



Principles for Koala Protection in the Greater Macarthur and Wilton Growth Areas and Surrounds

Draft Response to the NSW Chief Scientist and Engineer Report

In May 2021 an independent expert panel formed by the Office of the NSW Chief Scientist & Engineer published its report and provided Advice on the protection of the Campbelltown Koala population including 31 principles to be applied in the region.

The expert panel chaired by the NSW Deputy Chief Scientist & Engineer Dr Chris Armstrong was established and membership included:

- Associate Professor Mathew Crowther, School of Life and Environmental Sciences, the University of Sydney
- Dr Ben Moore, Hawkesbury Institute for the Environment, Western Sydney University
- Dr Martin Predavec, Retired, former Principal Scientist, Department of Planning, Industry and Environment

This draft working document outlines how our Koala Conservation Plan supports all 31 principals outlined by the [Report](#) and the framework we have put in place to support koala corridors throughout the Gilead site.

PRINCIPAL	ASSESSMENT & DETAILS
1.0 Habitat and connectivity	
<p>1. Strategic planning Habitat protection should be enabled through forward planning and commitments at a regional scale and over the lifetime of the development.</p>	<p>Exceeds - Strategic habitat protections extend beyond the lifetime of the development.</p> <ul style="list-style-type: none"> • A strategic approach to habitat protection was taken through a strategic biodiversity assessment under the Threatened Species Act. • The strategic conservation strategy has been developed at a regional scale and provides regionally significant outcomes. • Habitat will be protected in perpetuity; these protections are fully funded and will exceed the lifetime of the development.
<p>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</p>	<p>Meets - The revised development footprint increases retained habitat, connecting existing habitat by increasing areas of restored habitat.</p> <ul style="list-style-type: none"> • Over 200 hectares of koala habitat retained, and an additional 50 hectares of

<p>access and persist in refugia in times of stress, bushfire, drought, or other threats.</p>	<p>pastureland will be restored to koala habitat</p> <ul style="list-style-type: none"> • Increased connectivity between the Georges River and Nepean River via Menangle Creek (Corridor A) and Woodhouse Creek (Corridor B) • Continuous vegetated corridors with no habitat gap crossing thresholds supporting koala movement • Buffer areas between corridors and urban areas to provide refuge and buffering from light and noise. • Vegetated wetlands and basins in corridors to provide refuge from bushfire and drought. • Exclusion fencing between corridors and urban areas to separate dog and other threats.
<p>3. Avoid dead-ends and population isolation Ensuring (as far as possible) that the habitat has multiple connections can help to prevent the formation of dead ends and population sinks and ensure that koalas (and other species) have routes to move through the landscape.</p>	<p>Meets - The revised development footprint (in connection to the CPCP) eliminates the dead end at Noorumba Reserve.</p> <ul style="list-style-type: none"> • Underpasses at Noorumba and Beulah Reserves avoid dead-ends and provide safe passage through the landscapes of the Georges and Nepean rivers. • Enhanced corridors along the Nepean River, Menangle Creek and Woodhouse Creek provide multiple connections points not functioning today, avoiding potential population sinks.
<p>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.</p>	<p>Exceeds - Areas of protected habitat extend beyond the koala corridors.</p> <ul style="list-style-type: none"> • Habitat along Nepean Creek and other areas have been retained and protected for wider biodiversity values. • Protected habitat will also benefit other vulnerable and endangered species like: <ul style="list-style-type: none"> ○ Parrot ○ Southern Grey Ear Flying Fox ○ Swift Myotis ○ Large-eared Pied Bat ○ Squirrel Glider ○ Powerful Owl
<p>5. Corridor widths Corridors should be widened where feasible through revegetation to an average minimum width of 390 - 425 m, include a buffer on either side (30 m wide where fenced and wider to ~ 60 m where fencing is infeasible), and trees</p>	<p>Meets - The revised development footprint increases nominated corridors along Woodhouse Creek, Menangle Creek and the Nepean River.</p> <p>DPIE conducted an independent mapping of the corridors across all of Greater Macarthur for</p>

<p>should 3 m from the fence (to prevent tree branch damage to fence)</p>	<p>consistency with the advice from the Office of the NSW Chief Scientist.</p> <p>The independent mapping provided by DPIE have been adopted into the planning for the development.</p> <p>In addition to the ecological conservation areas, heritage protected Mount Gilead Homestead will remain a 150ha example of colonial farmlands. As possible since agricultural clearing first occurred these areas remain available for koala movement, taking into account the Mount Gilead Homestead the revised corridor movement corridors would Exceed the recommendations of the NSW Chief Scientist.</p>
<p>6. Larger area, shorter edges - Revegetation should be targeted to widen habitat units and corridors where feasible and aim to reduce the edge: area ratio of habitat (i.e. 'fingers' or areas between strips of habitat could be infilled with vegetation).</p>	<p>Meets - The revised development footprint will revegetate over 50 hectares of cleared pasture lands to woodlands, widening corridors along Woodhouse Creek, Menangle Creek and the Nepean River.</p>
<p>7. Habitat buffers separate from APZ - Buffer zones in corridors/habitat should be separate from Asset Protection Zones (APZs), with APZs on the urban side of the exclusion fence.</p>	<p>Meets - All APZ's are excluded from the corridors including buffer areas.</p>
<p>8. Target shale soils - Where possible, revegetation should target relatively higher quality soils (i.e. to produce higher quality habitat) – shale-based 'Blacktown soil landscape' is preferred to 'Hawkesbury sandstone landscape'.</p>	<p>Meets - Revegetation is predominately focused on areas within the Blacktown soil landscape. While revegetation will occur within Hawkesbury sandstone landscape to support widening of corridors.</p>
<p>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.</p>	<p>Exceeds - The removal of grazing stock from future conservation areas has resulted in a natural recovery of tree saplings, this in combination with early planting has been incorporated into the conservation methodology since 2015.</p>
<p>10. Prevent degradation of habitat - Early protection and active management will prevent the degradation and loss of existing habitat over the time during development – engage community and stakeholders to protect habitat.</p>	<p>Exceeds - The removal of grazing stock and fencing of future conservation areas will prevent further loss of habitat. Construction management plans ensures that habitat is protected during all phases of the development.</p>
<p>11. Plan for climate change - Consider water sources, soil types, tree varieties, and well connected refugia.</p>	<p>Exceeds - The development of the Koala Conservation Plan for the project allows for adaptative management throughout the development.</p>

2.0 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.	Meets - Where infrastructure is required to cut across a nominated corridor, underpass structures will be installed to ensure connectivity is maintained or improved.
13. Fencing underpasses - Suitable fencing and connecting habitat put in place early enough through the process so that it is complete by the time the infrastructure is constructed.	Meets - Fencing will be installed prior to works commencing.
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. Designing 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, include furniture such as logs for koalas, the bigger the better.	Meets - Underpasses have been proposed to Appin Road and will be designed with input for specialist ecologists with experience in koala movement. Were exclusion fencing in conjunction with gates and grates have been proposed to private access points.
3.0 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.	Meets - Exclusion fencing will be installed along all conservation corridors. The Koala Conservation Plan includes adaptive management processes to evaluate the effectiveness of fencing and other safety devices.
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.	Meets - Planning for the development has been completed at a regional scale and in consultation with the Cumberland Plain Conservation Plan. Commitments. Management planning to address threats and stressors include: <ul style="list-style-type: none"> • Active predator management • Weed control • Bushfire • Flooding • Water Cycle management

<p>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.</p>	<p>Exceeds - The implementation of Construction Environmental Management Plan identifies and describes how construction works might impact on the biodiversity values of the site, and to set out clear commitments on how these impacts will be avoided, minimised and managed. Including:</p> <ul style="list-style-type: none"> • Environmental inductions for all contractors • Pre-clearance protocols • Wildlife relocation protocols • Dam dewatering
<p>18. Sensitive urban design - Traffic calming measures, planning of greenspace, avoid koala feed trees in urban footprint, domestic dogs secured in neighbourhood backyards, fauna sensitive design</p>	<p>Meets - Exclusion Fencing will be installed to all koala corridors. Site specific planning controls (DCP) will outline:</p> <ul style="list-style-type: none"> • Fencing requirements for residential dwelling • Guidelines for the design of roads adjacent to corridors • Guidelines for the design of open space areas. • Trees for planting within urban areas.
<p>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, increased propensity to disease. Utilise approaches to reduce these effects including buffers.</p>	<p>Meets - The use of buffers to all conservations will reduce effects of urbanism. The detailed design of road adjacent to corridors will reduce light emissions into corridors.</p> <p>Increasing areas of habitat and connectivity with buffer areas will lead to a reduction of edge effects.</p>
<p>4.0 Disease management</p>	
<p>20. Avoid chlamydia incursion - Much of the koala population within the CPCP appears currently 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.</p>	<p>Meets - The site is situated within the central koala occupancy area and is unlikely to see interaction with other koala populations, the adaptive monitoring program will allow for monitoring of the population for increased signs of disease.</p>
<p>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.</p>	<p>Meets - The site is situated within the central koala occupancy area and is unlikely to see interaction with other koala populations, monitoring for symptoms will be a key focus for the monitoring program.</p> <p>Sharing knowledge with the NSW koala strategy and other monitoring program will allow for early</p>

	indicators for disease to be identified and managed.
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 population). Vaccines are still unproven so not yet a basis for management.	Meets - The site can be used for vaccine trials as part of the NSW Koala Strategy.
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.	Meets - A monitoring program has been put into place, this program will be expanded to include DNA analysis
4.0 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.	Meets - A base line monitoring program was completed using thermal drone and detection dogs in 2021.
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).	Meets - Annual monitoring programs will be completed using thermal drone surveys.
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.	Exceeds - A trial of monitoring techniques was conducted in 2021.
27. Interface monitoring with 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 CPCP and that will evolve over time.	Meets - Results from annual monitoring programs have been shared with Council and DPIE.
28. Adaptive management informed by triggers - Monitoring should include evaluation points tied to management 'trigger' actions and responses.	Meets - The Koala Conservation Plan includes adaptive management processes to evaluate changes in koala over the life of the project. The initial phase is focused on occupation of the site the next phase will focus on movement and effectiveness of crossing structures.
29. Timely mitigation - As per an adaptive management approach, a lack of information should not preclude mitigation activities occurring in a timely manner.	Meets - The Koala Conservation Plan includes adaptive management processes which allows for the timely adaptive management outcomes.

<p>30. Understand alternatives - There is also a need to map alternative management approaches that could be employed if actions are not achieving the desired results.</p>	<p>Meets - The Koala Conservation Plan includes adaptive management processes, in consultation with Council and DPIE alternate management approaches can be implemented at a regional scale.</p>
<p>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.</p>	<p>Meets - The Koala Conservation Plan and the Construction Environmental Management Plan includes protocols for emergency responses.</p>

Next steps

This working document will be reviewed and updated in line with Government policy and planning changes. For further insights please download the full [Koala Conservation Plan](#).

