoring Framework.

25. Surveys and monitoring

Ongoing and regular survey and monitoring efforts compared against the baseline, to detected population trends over time and inform adaptive management approaches (including the development and understanding of appropriate triggers and responses, including timeframes).

As in the response to principle 24, the updated Koala Strategy intends to support ongoing monitoring of the Campbelltown–Wollondilly populations. The data generated from monitoring programs under the NSW Koala Monitoring Framework will feed into the adaptive management process of the proposed strategy. It will contribute to evaluation of the success



Ongoing monitoring of the Southern Sydney koala population will help inform the adaptive management of the Plan. © George Madani/DPIE

of management actions in achieving the long-term goal to increase koala numbers and ensure genetically diverse and viable populations across the state. The cyclical nature of the adaptive management process allows modification of actions if objectives are not being met, so that they provide better conservation outcomes for koalas.

26. New monitoring technologies

New monitoring approaches enabled by smaller, cheaper, more sensitive devices that are connected and remote will increase the extent and value of monitoring programs.

New technology (thermal imagery from drones and detection dogs) has been used in the 2021 population and disease surveys of the Southern Sydney koala population. The updated Koala Strategy will continue to support the development of new and innovative monitoring technologies.

27. Interface monitoring with the NSW Koala Monitoring Framework

Monitoring should inform the NSW Koala Strategy, as a designated monitoring site. Site-specific monitoring will need to be conducted within the Cumberland Plain Conservation Plan area, and that will evolve over time.

The Plan will fund ongoing monitoring of the local koala population to increase our understanding of the status, genetics and movement of koalas in south-western Sydney. As in the response to principle 25, the data generated from monitoring programs under the NSW Koala Monitoring Framework will feed into the adaptive management process of the updated Koala Strategy. We will monitor any koala crossings on infrastructure constructed as part of the Plan under the NSW Koala Strategy Monitoring Framework.

28. Adaptive management informed by triggers

Monitoring should include evaluation points tied to management ‘trigger’ actions and responses.

In the NSW Koala Strategy Monitoring Framework, sampling objectives have been set in each section with ecologically meaningful points that require action. These points may indicate undesirable changes (such as declines in occupancy) but could also indicate positive outcomes (for example increases in koala habitat due to land purchases). The frequency with which trends should be evaluated is also specified.

Through the updated Koala Strategy, monitoring partners will provide data to the department in accordance with the requirements of their programs. When a sampling objective is reached, it will be assessed by the NSW Koala Monitoring Expert Panel and a recommendation for action will be presented to the department’s Environment, Energy and Science Group NSW Koala Strategy Program Board. If a serious or rapid change is detected, for example if *Chlamydia pecorum* is detected in a naïve population, an immediate response will be put in place. An extraordinary meeting of the NSW Koala Monitoring Expert Panel would be called so that action (such as a vaccination program) could be implemented as soon as practicable.

29. Timely mitigation

As per an adaptive management approach, a lack of information should not preclude mitigation activities occurring in a timely manner.

The Plan includes an adaptive management framework to account for major changes that cannot be forecast by the Plan’s risk management process and implementation planning. The Plan’s evaluation program will identify these large-scale risks up front and monitor changes through the life of the Plan, with linkages to the updated Koala Strategy and the NSW Koala Strategy Monitoring Framework.

The NSW Government will also commission an independent review on the status of the Plan every 5 years. If required, the updated Koala Strategy will be adaptively managed in consultation with the department's Environment, Energy and Science Group to respond to any unforeseen changes, or where actions are not having the desired outcome. When there is an absence of scientific certainty to inform decision-making, the approach will incorporate the precautionary principle.

30. Understand alternatives

There is a need to map alternative management approaches that could be employed if actions are not achieving the desired results.

The Plan includes an adaptive management framework with regular review of outcomes to see if actions are achieving the desired results (see principle 29). This approach will ensure the long-term 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 updated Koala Strategy will also apply an adaptive management process, including a regular review of outcomes. Adaptive management will occur at the project level (the koala monitoring project) and at the program level (5-yearly reviews). There will be links to other programs under the updated Koala Strategy (such as the land purchase program and private land conservation program) that we could explore if actions are not deemed to be effective.

31. Risk-based emergency response protocols

Interested stakeholders undertake a risk assessment (likelihood and consequence) and establish monitoring and response protocols – for threats with a fast or slow onset.

Risks to koala populations include habitat loss, vehicle strike, attack by domestic dogs, disease and fire. Some of these are being addressed directly through the Plan including vehicle strike and urban-related threats through fencing and development controls. It is intended that other risks to koalas in the Plan area, such as disease and fire, will be addressed through the updated Koala Strategy. Each of these programs will work in parallel and help inform the other's adaptive management program.

The proposed monitoring program will review koala population trends and identify impacts/priorities of threats in the Campbelltown area and the effectiveness of actions to mitigate them.



Bushland along the Nepean River is part of a primary koala corridor.

Next steps

We have updated the Plan to reflect feedback received from community, landholders, and stakeholders during public exhibition and the latest advice from the Office of the NSW Chief Scientist & Engineer. The Plan's mapping including koala corridors are being incorporated into local and regional planning for the Greater Macarthur and Wilton growth areas.

The Plan has been submitted to the NSW and Commonwealth Ministers for the Environment for their consideration. It is expected that State and Federal regulators may take up to six months to assess the Plan, and changes or conditions may be set prior to the Plan's final approval. The Plan is expected to be finalised and released in 2022 and the department will provide further information about the Plan's finalisation once there is greater certainty of the regulator's views on the Plan.



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