GREENCAP
Going Further in Managing Risk

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INDEPENDENT REVIEW OF KOALA RELATED MATTERS

July 2020
J168283

Monaltrie 2480 Pty Ltd

Monaltrie Village Precinct

GREENCAP
Going Further in Managing Risk

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Independent Review of Koala Related Matters
Monaltrie 2480 Pty Ltd
Monaltrie Village Precinct

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1 BACKGROUND

Greencap Pty Ltd (Greencap) understands that Monaltrie 2480 Pty Ltd (Monaltrie 2480) have produced a planning proposal to rezone land at 57 Durheim Road as well as 40 and 70 Monaltrie Lane, Monaltrie. The Site is described as: Lot 3 DP 1002771, Lot 4 DP 789389, Lot 5 DP 774499 and Lot 4 DP 24539.

The land is intended to be rezoned from rural to large lot residential zone. It is understood that in undertaking its due diligence for the project, Monaltrie 2480 and consulting planners Newton Denny Chapelle have met with Lismore City Council (Council) staff. In this meeting the proponents raised the suggestion to have the assessment and technical reports submitted to support the planning proposal to date independently peer reviewed and a report be provided to Council.

2 OBJECTIVE

The objective of this project is to provide independent peer review, assessment and advice on the standing of the planning proposal in relation to koala related matters.

3 SCOPE

The scope of this project includes the preparation of an independent peer review report relating to the standing of the proposed project with consideration of the Comprehensive Koala Plan of Management for south-east Lismore (Lismore City Council [LCC] 2013; CKPOM) incorporating reviews of:

- Legislative context.
- Preliminary Ecological Assessment, Monaltrie Investigation Area – A report to the Clarke, Munce and Piper Families (Blackwood 2016).
- Report – Rezoning Planning Proposal from RU1 Primary Production zone to Large Lot Residential at Durheim Road, Monaltrie Lane and Wyrallah Road, Monaltrie (LCC 2017). This report incorporates comments from:
  - Council ecologist (p. 30, 32); and
  - The former Office of Environment and Heritage (OEH; Table 1, Attachment 2).
- Koala Connectivity: Identifying least-cost dispersal pathways for koalas within the Lismore Comprehensive Koala Plan of Management (CKPoM) planning area. Report to the Department of Planning, Industry and Environment (Biolink 2019).

In conjunction with the above review, a brief site assessment was conducted to observe relative ecological constraints relating to koalas and undertake a qualitative allocation of vegetation communities that have been identified on the Site to draft Plant Community Types.

4 PART 1 – LEGISLATIVE CONTEXT

4.1 State environmental legislation

4.1.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal legislation regulating land use in NSW. The EP&A Act provides the framework for land use planning and the assessment of development proposals in NSW. The Act provides for a number of environmental planning instruments including State Environmental Planning Policies (SEPP) and Local Environmental Plans (LEP).

SEPPs pertain to matters of State or regional environmental planning significance and may identify specific planning controls for certain areas and/or types of development. SEPPs may also identify the type of environmental assessment that is required. Of relevance to this proposal is the current State Environmental Planning Policy (Koala Habitat Protection) 2019 (Koala Habitat Protection SEPP) and the repealed State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44). Each are detailed further in the subsections below.

LEPs provide a framework for the way land can be used and to guide planning decisions within a local government area (LGA) through the application of land use zones and development controls. The plan-making 'Gateway' process falls under Part 3 of the EP&A Act. LEPs and amendments to LEPs commence with a planning proposal for a development. The Gateway determination is a checkpoint for planning proposals and ensures there is sufficient justification early in the process to proceed with a planning proposal.

This proposal is yet to seek an endorsement from the elected Council to forward the planning proposal to the Department of Planning, Industry and Environment (DPIE) for a Gateway determination.

4.1.1.1 State Environmental Planning Policy No 44 – Koala Habitat Protection

In response to declining koala populations across NSW, SEPP 44 was enacted in 1995 to encourage the conservation and management of areas of vegetation that provide habitat with the aim on ensuring a permanent free-living koala population and to reverse the decline of koala population. SEPP 44 applied to a number of LGAs in NSW, including Lismore LGA.

The SEPP provided for the preparation of comprehensive koala plans of management for the part of or a whole LGA and for individual koala plans of management for specific development sites. Lismore City Council has a Comprehensive Koala Plan of Management for south-east Lismore 2013 (CKPOM; LCC 2013) that was approved by Director General of the former Department of Planning and Infrastructure. The site is located within the Koala Planning Area to which the CKPOM applies.

4.1.1.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

At the time that the Koala Habitat Protection SEPP 2019 was enacted SEPP 44 was repealed. The Koala Habitat Protection SEPP applies to a range of LGAs in NSW, including Lismore LGA. As the site is located within the Koala Planning Area to which the CKPOM applies, under the savings provision relating to plans of management of the Koala Habitat Protection SEPP (Part 4, Clause 16) the CKPOM continues to apply.

4.1.2 Biodiversity Conservation Act 2016

The purpose of Biodiversity Conservation Act 2016 (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community consistent with the principles of ecologically sustainable development. In particular, the BC Act aims to:

- Conserve biodiversity both at bioregional and State scales;
- Maintain the quality of ecosystems;
- Enhance the ability of ecosystems to adapt to climate change;
- Improve and support knowledge, data and resource sharing in the community;
- Assesses the extinction risk of species and ecological communities;
- Identify key threatening processes;
- Regulate human-wildlife interactions, based on risk;
- Slow the rate of biodiversity loss, and conserve threatened species; and
- Provide expert advice and knowledge to support the Minister on biodiversity conservation matters.

Notably, the BC Act provides for the Biodiversity Offset Scheme (BOS) which establishes the creation of biodiversity credits and a market-based system for trading biodiversity credits. This market-based system is the mechanism that enables credits to be acquired by proponents who have a biodiversity offset obligation. The BC Act legislates the 'avoid, minimise and offset' hierarchy to manage impacts on biodiversity.

The Act also provides for the establishment of a state-wide biodiversity assessment method through the Biodiversity Assessment Method Order 2017 (BAM). The BAM details the method by which the existing biodiversity values of a proposed development site are assessed; and how the impacts of a proposed development on the existing biodiversity values are quantified. The role of an accredited person has also been established to undertake these assessments. The benefits of the BAM are that:

- It is a repeatable, transparent method;
- It enables more predictable outcomes for both biodiversity and proponents;
- Proponents have a choice of a range of methods for offset delivery;
- Conserved areas of bushland are potentially valuable in the credit offset market.

Should the Site be rezoned and the project proceed to a Development Application for subdivision, this project is classified as a Local Development within the meaning under Part 4 of the EP&A Act and must be assessed in accordance with the BAM by an accredited person.

4.2 Local environmental legislation

4.2.1 Lismore Local Environmental Plan 2012

The Lismore Local Environmental Plan (LEP) 2012 is the principal document used to guide planning decisions within the Lismore LGA through the application of land use zones and development controls.

In response to community concern regarding the application of environmental zones (E zones) and environmental overlays by Councils in the Ballina, Byron, Kyogle, Lismore and Tweed LGAs, in 2012 the Minister for Planning commissioned an independent review of the way E zones and overlays were applied. The final report (DPE 2015) provides recommendations around an approach to applying E zones and other mapped planning controls to land within the above LGAs. Following publication of the report, a ministerial direction (s. 117 Direction) was issued, requiring Councils in the above LGAs to use the criteria set out in Tables 1 and 2 of DPE (2015) when determining whether to apply an E2 Environmental Conservation or E3 Environmental Management zone.

Should the planning proposal include environmental zones, then the criteria set out in Tables 1 and 2 of DPE (2015) apply.

4.2.2 Comprehensive Koala Plan of Management for south-east Lismore 2013

In 2013 Lismore City Council prepared the CKPOM to protect koalas and their habitats more effectively. To this end the plan sets out management activities and a development assessment framework. For Development Applications that trigger the CKPOM, the development assessment framework sets to achieve the following:

- Guides Council and proponents in what information is required to support a Development Application;
- Provides guidelines for the retention koala habitat;
- Provides habitat compensation guidelines that offset the impact of development on koala habitat; and
- Identifies assessment criteria that set out measures to avoid, minimise and mitigate the impact of development on koala habitat.

5 PART 2 – REVIEW OF DOCUMENTATION

5.1 Review of Blackwood Ecological Services report (Blackwood 2016)

5.1.1 Overview

Blackwood Ecological Services were engaged by the Clarke, Munce and Piper families to complete a preliminary ecological assessment in support of a planning proposal to seek a Gateway determination from the former Department of Planning and Environment (now Department of Planning, Industry and Environment; DPIE). The planning proposal was for the rezoning of land at Durheim Road, Monaltrie Lane and Wyrallah Road, Monaltrie to R5 Large Lot Residential and E3 Environmental Management.

It is noted that this report is preliminary in nature and that it includes consideration of issues related to ecology and biodiversity over and above those specifically related to koalas. However, this review is specific to issues that are directly or indirectly related to koalas.

5.1.2 Summary and reviewer comments

A summary of the Blackwood 2016 report is provided in Table 1.

Table 1 Summary and review comments on Blackwood 2016

Section summary	Review comments
Vegetation classification and mapping	
The report identifies six vegetation communities (report Table 3 in Blackwood report): • Community 1 - Camphor laurel/Sub-tropical rainforest • Community 2 - Sclerophyll woodland (brushbox/mixed species) • Community 3 - Sclerophyll woodland communities (forest red gum dominant) • Community 4 - Tall mixed forest (eucalypt species/rainforest species/hoop pine/camphor laurel) • Community 5 - Low grassland with scattered paddock trees • Community 6 - Dams	• Descriptions do not reference the vegetation classification standard that was current for the Lismore LGA at the time that this report was produced (i.e. Stewart et. al. 2011). • Following the commencement of the *Biodiversity Conservation Act 2016* (BC Act) on 25 August 2017 any mapping to support the Gateway determination should reference the NSW Plant Community Type (PCT) classification to ensure that vegetation mapping is unambiguous.
Preferred Koala habitat	
• Figure 4 in the Blackwood report (an extract from CKPOM) identifies vegetation that is indicative Primary and Secondary A Preferred Koala Habitat on the site.	• The report does not ground truth this mapping nor does it classify the vegetation that is found on site into a Preferred Koala Habitat category that is based on the CKOPM classification. It is therefore not possible to accurately identify areas of constraint on the Site.
• The report indicates that Koala scat searches were undertaken around all Koala food trees located on the Site, Koalas (including a mother with joey) were present at several locations throughout the site during the inspection and that evidence of Koala use is widespread across the site.	• The report does not set out the methodology that was employed for scat searches, nor does it present the results of the scat searches (e.g. a map of the locations where koalas or koala scat were recorded at a minimum). It is therefore not possible to accurately identify areas of constraint on the Site.
Wildlife corridors	
• The report identifies a conceptual east-west wildlife movement corridor passing through the majority of land on the Subject site north of Monaltrie Lane (Figure 4 in the Blackwood report; an extract from Milledge 2012).	• Concur.

Section summary	Review comments
• The report identifies that the Site is part of a highly cleared landscape, native vegetation cover is fragmented and movement opportunities for fauna through this highly disturbed landscape are limited.	• Concur, however these two statements are difficult to validate without presented results of the scat survey.
• The vegetation in riparian corridors is patchy but does serve to connect some of the larger patches. Scattered trees on the site also site provide stepping-stones for Koalas.	
Constraints and opportunities	
• The report identifies that the major constraint to development is the existing breeding Koala population in the Study area.	• It is generally accepted industry practice for ecological reports that support planning proposals for the rezoning of land to map ecological constraints based on an objective classification of constraint categories (e.g. high, moderate and low). • A categorised ecological constraints analysis was not undertaken, and it is therefore challenging to identify both constraints and opportunities.
Design considerations	
The report recommends a number of design considerations. In summary:	
• Future development should retain native vegetation (i.e. patches of forest and paddock trees).	• Concur that the proposed subdivision should avoid and minimise impact on koala habitat and the resident koala population. • This concept is integral to the BOS and the application of the BAM as well as the CKPOM.
• Retained vegetation should be enhanced through management activity and protected using a suitable land use protection mechanism.	• Concur that retained vegetation should be enhanced and managed. • Habitat retention, enhancement and creation is integral to the application of the CKPOM.
• Koala access to mature feed trees and the opportunity for Koala movement across the site using Koala friendly fencing should be generally maintained.	• Concur. Refer to recommendations in Section 6.

Section summary	Review comments
• Individual areas of the site may be fenced in a way that restricts Koala access.	• This statement warrants further detail and clarification.
• Subdivision design should create additional Koala habitat and incorporate an east-west Koala movement corridor along drainage lines and/or other suitable areas.	• Concur. Refer to recommendations and discussion on offsetting.
• Dogs should be confined to fenced yards and kept on leashes when in public areas.	• Given that the Site has a breeding koala population the keeping of domestic dogs is considered a significant risk. Refer to recommendations in Section 6.
• Traffic speeds should be restricted to 50km/hr or less and Koala signage should be located in areas where Koalas are likely to cross roads.	• Given that the Site is breeding koala population a 50 km/h road speed limit and appropriate signage should be considered a minimum requirement. Refer to recommendations in Section 6.

5.2 Review of Lismore City Council report and OEH comments (LCC 2017)

5.2.1 Overview

This report provides Council with an overview of the planning proposal to rezone the land. The report is a standard Council report that includes:

- an overview of the planning proposal;
- sets planning context;
- an environmental social and infrastructure assessment; and
- pre-gateway government agency comments.

As such the report incorporates comments from Council's ecologist and includes detailed comments from the former Office of Environment and Heritage (OEH; now Biodiversity Conservation Division, Department of Planning Industry and Environment)

It is noted that this report considers a range of issues related to ecology and biodiversity over and above those specifically related to koalas. This review is restricted to issues that are directly or indirectly related to koalas.

5.2.2 Summary and reviewer comments

A summary of the LCC 2017 and OEH comments (LCC 2017, Attachment 2) is provided in Table 2 and Table 3.

Table 2 Summary and reviewer comments on Lismore City Council 2017, incorporating Council ecologist comments

Section summary	Review comments
Executive summary	
The proponent is seeking Council's support for a Gateway determination to alter the:	
• Land use zone for part of the subject land from RU1 Primary Production to part R5 Large Lot Residential and part E3 Environmental Management.	• The proposed change in land use zone from RU1 Primary Production to either R5 Large Lot Residential and E3 Environmental Management presents both increased and reduced risk to koalas in terms of the activities. • For instance, a change from RU1 Primary Production would mean that activities that are permitted either with or without consent that may present a risk to koalas/koala habitat are prohibited under R5 Large Lot Residential and E3 Environmental Management (e.g. forestry, extractive industries, rural industries, tourist/visitor accommodation). • Under R5 Large Lot Residential and E3 Environmental Management there are other site-specific activities that are permitted with consent but may not be realistically feasible for the Site (e.g. emergency services facilities, oyster aquaculture, pond-based aquaculture). • The main activity that may present a risk to koalas/koala habitat that is permitted with consent under R5 Large Lot Residential and/or E3 Environmental Management is the increased density of dwelling houses.
• Minimum lot size for the: - R5 Large Lot Residential part of the subject land from 40 hectares to 2,500m^2 and 5,000m^2 [1]; and - Large E3 Environmental Management area to 20 hectares and the two smaller areas to 40 hectares.	• Based on the number of dwelling entitlements created by changing the existing land use zone to R5 Large Lot Residential alone may present risk to koala habitat as a result of clearing for dwellings/associated infrastructure, Asset Protection Zones and roads infrastructure.

[1] The proposed minimum lot size map was amended to introduce a 5,000m^2 minimum lot size for the land encumbered with the key koala vegetation and/or containing slopes greater than 18°. This is detailed in correspondence from Newton Denny Chapelle (13 October 2016).

Section summary	Review comments
	• As part of the Biodiversity Development Assessment Report (BDAR) that is required to support a subdivision proposal the proponent would need to demonstrate how impact on koala habitat has been avoided and minimised. For instance, identifying no build zones and/or building envelopes to which building is restricted on new allotments.
• Part of the land is proposed to remain RU1.	• No change in land use.
Environmental and physical constraints – Biodiversity	
• The submitted report does not adequately assess the ecological values of the site, although it is sufficient for the purposes of a Gateway assessment. • The ecological assessment provided to date is satisfactory for the purposes of considering approval for a Gateway determination. • However, post any Gateway determination additional information will be required on Koala habitat and movements.	• Concur.
• The site is within the area of the Comprehensive Koala Plan of Management for South East Lismore and at least three areas of primary Koala habitat. The quality of this habitat has been confirmed by site investigation. • A breeding colony of Koalas is known to use the site.	• Concur. However, note reviewer comments regarding the presentation of results in Blackwood 2016.
• The adjoining land to the north accommodates another significant area of primary Koala habitat.	• Concur. This has been identified in Blackwood 2016 as Community 4 Tall mixed forest.
• Three key areas of Koala habitat are proposed for inclusion in an E3 Environmental Management zone. • It is proposed that the larger E3 area includes Koala habitat to the west and steep land that may be suitable for habitat restoration but is unsuitable for rural residential housing.	• Concur that an E3 Environmental Management land use zone (at a minimum) for existing areas of Koala habitat is warranted.

Section summary	Review comments
• The expanded E3 area is warranted to support a breeding population of Koalas because: - The E3 zone encompasses all of the area of mapped Primary Koala habitat occurring on existing Lot 3 DP 1002771; - The E3 zone encompasses the vegetation communities 2a, 3a, 3b and 3c mapped in Blackwood 2016 as containing the preferred food tree species Forest Red Gum *Eucalyptus tereticornis*. - A corridor of Koala habitat is maintained to facilitate Koala movement between this vegetation and mapped Primary Koala habitat on the adjacent Lot 7 DP 1000089 on the northern side of Lot 5 DP774499.	

Table 3 Summary and reviewer comments on Lismore City Council 2017, incorporating OEH comments (Attachment 2)

Pre-Gateway Government Agency Comments **Table 1 – Preliminary Comments from Office of Environment and Heritage**		**Review comments**
OEH Comments	**Council Staff Response**	
Comment 3 All areas of high conservation value in the planning area identified in the ecological assessment should be zoned E2 – Environmental Conservation.	This is an issue that Council has dealt with recently on a broader scale. Primary use of all of the subject land (including the Koala habitat) over the last 2 years has been cattle grazing (not environmental conservation or environmental management). Therefore, the application of either of the E-zones is inconsistent in terms of primary use. The E-zones review states that: 'private land may be zoned E2 or E3, despite being inconsistent with the criteria, only if it is consistent with a negotiated development outcome (master plan, rezoning, development consent, designated offset areas) or at the request of the landowner'. Given the history of agriculture on this site an appropriate negotiated development outcome is an E3 Environmental management zone over the Koala habitat as well as the steep land in the vicinity that could be regenerated as Koala habitat.	Concur with Council staff response regarding the primary use of the land (DPE 2015, Recommendation 1 and 2) and negotiated development outcome (DPE 2015, Recommendation 7). Despite comments from OEH that the areas of high conservation value on the Site do not appear to meet the E-zone criteria, notwithstanding that the primary use of the land over the previous two years is agriculture, the vegetation that is classified as Preferred Koala Habitat on the land meets one of the E2 Environmental Conservation zone criteria 'Over-cleared vegetation communities' (DPE 2015, Recommendation 3, Dry sclerophyll forests shrubby and shrub/grass sub formations referred to in DECCW 2010). The Northern Council's E-zone Review Final Recommendations Report (DPE 2015) provides Councils with strict criteria for the application of E-zones and allows Council discretion in the application of E-zones even if one or more E-zone criteria are met. For instance: • If the land has attributes that meet the E2 Environmental Conservation criteria, however the primary use of the land is environmental management rather than environmental conservation, a council may apply an E3 Environmental Management zone (DPE 2015, Recommendation 4). • It is not mandatory to apply an E2 or E3 zone even if the land has been verified to meet the criteria (DPE 2015, p. 6).

Pre-Gateway Government Agency Comments Table 1 – Preliminary Comments from Office of Environment and Heritage		Review comments
OEH Comments	**Council Staff Response**	
Comment 4 In circumstances where areas of high ecological value are to be located within a R5 zone the impacts of future residential development should be offset using an appropriate offsetting biometric such as the BioBanking Methodology as part of the planning proposal.	Any Koala habitat that is to be removed for the development (would largely limited to removal of isolated Forest Red Gum trees) will be appropriately compensated for through Council's Comprehensive Koala Plan of Management for South-east Lismore. This compensatory plantings/ habitat rehabilitation (directed by a VMP) will be required to be undertaken within gaps within the proposed E3 zone.	The BioBanking Assessment Methodology (BBAM) was replaced by the Biodiversity Offset Scheme (BOS) and the Biodiversity Assessment Method (BAM) following commencement of the BC Act on 25 August 2017. Under the BAM methodology, those residual impacts of development that cannot be avoided or minimised can be offset by the 'retirement' of biodiversity credits. In the case of this project, the proponent could meet an obligation to offset the residual impact of development by one of three methods: 1. Set up a Biodiversity Stewardship Agreement (BSA) site to generate the required biodiversity credits and then retire the credits; 2. Source the required biodiversity credits on the open market and then retire the credits; 3. Pay into the Biodiversity Conservation Fund (BCF) in lieu of retiring biodiversity credits. However, the CKPOM has a Habitat Compensation Policy (Appendix 5) as is alluded to in the Council staff response. This policy effectively operates as an offsetting scheme and when first examined operates separately to the BOS. The implication is that the proponent could have an offset obligation under the BOS as well as a habitat compensation obligation under the CKPOM. However, a development application is deemed to have complied with the Habitat Compensation Policy (Appendix 5) and met the guideline requirements for Habitat Compensation Measures detailed in the CKPOM if '*the proponent has entered into a BioBanking Agreement (TSC Act) or similar legal biodiversity offsetting agreement adopted by either the NSW or Australian Government*' (s. 4.5.2 (1)(b)(ii)). The BOS is a similar legal biodiversity offsetting agreement adopted by the NSW government. Consequently, the proponent could concurrently meet both the BOS offset obligation and the CKPOM the habitat compensation obligation by one of the three methods identified above. However, unless credits have been generated though a BSA site that is located in the Lismore LGA (local offset) it is likely that credits sourced on the open market or payment into the BCF would be generated outside of the Lismore LGA.

Pre-Gateway Government Agency Comments Table 1 – Preliminary Comments from Office of Environment and Heritage		Review comments
OEH Comments	**Council Staff Response**	
		To account for local biodiversity impacts, Council may consider discounting credits required under the BC Act if local offsets are proposed, or conversely increased credits if local offsets are not proposed. This approach is being adopted by Coffs Harbour City Council. However, it should be noted that any reduction in credits will require concurrence from the Department of Planning Industry and Environment (DPIE). The CKPOM and indeed Comment 4 refer to the minimum area required for compensation works for each class of koala habitat and for each category of compensation works defined in this Plan to be calculated using the: '*BioBanking Assessment Methodology… or similar methodology adopted by either the NSW or Australian Government*' (s. 4.5.2 (1)(c)(ii)). Under the BAM the offset unit is based on biodiversity credits and not area. However, an area calculation based on a biodiversity credit obligation could be reversed engineered.
Comment 5 The planning proposal should be revised to include an area to be revegetated for maintaining and enhancing east-west wildlife corridor function through the planning area. The nominated wildlife corridor area should be subject to an appropriate mechanism, such as a planning agreement, to protect remnant native vegetation in that area and facilitate future native vegetation enhancement to improve and sustain wildlife corridor function.	The location of this corridor should be identified in a structure plan for the site, and the revegetation of this corridor addressed in a Vegetation Management Plan prepared for the site. The requirement for a structure plan is recommended as a condition of any Gateway determination.	Concur that an east-west corridor should be incorporated in the structure plan. However, in determining the location of the corridor consideration should be given to the location of mapped waterways on the Site, the results of koala connectivity report within the CKPOM area (Biolink 2019) and the risk posed by facilitating koala movement toward Wyrallah and Durheim Roads. The CKPOM lists a range of acceptable protection mechanisms to protect both corridor and habitat areas (LCC 2013, Table 6) and a planning agreement under the *Environmental Planning and Assessment Act 1979* is one of these mechanisms. Also note some of the primary protection mechanisms identified in the CKPOM have been superseded by conservation agreements (BC Act Division 3).

5.3 Review of Biolink Ecological Consultants report (Biolink 2019)

5.3.1 Summary and review comments

Fragmentation of koala habitat resulting from human activity is both a historical and current process that occurs in the Lismore LGA regardless of the rezoning proposal for this Site. Habitat fragmentation is a threat as it results in landscapes that support smaller, more isolated koala populations which may reduce population viability and increase extinction risk. Mitigation efforts often focus on identifying, conserving and restoring habitat patches to maintain connectivity through wildlife corridors or scattered trees that function as stepping-stones for dispersal.

This report is based on a decision support framework - the General Approach to Planning Connectivity from Local Scales to Regional (GAP CLoSR) framework to facilitate planning and implementation of biodiversity connectivity networks at both regional and local scales (Lechner & Lefroy 2012). Initially implemented as a prototype framework in the Lower Hunter Region of NSW, the stated intention of the GAP CLoSR project was to develop a transferable GIS framework that draws on best-practice ecological science that could be used for connectivity planning.

In summary, GAP CLoSR framework was developed by combining decision analysis of multiple criteria with connectivity modelling to consider the ecological determinants of biodiversity conservation. Employing a collaborative, landscape-based approach, these ecological determinants include consideration of habitat requirements (e.g. habitat patch size and location of preferred habitat) and dispersal behaviour of target species (e.g. ranging patterns, dispersal behaviour, the greatest distance of open ground that can be crossed, and the distances that can be moved in a connected landscape). The framework enables assessment of land use scenarios that reflect different ecological, social and economic interests. GAP CLoSR consists of a connectivity model; multi-criteria analysis framework and a GIS tool to automate preparation of spatial datasets for use in the models (Lechner & Lefroy EC 2012). The visual output enables identification of what is termed key landscape ‘components’ and associated habitat ‘patches’ that are linked via a system of ‘least-cost pathways’ (i.e. the shortest pathway between two habitat patches as a function of barriers to movement).

This document has been reviewed in relation to the application of the data that underpins the GAP CLoSR methodology and the results that are relevant to the Site. A summary of the Biolink 2019 is provided in Table 4.

Table 4 Summary and reviewer comments on Biolink 2019

Section summary	Review comments
Methodology	
Study Area: The report was prepared for the Koala Planning Area located in the south-east of the Lismore LGA and is the land to which the Comprehensive Koala Plan of Management for south-east Lismore applies. The report identifies a loosely defined Koala Critical Precinct (KCP) in the area bounded by Tregeagle, Wyrallah and Monaltrie.	This area has previously identified by Biolink as an area that supports local koala source population (Biolink 2017).
Allocating resistance to land use for koala movement.	The allocation of a percentage resistance value (PRV) is based on Lechner & Lefroy 2012 and appears reasonable.
Determination of a gap-crossing threshold.	The method employed to determine the koala gap-crossing threshold appears reasonable.
Creation of a dispersal cost surface: • The dispersal cost surface incorporates considerations of localised resistance related to the following land use attributes: transport infrastructure; waterways; vegetation cover; mining and quarrying; agricultural land use; and urban land uses.	This considered a reasonable approach to employ these land use attributes.
Vegetation cover and Preferred Koala Habitat (PKH) classification: • Vegetation cover and PKH classification is based on Stewart *et. al.* 2011. • 30% of the vegetation in the study are was groundtruthed for the presence of preferred koala food trees.	This is considered a reasonable approach however the polygon size identified in Stewart *et. al.* 2011 is 0.5 ha. Therefore, smaller habitat features such as isolated paddock trees that are prevalent throughout the Site are not considered in the study.
Defining a minimum patch size.	The minimum habitat patch size of 10 ha appears reasonable. However, home ranges for Lismore defined by the minimum convex polygon in published work suggests a larger home range (mean +/- s.e. = 37.4 +/- 8.2 ha; Goldingay & Dobner 2014). More recent work suggests koala density of 0.34 koalas/ha which equates to a home range of 2.94ha (Biolink 2017).

Section summary	Review comments
Layering for rasterization purposes: Data layers were defined as having the following order of precedence, in terms of their cost value: gap-crossing threshold layer; connectivity structures spanning roads (e.g. underpasses on Skyline Rd); roads; hydrology; vegetation cover including PKH classification; and land use.	The order of precedence established appears reasonable.
Identifying landscape components, habitat patches and least-cost dispersal pathways.	It is noted that the threshold method was used to determine least-cost dispersal pathways rather than relying on Euclidian distance; and that cost considerations were used to incorporate information from the land use layer to determine a cumulative cost threshold.
Integral index of connectivity.	Noted.
Graphab settings and metrics.	Noted.
Incorporating Councils Urban Green Corridors.	Noted.
Results	

• Land use layer and associated dispersal cost surface:
  ○ Figure 1 displays the dispersal cost surface for the Site (located approximately in the centre of the map). Areas of land that represent a land use type that are easier for Koalas to traverse are classified as 'low cost' and are represented in blue whilst areas of land that are more difficult for Koalas to traverse are classified as 'high cost' and are represented in red. The crosshatched areas exceed the gap-crossing threshold of 250 m from the nearest mapped vegetation.
• Graphab/GAP CLoSR output:
  ○ Figure 2 displays habitat patches and least-cost pathways identified by the Graphab/GAP CLoSR output for the Site.
	• The report notes that in the north west of the KCP three of the least-cost pathways cross Wyrallah Road and two cross Skyline/Durheim Road.
	  ○ The least-cost pathways that are located on the site may channel koalas to cross Wyrallah Road to the west or Skyline Road to the north of the site and potentially into harm's way are marked in orange on Figure 2.
	  ○ Similarly the least-cost pathway that may channel koalas into larger patches of koala habitat is marked in blue on Figure 2.
	• The placement of any planted corridor to facilitate east-west movement as suggested by OEH (LCC 2017, Table 3 and Attachment 2) should consider the risk posed by facilitating koala movement toward Wyrallah and Skyline/Durheim Roads.

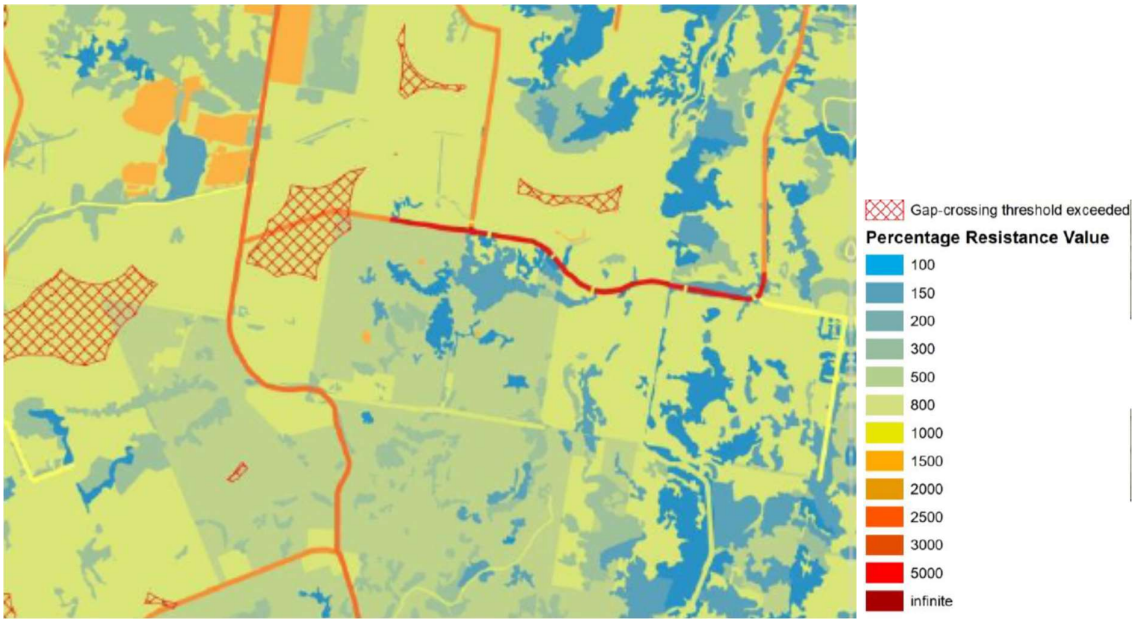

Figure 1 Dispersal cost surface for the Site and surrounding areas (extract from Biolink 2019, Figure 2).

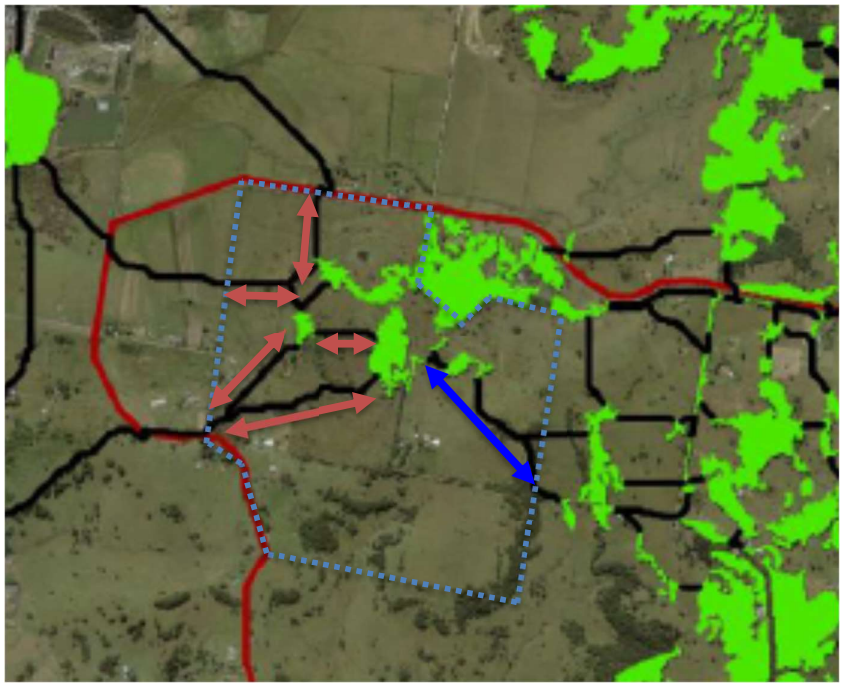

Figure 2 GAP CLoSR output identifying habitat patches and least-cost pathways for the Site (extract from Biolink 2019, Figure 5)

6 FINDINGS AND RECOMMENDATIONS

6.1 Vegetation mapping

The on-ground assessment of the vegetation mapping is relatively accurate and conforms to the vegetation descriptions provided in Table 3 of Blackwood (2016). It is noted that Blackwood 2016 identifies the location of relatively isolated trees on cleared land. Most of these trees are preferred koala food tree species as well as rainforest species. However, it is beyond the scope of this report to determine whether these trees meet the definition of 'paddock tree' that is provided in the BAM (Appendix 1).

Each vegetation community identified in Blackwood 2016 has been assigned a vegetation formation, vegetation class, draft PCT based on the site observations and qualitative descriptions (Blackwood 2016) as well as a draft Vegetation Zone (Appendix A). However, final confirmation of PCT that would be required for a future BAM assessment is based on a data collected in a plot-based floristic survey.

Five eucalypt communities that were identified in Blackwood 2016 (i.e. Community 2a, 2b, 3a, 3b and 3c) have been classified as 'PCT 841 Forest Red Gum grassy open forest of the coastal ranges of the NSW North Coast Bioregion'. PCT 841 can be classified as 'Primary A Preferred Koala Habitat' as defined in the CKPOM is be considered to be highly constrained.

6.2 Additional information post Gateway

The ecological assessment (Blackwood 2016) is sufficient for the purposes of considering approval for a Gateway determination. The CKPOM is only triggered when a Development Application is required and received by Council.

6.2.1 Recommendation

It is recommended that any additional documentation produced post Gateway:

1. Include a Koala Habitat Assessment Report (KHAR) that is prepared in accordance with the minimum structure and content requirements set out in the CKPOM (LCC 2013, Table 3) to address Council's requirement for additional information about koalas and their habitats post Gateway determination.
2. Consider all relative ecological constraints be considered in the design of the rezoning concept plan including but not limited to: koala habitat utilisation, threatened ecological communities, watercourses, regional/subregional/local wildlife corridors, cleared land, exotic vegetation.

6.3 Avoiding and minimising impacts

The principles of avoiding and minimising impact on koalas are legislated within the BOS and a central concept to the CKPOM.

6.3.1 Recommendation

It is recommended that:

3. Further to the recommendations presented in Section 6.2.1, the proponent prepares a rezoning concept plan that demonstrates how impacts on koalas are avoided and minimised, particularly in regard to the location of roads, infrastructure and lot design (i.e. identify no build zones and/or building envelopes).

6.4 Mitigating impacts

It is possible for koalas and humans to co-exist and it is possible to mitigate the impacts of this proposal as evidenced by the Koala Beach Estate. The Koala Beach Estate is a residential development located between Pottsville and Hastings Point on the Tweed Coast. The estate was designed to ensure that wildlife and their

habitats within and around the estate could coexist alongside the residential development. The urban design principles supporting this aim include: prohibition of dogs and cats; 40 km per hour road speed limit throughout the estate to allow for safer passage of wildlife across roads; koala food trees protected and planted in backyards and on roadsides encourage koalas to continue living and moving around the estate; and Wildlife friendly fencing that allows for safe fauna movement through backyards.

6.4.1 Recommendation

It is recommended that:

4. The following mitigation measures are employed at a minimum to mitigate potential impacts on koalas:
    - Prohibition of dogs;
    - Road speed limit of 40 km per hour where possible;
    - Road design to incorporate warning signage and traffic calming measures; and
    - Koala friendly fencing that enables free koala movement.

6.5 Feasibility of biodiversity stewardship

As discussed in Table 3 the interaction of biodiversity offsetting that may be required under the BOS and the habitat compensation requirements of the CKPOM is complex. This proposal may generate both an offset obligation under the BOS and a habitat compensation obligation under the CKPOM. It is our opinion that both these obligations could be met concurrently by sourcing biodiversity credits on the open market or payment into the BCF. However, unless the biodiversity credits were generated though a BSA site that is situated in the Lismore LGA it is likely that credits would have been generated outside of the Lismore LGA.

6.5.1 Recommendation

In order to secure a locally generated biodiversity credits, it is recommended that:

5. The proponent conducts a feasibility assessment/business case for the establishment of a Biodiversity Stewardship Agreement on the Site.

6.6 Koala corridor

Both Council and OEH have identified requirements for a koala corridor to be incorporated in the structure plan. It is noted that it is likely that the corridor identified in Figure 1 of the OEH comments may increase risk to koalas by facilitating koala movement toward Wyrallah Road.

There is limited published information for the minimum requirement to maintain or create effective natural habitat linkages for particular species (including koalas) in Australia (Gleeson and Gleeson 2012). There is no minimum effective corridor width or stepping-stone patch size that can be generally applied because metrics will vary with a range of factors including species, time, habitat and landscape (Gleeson and Gleeson 2012).

A best-practice, standardised method that specifies optimal koala corridor width is becoming established in recent, heavily reviewed literature (Biolink 2016, 2020). The method takes into account the following parameters: a Minimum Breeding Unit (MBU; 1 male and 2 females), median home range area for a female, minimum habitat area required to support one MBU, optimal habitat requirement to support one MBU (based on 50% occupancy), corridor length and corridor width (Biolink 2016, 2020).

Although the identifying the location of an east-west corridor is beyond the scope of this report, by employing the above method to a notional 750 m corridor that is marked as a blue line in Figure 2 the optimal width of this corridor is calculated to be 25 m.

6.6.1 Recommendation

It is recommended that:

6. The rezoning concept plan identify the location of an east-west corridor and that the corridor width is calculated in accordance with Biolink (2016, 2020).
7. In determining the location of the east-west corridor consideration should be given to the location of mapped waterways on the Site, the results of koala connectivity report within the CKPOM area (Biolink 2019) and the risk posed by facilitating koala movement toward Wyrallah and Durheim Roads.

7 REFERENCES

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Independent Review of Koala Related Matters

Monaltrie 2480 Pty Ltd

Monaltrie Village Precinct

APPENDIX A DRAFT PLANT COMMUNITY TYPES

Vegetation formation	Vegetation class	Draft PCT	Draft PCT Common Name	Draft Vegetation Zone	Qualitative description (Blackwood 2016)	Equivalency with Blackwood 2016
Rainforest	Dry Rainforest	887	Hoop Pine – Yellow Tulipwood Dry Rainforest of the NSW North Coast Bioregion	1	Regrowth with < 40% camphor laurel	Community 1a
				2	Regrowth with 40-80% camphor laurel	Community 1b
				3	Regrowth with >80% camphor laurel	Community 1c
Dry Sclerophyll Forests (Shrub/ Grass sub-formation	Northern Gorge Dry Sclerophyll Forest	841	Forest Red Gum grassy open forest of the coastal ranges of the NSW North Coast Bioregion	4	Brushbox/Pink bloodwood/Grey ironbark/Forest red gum/Rainforest species Forest red gum +/- Swamp turpentine & Pink bloodwood	Community 2a, 2b Community 3a
				5	Forest red gum/Pink bloodwood/Rainforest species with <30% Camphor laurel	Community 3b
				6	Forest red gum/Camphor laurel	Community 3c
Forested Wetlands;	Coastal Swamp Forests	1064	Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion	7		Willow bottlebrush patch