# APPENDIX M

# Draft Koala Management Plan

**BORDER TO GOWRIE** REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

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# 1. INTRODUCTION

## 1.1 Background

This draft Koala Management Plan (KMP) has been prepared for the Australian Rail Track Corporation (ARTC) and forms part of the revised draft Environmental Impact Statement (EIS) for the Border to Gowrie (B2G) Project ('the Project'). The draft KMP addresses the request for information requirement received by ARTC from the Coordinator-General following the public notification of the draft EIS and has been structured in accordance with *Environmental Management Plan Guidelines,* (DCCEEW, 2024).

This draft KMP includes the following:

- An overview of the draft KMP scope and objectives, relevant legislation, and Project description (Section 1);
- Details of koala populations, habitat, key threats and impacts associated with the Project (Section 2);
- Overview of proposed management actions and previous learnings of implemented management actions on similar projects (Section 3);
- Potential impacts, management goals and proposed management actions, monitoring and/or reporting, corrective actions and intervention triggers, and responsibilities for each management action during the Pre-construction phase of the Project (Section 4);
- Potential impacts, management goals and proposed management actions, monitoring and/or reporting, corrective actions and intervention triggers and responsibilities for each management action during the Construction phase of the Project (Section 5);
- Potential impacts, management goals and proposed management actions, monitoring and/or reporting, corrective actions and intervention triggers and responsibilities for each management action during the Operation phase of the Project (Section 6);
- Proposed monitoring programs (including population, crossing structure and revegetation monitoring programs), monitoring objectives and monitoring schedule including monitoring activity, applicable project phase, timing, description, performance criteria and corrective actions (Section 6.5); and
- An overview of the relevant evaluation and review and reporting processes for the draft KMP (Section 8).

This draft KMP should be read in conjunction with the Fauna Connectivity Strategy presented in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024). The Fauna Connectivity Strategy is concerned with ecological connectivity and minimising the risk of injury and mortality of fauna from wildlife-train collisions for listed threatened fauna species. The Fauna Connectivity Strategy has:

- Identified locations in the landscape where connectivity currently exists that intersect the proposed project corridor, identified as Priority Connectivity Zones (PCZs);
- Undertaken a connectivity impact assessment based on the project's proposed design elements; and
- Described the performance criteria, design outcomes and mitigation measures to allow fauna connectivity to be integrated in the Project's design progression so the Project does not lead to an unacceptable risk to ecological connectivity and wildlife-train collision.

## 1.2 Objectives

The objectives of this draft KMP are to:

- Establish best-practice mitigation and management measures to be implemented during design, construction and operation of the Project that:
  - Minimise the risk of injury and mortality of koalas from wildlife-train strikes;
  - Minimise losses to koala foraging, breeding and dispersal habitat; and
  - Maintain ecological connectivity which encompasses both daily activity movements and dispersal of koalas across the Project through implementation of mitigation measures.
- Define the key aspects of a koala monitoring plan; and
- Provide a framework for adaptive management, including schedules and triggers for audits, management plan review and reporting.

## 1.3 Project Description

The ARTC aims to deliver the Inland Rail Program (IR), which spans more than approximately 1,600 kilometres (km). The Project lies within this greater IR.

The Project is a 217.48 kilometres (km) section of new dedicated single track, open access freight railway between the New South Wales (NSW)/Queensland (QLD) border and Gowrie, in Queensland. The Project is comprised of 7 km of standard-gauge rail (1,435 millimetres (mm)) and 210.48 km of dual standard/ narrow-gauge rail (1,435 mm standard and 1,067 mm narrow). The new railway will be positioned with approximately 149.48 km of new rail corridor (greenfield) and approximately 68.00 km of existing open access rail corridor (brownfield), that forms part of Queensland Rail's (QR) South Western Line and Millmerran Branch Line.

The Project commences at Chainage (Ch) 30.60 km (North Star to NSW/QLD border (NS2B)) at the NSW/QLD border, the median point of the Macintyre River, approximately 18 km South-East of Goondiwindi. The Project runs northeast via Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook and the Toowoomba Wellcamp Airport to Ch 208.48 km at Gowrie Junction, northwest of Toowoomba.

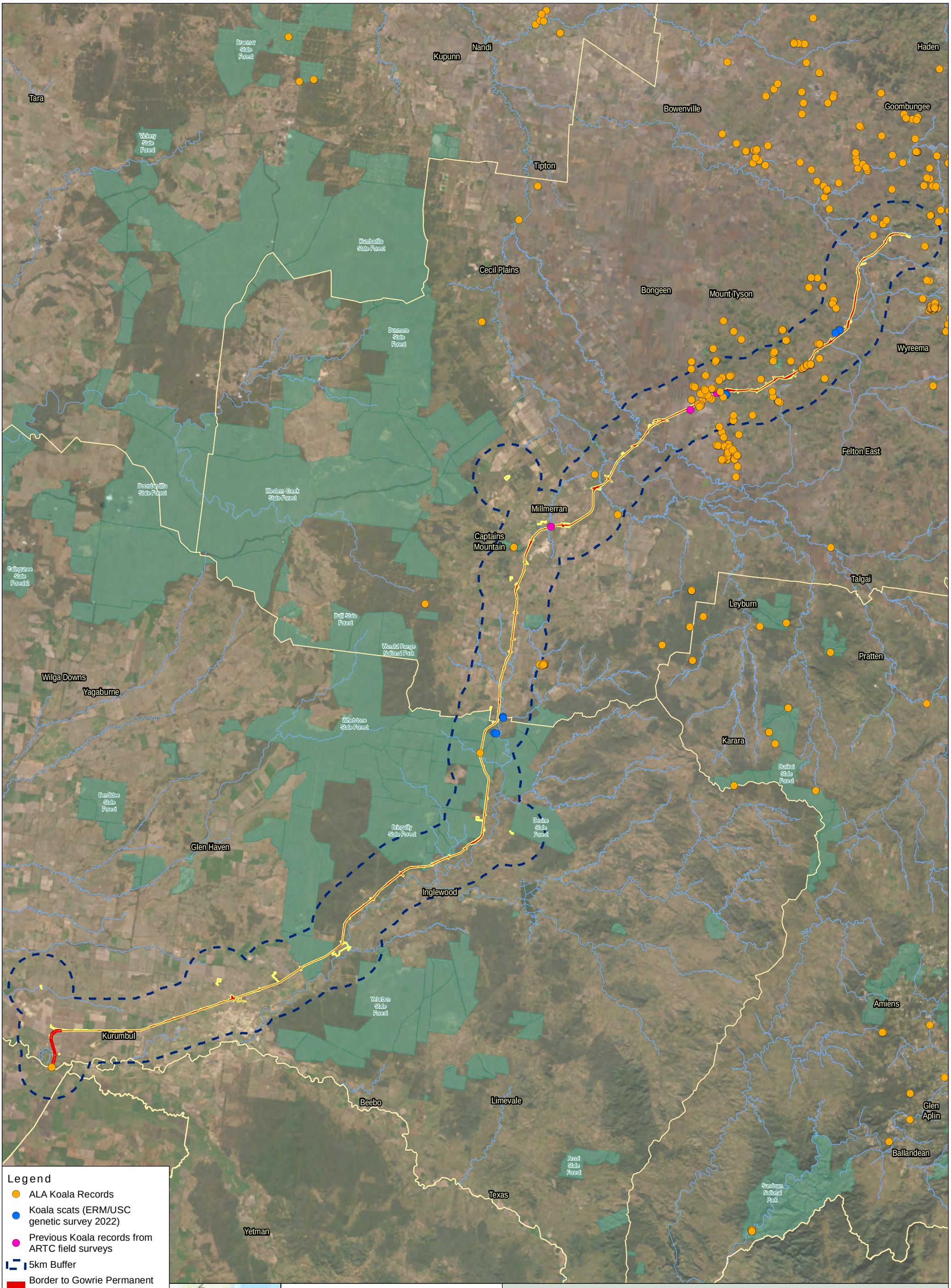
The 'Project Footprint' includes the permanent footprint, which includes the area required to accommodate permanent infrastructure associated with the Project, including rail, road and other miscellaneous infrastructure, and the temporary footprint required to accommodate construction activities and facilities of a temporary nature and duration to support the Project. The 'Study Area' for the KMP refers to the Project footprint with a 5 km buffer (Refer to **Figure 1-1**). A 5 km buffer was used so that an understanding of potential connectivity across the landscape could be obtained to inform potential management (See **Section 2**).

A summary of the duration of the Project, including all Project stages, and the expected quantity of trains once operational is presented in **Table 1-1** The Project's anticipated timing of stages following the receipt of the Coordinator-General's evaluation report and EPBC Act decision. The commencement of Year 0 is marked by the receipt of the Coordinator-General's evaluation report and EPBC Act decision, and Year 1 marks the commencement of physical works in the Pre-Construction Activities and Early Works stage.

The operation's phase will initially run 14 trains per day, potentially increasing to 20 trains per day in 2040 and up to 25 per day during peak operational periods.

## Table 1-1 Anticipated timing of the Project stages and activities

| **Duration (quarterly years)** | **Year 0** | | | | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | | **Year 5** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Detailed design | | | | | | | | | | | | | | | | | | | | | | | | |
| Project Approvals and Corridor Acquisition | | | | | | | | | | | | | | | | | | | | | | | | |
| Pre-construction Activities and Early Works | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction works | | | | | | | | | | | | | | | | | | | | | | | | |
| Commissioning | | | | | | | | | | | | | | | | | | | | | | | | |
| Operations | | | | | | | | | | | | | | | | | | | | | | | | |

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## 1.4 Regulatory Environment

This section describes the relevant regulatory provisions applicable to the Project and the management of koalas, particularly throughout construction and operation. A summary of the applicable Commonwealth and State legislation, guidelines and documents is presented in **Table 1-2** and **Table 1-3**.

**Table 1-2 Legislation relevant to this draft KMP**

| Legislation | Applicability |
|---|---|
| **Commonwealth** | |
| *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* | The Project was declared a controlled action under the EPBC Act on 9 April 2018 (2018/8165), to be assessed under the bilateral agreement between the Commonwealth and Queensland governments, with the Queensland *State Development and Public Works Organisation Act 1971* (SDPWO Act) EIS being the method of assessment. The relevant controlling provisions included listed threatened species and ecological communities of which the koala was one matter.<br>At the date of referral of the Project, the koala was listed as a vulnerable species and the Project will continue to be assessed using the status at the time the controlled action decision was made (vulnerable). The status of the koala was changed to endangered in February 2022. A National Recovery Plan for the koala and updated conservation advice has been published by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). This draft KMP is consistent with conservation and management requirements for the species listed as endangered. |
| **Queensland** | |
| *Nature Conservation Act 1992 (Qld) (NC Act)* | The NC Act regulates the protection of wildlife and its habitat, including the koala in Queensland. The NC Act is the overarching piece of legislation in Queensland that supports the conservation of species. |
| *Nature Conservation (Koala) Conservation Plan 2017* (Koala Conservation Plan) | The Project Footprint is located within koala district C, which consists predominantly of non-coastal local government areas, west of the Great Dividing Range. |
| *Draft Queensland Code of Practice for the Welfare of Wild Animals Affected by Land-clearing and Other Habitat Impacts and Wildlife Spotter / Catchers (Hanger and Nottidge 2009)* | The Project's clearing and construction phase will involve the engagement of a Fauna Spotter Catcher, who will be accredited and hold a current licenced (e.g., by the Department of Environment, Science and Innovation). The Fauna Spotter Catcher involved in the Project will be knowledgeable and competent in:<br>■ Survey techniques for all vertebrate fauna;<br>■ Identification of vertebrate fauna, and significant invertebrate fauna;<br>■ The humane capture, trapping and handling of vertebrate fauna;<br>■ Identification of habitat and or habitat resources of vertebrate fauna;<br>■ Ecological processes and the relevance for fauna;<br>■ Locally occurring species and those listed specifically under Federal, State and Local legislation or policies as significant;<br>■ Data recording and written reporting; and<br>■ All Federal, State and Local statutes and laws, and international agreements, relevant to the conduct of activities of a fauna spotter catcher. |
| *Code of Practice – Rehabilitation of Sick, Injured or Orphaned koalas in Queensland* | The Project may involve the relocation of koalas by a licenced and accredited Fauna Spotter Catcher. The Fauna Spotter Catcher must adhere to the practices outlined in the *Code of Practice – Rehabilitation of Sick, Injured or Orphaned koalas in Queensland* to:<br>■ Ensure rehabilitation (including rescue, care, and release) practices lead to the best possible conservation outcomes for koalas (*Phascolarctos cinereus*); |

| Legislation | Applicability |
|---|---|
| | ■ Ensure appropriate welfare outcomes for sick, injured, or orphaned koalas;<br>■ Minimise risks to human health and safety; and<br>■ Ensure a collaborative approach with First Nations peoples where possible, including fostering ongoing working relationships, consultation, and obtaining permissions from Traditional Owners and Elders where relevant. |
| *State Development and Public Works Organisation Act 1971* | The Coordinator-General declared the Project to be a 'coordinated project' under the *State Development and Public Works Organisation Act 1971* (SDPWO Act), requiring an EIS. Additional information for the EIS was requested and this document forms part of revised draft EIS. |

## Table 1-3 Policies and other Documents Relevant to this Draft KMP

| Policy | Applicability |
|---|---|
| **Commonwealth** | |
| National Recovery Plan for the koala *Phascolarctos cinereus* (combined population of Queensland, New South Wales and the Australian Capital Territory) | The National Recovery Plan for the koala (*Phascolarctos cinereus*) (combined population of Queensland, New South Wales and the Australian Capital Territory) (DCCEEW, 2022a) documents the research and management actions to be implemented to ensure the long-term survival of the species, defining a road map for a national integrated recovery effort. The goal of the National Recovery Plan is to stop the trend of decline in population size of the listed koala, by having resilient, connected, and genetically healthy metapopulations across its range, and to increase the extent, quality and connectivity of habitat occupied. |
| *Environmental Management Plan Guidelines* (DCCEEW, 2024) | The *Environmental Management Plan Guidelines* (DCCEEW, 2024) provides general guidance to stakeholders preparing environmental management plans for environmental impact assessments and approvals under Chapter 4 of the EPBC Act. |
| **Queensland** | |
| *Nature Conservation (Koala) Conservation Plan 2017* (Koala Conservation Plan) | The Project Footprint is located within koala district C, which consists predominantly of non-coastal local government areas, west of the Great Dividing Range. |
| *South-East Queensland koala Conservation Strategy (2020–2025)* | This strategy has been developed to define actions to halt and reverse the decline of koala populations across SEQ. Although the Project is largely located outside of the South-East Queensland area for koala management, the eastern most extent of the Project includes land covered by the strategy. The strategy has six key action areas relevant to the protection and management of koalas. These key areas are:<br>■ Habitat protection;<br>■ Habitat restoration;<br>■ Threat management;<br>■ Improved mapping and monitoring (including research and reporting);<br>■ Community engagement; and<br>■ Partnerships and strategic coordination.<br>This KMP establishes mitigation measures that support the wider conservation of koalas as well as the implementation of these key actions when the extent of the Project overlaps with the extent of the south-east Queensland koala Conservation Strategy. |

| Policy | Applicability |
|---|---|
| *Koala-sensitive Design Guideline*: *A guide to koala-sensitive design measures for planning and development activities* (2022) (DES, 2022) | The guideline provides advice and information for managers, land-use planners, infrastructure providers and development applicants to determine appropriate measures to help avoid and minimise the impact of development and land-use planning on koala populations. Measures in the guideline are based on koala-sensitive design principles that help development:<br>■ Retain and protect koala habitat values in their natural state to enable koalas to feed, rest and move around;<br>■ Achieve permeability for koalas through the landscape to provide safe movement for koalas within and across a site; and<br>■ Reduce threats to resident and transient koalas.<br>The EIS has incorporated mitigation and management measures should koalas be observed during the construction and operation works. Additionally, within the detailed design stage, measures will be implemented regarding the clearing and construction timing of the Project, with clearing works to be undertaken outside of the koala breeding season, to the extent possible. |
| *Fauna Sensitive Transport Infrastructure Delivery manual* (DTMR, 2024) | Provides evidence-based information and recommendations for fauna connectivity to guide the planning, design, construction, operation and maintenance of roads and rail. |

## 1.5 Community and Stakeholder Engagement

In preparing this draft KMP, various sources of knowledge have been drawn upon including:

- Community and stakeholder engagement sessions with local organisations specifically involved with koala management as detailed in Section 1.5.1 and Chapter 17: Social, Section 17.4.8 and Appendix X: Social Impact Assessment;
- Feedback for the Moreton Bay Rail Link (MBRL) project from the Department of Transport and Main Roads;
- Reporting of the field data obtained within the Project footprint in order to facilitate discussions between stakeholders regarding koala presence and ecology specific to the Project. Field data sources included Ausecology (2022) Technical Ecological Assessment; and the University of the Sunshine Coast (UniSC), in collaboration with ERM, Joint koala Genetics Study (2023);
- Research by Dr Ben Allen at University of Southern Queensland, Toowoomba. The focus of the research includes the movement of individual koalas as revealed by GPS tracking display similar patterns (e.g., direction and speed of movement, crossing of the railway, home range size, use of key habitats) before, during and after construction and near and far from the railway; and
- The KMP will be finalised with reference to the outcomes of any relevant on-going consultation and research.

### *1.5.1 Local Community Engagement*

To assist in the collection of local knowledge on koala populations and threats in the Project footprint, ARTC held a workshop with community groups, environmental representatives, and koala experts on the 27 April 2022 at Southbrook Hall, Southbrook.

The scope and purpose of this community workshop was to access local knowledge and technical experts on the koala populations affected by the Project and to understand existing koala population distribution and existing threatening processes. A summary of the key points taken from this community meeting is provided below:

- Native tree planting initiatives with local landholders and in local small public areas (e.g., parks and reserves) in and around the township of Pittsworth in 2000, 2002/2003, 2003/2004 and 2012 focused on provision of koala habitat;

- Informal koala survey undertaken in 2012 (Southern Queensland Landscapes);
- The Pittsworth community has been recording koala counts and survey numbers via iNaturalist. Wildlife carers keep records of rescues, transport and care (as per Queensland Government requirements). Pittsworth Landcare have collected scats and locations of koala observations (records are available in the online tool of the Atlas of Living Australia database);
- Southbrook Felton Road, Southbrook (adjacent to Pittsworth locality) is anecdotally identified as a koala corridor;
- Wildlife carers commented on the impact of 2019/2020 drought (neurological blindness, starvation, increase in disease and kidney failure) and noted that trees appeared visibly drought-stressed and a decrease in the amount of suitable food in region;
- Discussion lead by Pittsworth Landcare, with contributions by other attendees including wildlife carers, on linkage between habitat trees, vegetation assemblages and soil type. Consideration should be had regarding the carrying capacity of habitat, stemming from queries about the number of trees required to support a koala. Concerns were raised regarding the adaptive quality and/or ability of koala's gut bacteria to respond to changes in environment (food, water, etc.);
- Wildlife carers commented on the difficulty in obtaining food (green pick) for koalas in their care. There isn't currently a 'fodder farm' in the region. Interest from those present to understand more and apply for the Community Grants discussed at the workshop; and
- It was noted that vehicle strike on the recent Toowoomba Bypass Project indicates that management of train strike should be considered.

The information from the session, together with data from field surveys, research and desktop sources, was used to guide the identification of koala hotspots associated with the Project (described in Section 2).

## 1.6 Additional Key Information Sources

In addition to the key Commonwealth and State legislation and policies, and local community engagement, the following documentation have been considered key information sources in the drafting of this KMP:

- Revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024);
- Approved *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2021) (herein referred to as the 'approved conservation advice');
- Revised draft EIS Appendix O: Matters of National Environmental Significance Technical Report; and
- Revised draft EIS Appendix L: Terrestrial and Aquatic Ecology Technical Report.

# 2. KOALA POPULATION AND POTENTIAL IMPACTS

## 2.1 Koala Ecology

The koala (*Phascolarctos cinereus*) is a tree-dwelling marsupial known to reside in a range of open forest and woodlands habitats/communities, typically governed by the presence of certain Eucalyptus spp. or 'food trees', including *Corymbia spp.* and *Angophora spp*. (DCCEEW, 2022b). Shelter trees are used for sheltering and resting, and can comprise a range of species, with preference given to larger, shadier trees which allow koalas to thermoregulate (DAWE, 2022).

Populations are distributed across eastern and southern mainland Australia, typically associated with areas on more fertile soil by waterways, however koalas will persist in partially cleared or urban areas as koalas use open ground to travel between trees/patches (DPE, 2022). Across eastern Australia, discrete koala populations only exist in rare cases (Runge et al., 2021). koala home ranges range from 37 hectares (ha) to 135 ha (Goldingay and Dobner, 2013; Ellis et al., 2002), however individual home ranges depend on the habitat quality. koalas are considered sedentary, with males typically dispersing and covering more area than females (DES, 2022).

Koala habitat is defined in the National koala Recovery Plan, as 'forests or woodlands; roadside and railway vegetation and paddock trees; safe intervening ground matrix for travelling between trees and patches to forage and shelter and reproduce; and access to vegetated corridors or paddock trees to facilitate movement between patches. These resources fall within individual koala's home ranges and allow for interaction with adjacent individuals (DCCEEW, 2022b).

Koalas are specialist feeders and their diet consist predominantly of foliage from *Eucalyptus* spp. but may also extend to foliage from related genera (e.g., *Corymbia* spp*., Angophora* spp*., Lophostemon* spp*. and Melaleuca* spp.). koala reproduction is influenced by seasonality, breeding seasons reliant on population density, food quality and availability, and climate. Within south-east Queensland, koala breeding season typically extends from October to May, with joeys dispersing between June and December after reaching sexual maturity at 2 years of age (Dique et al., 2003). These time periods are considered significant to the lifecycle of the koala.

Within Queensland, the greatest concentration of koalas is in the South-East region (DES, 2022). koala habitat comprises approximately 9,184,788 ha within the Brigalow Belt Bioregion, supporting an estimated population size of 11,071 individuals (DES, 2020).

## 2.2 Koala Habitat in the Project area

Field surveys have been completed across the Project footprint to ground-truth vegetation communities and map associated habitats for the koala and are presented in revised draft EIS Appendix O: Matters of National Environmental Significance Technical Report of the revised draft EIS. This field-verified data has been used to classify koala habitat according to its function as foraging and breeding habitat, and dispersal habitat in line with habitat critical as defined in the approved conservation advice for koalas (DCCEEW, 2022b). The definitions of individual habitat types, including habitat defined as not suitable in this KMP is presented in **Table** 2-1.

Habitat critical to the survival of koalas is defined in the approved conservation advice for the species as any areas that the species relies on to avoid or halt decline and promote the recovery of the species. Additionally, DCCEEW (2022c) elaborates that habitat for the endangered species includes land that contains attributes to support the species, in the form of feed tree presence, habitat connectivity, and habitat in close proximity to areas with koala populations. Furthermore, unoccupied habitat should be considered, unless it is highly unlikely the species will recolonise in said habitat, as such, koala occupancy should be assumed if habitat is present within an area, or the area is likely to be used for dispersal.

Two broad koala habitat classifications have been mapped across the Project footprint. These are 'foraging and breeding habitat' and 'dispersal habitat', with the characteristics of each type defined in **Table 2-1.**

The mapped koala records are detailed in **Figure 2-1**, with further information provided in the below sections on how koala habitat was defined and areas of local importance across the Project.

Koala habitat is identified across the Project footprint as eucalypt woodland to open forest with mature box, ironbark, and red gum communities. Larger, connected patches of koala habitat are present to the west (between Canning Creek and the QLD/NSW border), then habitat generally becomes more fragmented, persisting as roadside vegetation or scattered paddock trees within agricultural landscapes to the east of the Project.

Locally important koala trees recorded within the Project footprint, include *Eucalyptus camaldulensis, Eucalyptus chloroclada, Eucalyptus crebra, Eucalyptus fibrosa, Eucalyptus melanophloia, Eucalyptus orgadophila, Eucalyptus populnea* and *Eucalyptus tereticornis*. Additional habitat trees, including *Acacia harpophylla, Acacia salacina, Corymbia erythrophloia* and *Corymbia tessellaris* were also recorded.

Koala habitat, as described in the species conservation advice (DAWE, 2022), is identified as any forest or woodland containing species that are known koala food trees, or areas with emergent food trees. Seasonal ecological surveys and information from consultation has identified four broad localities across the Project area, which have been assigned based on the types of koala habitats present and the spatial arrangement of these habitats in the landscape. These areas also have quite different known distribution of koalas, based on the historical records and the results of the revised draft EIS. Field-verified data has been used to classify koala habitat according to its function as foraging and breeding habitat and dispersal habitat and habitat mapping for the species within the Project footprint has been undertaken using the habitat criteria in **Table 2-1**.

## Table 2-1 Koala Habitat Type Classification

| Habitat classification | Definition | Ecological function | Proposed mapping rules |
|---|---|---|---|
| Foraging and breeding habitat | Any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees | Foraging and shelter habitat, used for breeding, dispersal, and general movement within home range | Discrete areas of any woodland or forest where trees are the dominant plant form and the percentage canopy cover of the tallest tree layer ranges from 0–30% for woodland and 30–70% for open forest.<br>Areas mapped as Essential Habitat. |
| Dispersal habitat | Part of the broader landscape that includes grass/bare ground, rural land-uses, dwellings, buildings, farm dams, sealed or unsealed roads and existing rail infrastructure.<br>Contains isolated or scattered foraging or shelter trees | Provides dispersal and movement opportunities for koalas. Some scattered foraging and shelter trees may be present | Areas adjacent to koala habitat where the dominant plant form is grasses, or areas that include bare ground and other rural land-uses (and related infrastructure)<br>Individual scattered trees (paddock trees) are not mapped separately. |

| Habitat classification | Definition | Ecological function | Proposed mapping rules |
|---|---|---|---|
| Not suitable | Not suitable habitat includes barriers (natural or artificial) that prevent the movement of koalas, such as mountain ranges, water bodies or treeless areas that are greater than 2 km wide | Part of a landscape that provides no suitable characteristics for foraging, breeding, dispersal, and general movement | Areas not mapped as koala habitat |

## 2.3 Koalas in the Project footprint

Records of koalas and koala habitat occur across the Project footprint (refer to the revised draft EIS Appendix L: Terrestrial and Aquatic Ecology Technical Report). The records identify that State forests and riparian zones contain high levels of koala activity. This is supported by multiple records from online databases (including ALA, WildNet and iNaturalist) from near Pittsworth and the Bringalily State Forest. Additionally, the Pittsworth community have been recording koala counts and survey numbers, with koala record locations publicly available online on iNaturalist and the Atlas of Living Australia database. Cardno (2021) and Ausecology (2022) investigations identified 26 direct koala sightings and 62 indirect signs (scat and scratches) over remnant and regrowth vegetation in the Pittsworth region (see **Figure 2-1a**).

The approved conservation advice (DAWE, 2022) states: Queensland has identified priority areas for management actions to achieve the highest likelihood of conservation outcomes for koalas in South-East Queensland. Such management actions include prioritising koalas in high quality habitats where there is a high likelihood of successful threat management (DES 2020). The current efforts to assess and identify important populations across the species range are hindered by a lack of comprehensive, unbiased data (DPIE 2020; DAWE 2021b) with the majority of study effort focusing on known high-density koala areas in easily accessible locations  rather than representative regions of suitable koala habitat.

Youngentob et al. (2021), also supports this statement by stating that the amount of habitat required to support a population is poorly understood, and definitionally difficult. This is due in part to disagreements over what constitutes a population and also due to variation in resource quantity and quality across the range of the koala that contributes substantially to differences in habitat area requirements.

### *2.3.1 Koala Hotspots within the Project footprint*

Three locations were identified as containing clusters of koala records together with foraging and breeding habitat within the Project footprint. These locations are referred to as ‘hotspots’ and have been determined based on historical and anecdotal information, sightings as per the available online databases, sightings in line with the ecological investigations undertaken for the Project and mapped habitat known to be utilised by koalas. The use of koala ‘hotspots’ is not reflective of the geographic extent of separate populations of koala within the B2G alignment. As per the results of the ARTC koala genetics study (ERM, 2024), koalas within the Project belong to a single population that extends throughout south-east Queensland. Although individual koalas may disperse through and utilise suitable habitat throughout the landscape, these ‘hotspots’ identify areas of priority for maintaining habitat connectivity and opportunities for maintaining koala dispersal as well as other suitable habitat throughout the landscape. **Table 2-2** and the accompanying text below provide a detailed description of the three hotspots within the Project footprint.

It should be noted that the three koala hotspots have been categorised from most important for the maintenance of habitat critical to the survival of koala across the Project to third most important. The rankings of the level of importance have been based on expert opinion, the density of koala records

within each hotspot, the location of vegetation within the landscape and the presence of important connectivity corridors to surrounding habitat. While these hotspots are not the only areas of suitable habitat, which may be utilised by koalas within the Project footprint, suitable habitat is highly fragmented and opportunities for improving landscape connectivity while minimising potential impacts to koalas during construction and operation may be limited.

**Table 2-2 Hotspot within the Project footprint**

| Hotspot Number | Landscape Values | Local Habitat Values | Corridors |
|---|---|---|---|
| 1 | Inclusive of Pittsworth to Athol. | Isolated regrowth vegetation dominated by koala food trees surrounded by pastoral land. | |
| 2 | Inclusive of Canning Creek, Whetstone State Forest and Bringalily State Forest. | Intact remnant vegetation in the State Forest dominated by koala food trees. | Bringalily State Forest<br>Whetstone State Forest<br>Canning Creek |
| 3 | Inclusive of the Millmerran area and Domville State Forest, Millmerran, to the Condamine River. | Isolated regrowth vegetation dominated by koala food trees surrounded by pastoral land.<br>Remnant vegetation in both in the State Forest and lining rivers and creeks, dominated by koala food trees. Surrounded by pastoral land. | Condamine River and floodplain<br>Domville State Forest |

**Hotspot Number 1 - Pittsworth inclusive of Yarranlee**

Located in the northern end of the Project footprint including Pittsworth, Yarranlea and Athol, presented in **Figure 2-1b**, this locality contains the highest density of koala observations across the Project, as shown by current records collected during project specific ecological surveys and historical records from publicly available records (e.g., public and community records posted on the Atlas of Living Australia Database, WildNet and iNaturalist). The landscape in this locality is composed of fragmented patches of foraging and breeding habitat, in the form of eucalypt open forests and woodland, within a matrix of rural and agricultural land uses (**Figure 2-1b**).

Of note in this locality is the absence of large, intact, and contiguous areas of foraging and breeding habitat composed of eucalypt open forest or woodland. Records of koalas during field surveys conducted in Q3 2022, and from historical records (largely collected by local community groups), are from areas of small patches of eucalypt woodland, such as thin strips of riparian vegetation or areas within smaller, local road reserves. Additionally, the Pittsworth community have been documenting koala records from surveys and them making publicly available on iNaturalist and the Atlas of Living Australia databases.

This hotspot is considered to be the most important across the Project and highlights the importance that small fragments of habitat have in maintaining a population in this location.

**Hotspot Number 2 - Canning Creek inclusive of Whetstone and Bringalily State Forest**

This hotspot is characterised by large areas of intact and contiguous eucalypt open forest and woodland, mostly to the west of the proposed Project area. Protected areas in this locality include (from north to south) Bringalily State Forest and Whetstone State Forest. Canning Creek is also a major landscape feature in this locality, running to the east of the Project alignment for most of its length. The landscape structure to the east of the Project alignment is composed of mainly rural land uses, with fragmented patches of native vegetation. An existing wild dog check fence also runs along the boundaries of the State forests to the west of the Project (**Figure 2-1c**).

Koala records from EIS field surveys, the ERM/UniSC surveys and historical observations show utilisation of koalas in this hotspot, with several observations in Bringalily State Forest and around Canning Creek to the east, with declining observations in the south.

This hotspot is considered to be the second most important across the Project, and differs to the Pittsworth and Yarranlea hotspot, in that it is associated with a large contiguous area of foraging and breeding habitat.

**Hotspot Number 3 - Millmerran**

The Millmerran hotspot is inclusive of the landscape surrounding Millmerran, particularly including the surrounding areas between the south Domville State Forest to the Condamine River in the north (**Figure 2-1d**).

It is characterised by predominantly rural and agricultural land uses, with fragments of eucalypt forest and woodland retained in road reserves. While this locality has fewer recorded koalas, the pattern of koala utilisation in this area shows strong usage of generally narrow linear fragments of eucalypt open forest and woodland retained in riparian zones or roadways. This includes recent records from EIS surveys to the south of Millmerran and around Yandilla. In 2016 Eco Logical Australia (ELA) found signs of koalas along the Condamine River, with riparian habitat inclusive of *Eucalyptus camaldulensis* being a known food tree to koala in this region.

This hotspot is considered to be the third most important for the maintenance of koalas across the Project.

Dalby
Kulpi
Haden
Nandi
Kupunn
Tara
Bowenville
Acland
Goombungee
Jondaryan
Tipton
Oakey
Cecil Plains
Bongeen
Mount Tyson
Wyreema
Cambooya
Felton East
Captains Mountain
Talgai
Leyburn
Pratten
Kooroongara
Wilga Downs
Yagaburne
Karara
Glen Haven
Inglewood
Kurumbul
Amiens
Beebo
Limevale
Glen Aplin
Ballandean
Texas
Yetman

Breamar State Forest
Vickery State Forest
Kumbarilla State Forest
Dunmore State Forest
Boondandilla State Forest
Western Creek State Forest
Calingunee State Forest 2
Bulli State Forest
Wondul Range National Park
Wheistone State Forest
Bendidee State Forest
Bringalily State Forest
Devine State Forest
Durikai State Forest
Yelarbon State Forest
Arcot State Forest
Sundown National Park

Legend

- ALA Koala Records
- Koala scats (ERM/USC genetic survey 2022)
- Previous Koala records from ARTC field surveys
- 5km Buffer
- Wild Dog Fence
- Border to Gowrie Permanent Disturbance Footprint
- Temporary Disturbance Footprint
- LGA Boundary
- Watercourse
- Active Koala Hotspots
- Protected Area

Brisbane
Sydney

Coordinate System:
GDA2020 MGA Zone 56

Date: 24/04/2024
Created By: VN
Drawing Size: A3

0 5 10 15km

1:550,000

# F2.1a - Koala Habitat, Records and Populations

B2G - Koala Management Plan

ARTC

ERM

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Oakey Creek
Gowrie Creek
Dry Creek
Mount Tyson
One Mile Gully
Half Mile Gully
Westbrook Creek
Umbiram Creek
McEwan State Forest
Perrie Gully
Jimna Springs Creek
Hodgson Creek
Emu Creek
Felton East
Spring Creek

**Legend**

- ALA Koala Records
- Koala scats (ERM/USC genetic survey 2022)
- Previous Koala records from ARTC field surveys
- 5km Buffer
- Wild Dog Fence
- Border to Gowrie Permanent Disturbance Footprint
- Temporary Disturbance Footprint
- LGA Boundary
- Watercourse
- Active Koala Hotspots
- Protected Area

Coordinate System:
GDA2020 MGA Zone 56

Date: 24/04/2024
Created By: VN
Drawing Size: A3

0 1 2 3km

1:130,000

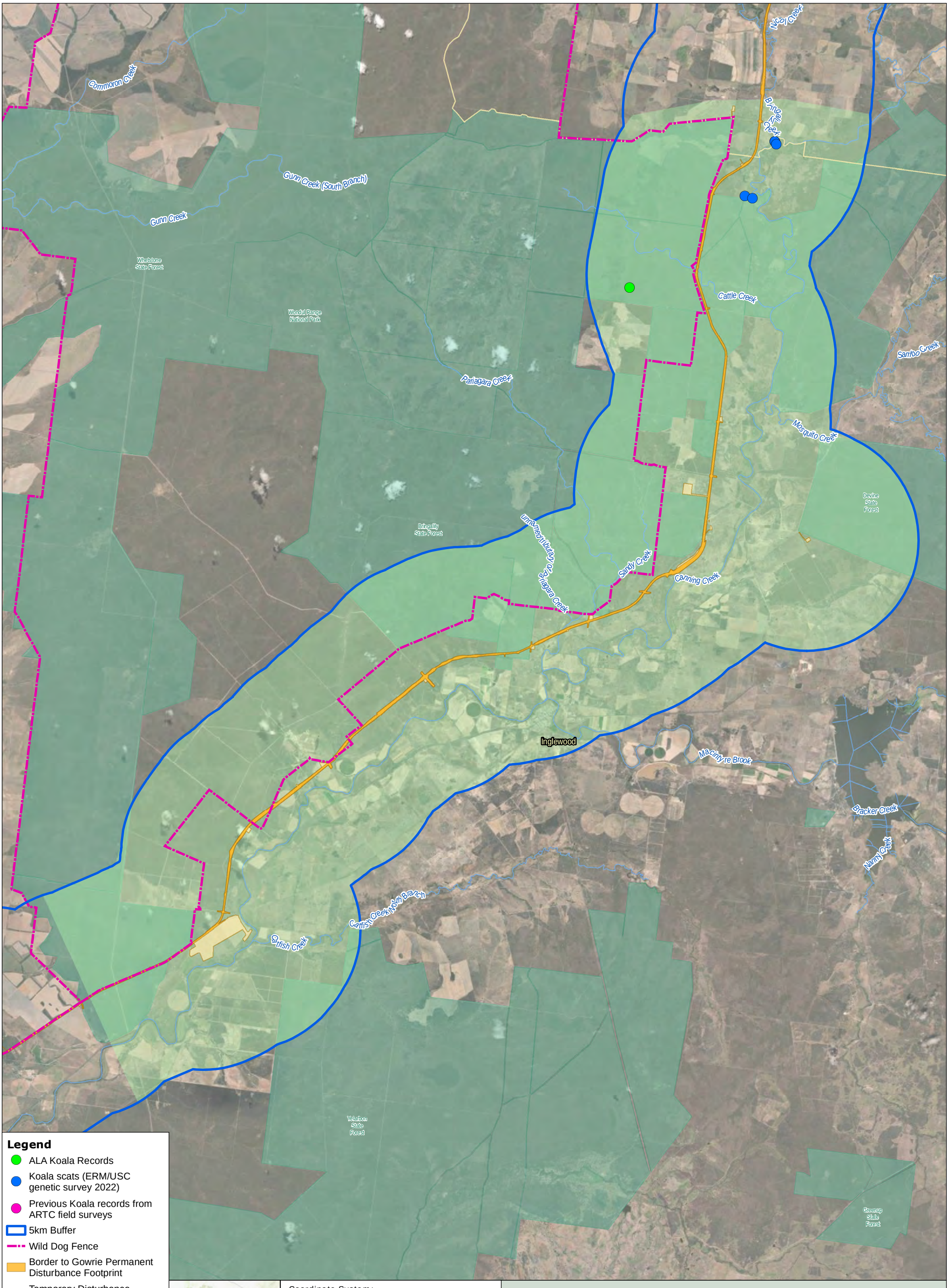
# F2.1b - Koala Habitat, Records and Populations

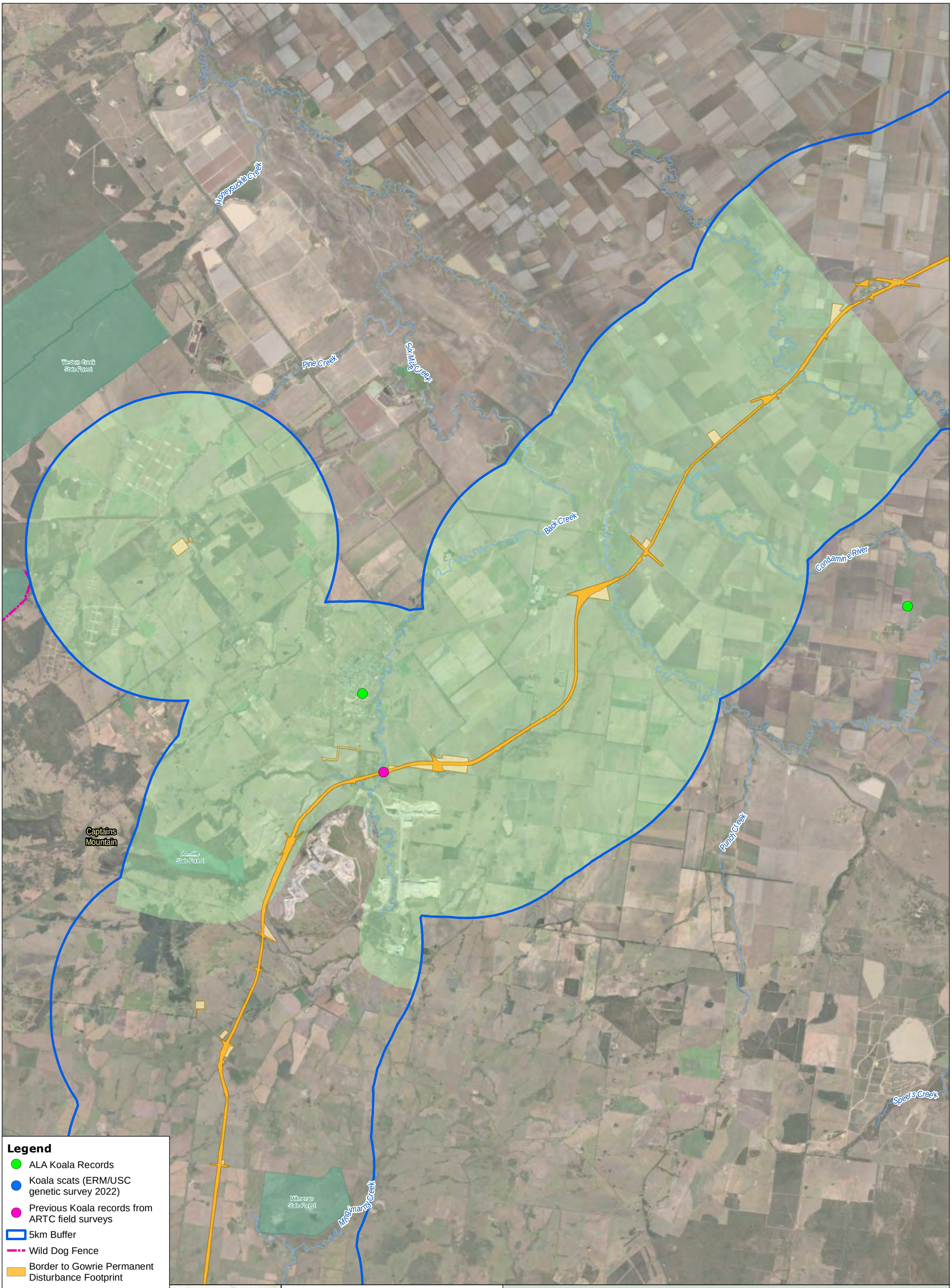
B2G - Koala Management Plan

ARTC

ERM

0618472_B2G_KK_G003_R0.mxd


Commoron Creek
Gunn Creek (South Branch)
Gunn Creek
Whetstone State Forest
Wondul Range National Park
Bringally State Forest
Parlagara Creek
Unnamed tributary of Parlagara Creek
Sandy Creek
Canning Creek
Nicol Creek
Bangalee Creek
Cattle Creek
Mosquito Creek
Devine State Forest
Sambo Creek
Inglewood
Macintyre Brook
Bracker Creek
Narrin Creek
Catfish Creek (North Branch)
Catfish Creek
Yelarbon State Forest
Greenup State Forest
Legend
ALA Koala Records
Koala scats (ERM/USC genetic survey 2022)
Previous Koala records from ARTC field surveys
5km Buffer
Wild Dog Fence
Border to Gowrie Permanent Disturbance Footprint
Temporary Disturbance Footprint
LGA Boundary
Watercourse
Active Koala Hotspots
Protected Area
Coordinate System:
GDA2020 MGA Zone 56
Date: 24/04/2024
Created By: VN
Drawing Size: A3
0 1 2 3km
1:160,000
F2.1c - Canning Creek Hotspot– Koala habitat and observation
B2G - Koala Management Plan
ARTC
ERM
0618472_B2G_KK_G004_R0.mxd




**Legend**

- ALA Koala Records
- Koala scats (ERM/USC genetic survey 2022)
- Previous Koala records from ARTC field surveys
- 5km Buffer
- Wild Dog Fence
- Border to Gowrie Permanent Disturbance Footprint
- Temporary Disturbance Footprint
- LGA Boundary
- Watercourse
- Active Koala Hotspots
- Protected Area

Coordinate System:
GDA2020 MGA Zone 56

Date: 24/04/2024
Created By: VN
Drawing Size: A3

0 1 2 3km

1:120,000

# F2.1d - Millmerran Hotspot– Koala habitat and observation

**B2G - Koala Management Plan**

ARTC

ERM

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### *2.3.2 ERM/UniSC Joint koala Genetics Study*

A koala genetic study (ERM, 2024) commissioned by ARTC was undertaken by the UniSC Detection Dogs for Conservation team and ERM to understand the koala population genetics along the Narromine to Acacia Ridge/Bromelton sections of the IRP. koala detection dogs provide reliable, efficient, and accurate methods for surveying large areas of habitat for evidence of koalas, by specifically targeted koala faecal pellets (scats) that contain genetic information. Survey locations for this study were informed by identification of 'hotspots' of known koala activity to maximise detection of fresh koala scats. A total of 120 detection dog surveys were undertaken throughout the IRP at 118 locations, with forty-one (41) sites returning direct observations of individual koalas, including B2G, and seventy-three (73) sites with fresh scat detections (including those with direct sightings). Within the Study Area, twenty-six (26) sites were walked by the koala detection dog team, with seven (7) returning a positive scat detection as shown in **Figure 2-2.**

Key findings from the Genetic Study (ERM, 2024) indicate that the three groups, from which samples were collected in this study, compared to other groups in the larger landscape had:

- High levels of heterozygosity: Higher levels of heterozygosity equate to larger genetic diversity within a population(s), which is positive as genetic diversity is linked to both individual health and at population level, evolutionary potential; with Group 3 (B2G + G2H) higher than the other groups;
- Low levels of inbreeding and of relatedness between individuals: this suggests gene flow is currently occurring within the groups and the potential for negative impacts due to excessive inbreeding is minimal;
- Relatively small population size, with Group 3 (B2G + G2H) having a larger population size relative to other groups. This results in overall lower densities of koalas across the landscape; and
- No concerns regarding sex ratio, but high chlamydia prevalence, except Group 3, which is medium prevalence (however the sample size remain very low). The ratio of males to females is not of concern for genetic health although chlamydia prevalence is high. Caution should be taken when interpreting these findings as the sample size is small.

There appears to be reasonable connectedness of koala populations within the landscape, and so it is imperative that ongoing design and management measures support the ability for koalas to traverse the landscape through the maintenance of habitat connectivity. Overall, this research assisted with defining koala hotspots or key areas for focused management that is the subject of this draft KMP.

Dalby
Kulpi
Nandi
Kupunn
Haden
Tara
Bowenville
Acland
Goombungee
Jondaryan
Tipton
Oakey
Kingsthorpe
Cecil Plains
Bongeen
Mount Tyson
Wyreema
Cambooya
Felton East
Millmerran
Captains Mountain
Talgai
Leyburn
Pratten
Kooroongara
Wilga Downs
Yagaburne
Karara
Glen Haven
Inglewood
Kurumbul
Amiens
Beebo
Limevale
Glen Aplin
Ballandean
Texas
Yetman

Braemar State Forest
Vickery State Forest
Kumbarilla State Forest
Dunmore State Forest
Boondandilla State Forest
Western Creek State Forest
Calingunee State Forest 2
Bulli State Forest
Wondul Range National Park
Wheistone State Forest
Bendidee State Forest
Bringally State Forest
Devine State Forest
Durikai State Forest
Yelarbon State Forest
Arcot State Forest
Sundown National Park

**Legend**

- No Detection
- Detection
- Koala sightings
- Scat detections - West
- Dog Track
- Wild Dog Fence
- Border to Gowrie Permanent Disturbance Footprint
- Temporary Disturbance Footprint
- 5km Buffer
- LGA Boundary
- Protected Area
- Active Koala Hotspots

Brisbane
Sydney
RANGE

Coordinate System:
GDA2020 MGA Zone 56

Date: 24/04/2024
Created By: VN
Drawing Size: A3
0 5 10 15km

1:550,000

# F2.2 - B2G Koala Detection Dogs Survey

B2G - Koala Management Plan

ARTC

ERM

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### *2.3.3 University of Southern Queensland (UniSQ) Home Range Research*

Through a research partnership between ARTC Inland Rail and the University of Southern Queensland (UniSQ), koalas around Yarranlea and Canning Creek have been captured and GPS collared to identify habitat utilisation and movement pathways of koalas in the local area.

Between April 2023 and May 2024, UniSQ obtained usable GPS points from 38 collared koalas, including 18 males and 20 females (UniSQ, 2024). Males travelled longer daily distances than females, on average (males: mean 173 ± 220m/day; and females: mean 106 ± 185 m/day) (UniSQ, 2024). Home ranges for dispersing koalas were also higher (mean = 2.45 ± 2.4 $km^2$) compared with non-dispersing (mean = 0.57 ± 0.5 $km^2$) and variable among sexes, with males moving greater distances than females (UniSQ, 2024).

Both males and females had similar and good body condition scores (median = 7, scale of 1–10, with 1 indicative of poor condition and 10 indicative of excellent condition), with adult males significantly heavier (7.88 ± 0.84 kg) than adult females (6.2 ± 0.67 kg) (UniSQ, 2023).

The UniSQ research is ongoing, and findings will be used to increase knowledge of use of the local landscape by koalas as well as providing input to mitigation measures outlined in this draft KMP and contributing to the baseline understanding of koala populations prior to monitoring.

## 2.4 Key Existing Threats to koalas

As per the Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (2022), key threats to koalas include:

- Environmental stressors like bushfires and drought;
- Clearing and degradation of habitat;
- Encounters with vehicles and dogs ending in mortality; and
- Koala specific disease including koala Retrovirus and Chlamydia.

Loss of riparian or remnant vegetation is likely to impact koala movement and persistence in the landscape. With vegetation existing in small and heavily fragmented patches, edge effects are likely to increase disturbance, through impacting on individuals' ability to thermoregulate, increasing the risk of injury and mortality from livestock, domestic dogs and foxes.

Stressors to the environment, including heatwaves, droughts, bushfires, and floods are known to cause high mortality in koalas, as well as this, post extreme event recovery can be impaired by other threatening processes (DCCEEW 2022b).

Human activities like deforestation, land clearing for grazing, agriculture, mining, and urbanisation have resulted in habitat loss and degradation for koalas. Clearing for grazing is seen as a major driver for loss of habitat, with areas of large woodland lost since 2000, including in the Brigalow Belt where the Project is proposed (DCCEEW 2022b). The landscape surrounding the B2G Project is dominated by highly modified agricultural land with historic clearing activities resulting in loss and degradation of local koala habitat.

Vehicle related mortality and dog attacks pose significant risk to koala populations. The proximity of remnant vegetation to roads increases this risk, particularly in individuals attempting movement between patches of habitat and will only be exacerbated by future habitat loss. koalas are unable to adapt to these threats as human activities continue to expand into koala habitat areas, thus trauma as a result from these threats will continue. Mortality from these occurrences typically removes healthy breeding individuals, posing a threat to juvenile koala dispersal post-weaning (occurring in both males and females). Mature males are at higher risk due to larger home ranges and increased activity during

the breeding season, with males typically dispersing more frequently and over larger distances than females. Loss of a male from this trauma has potential to disrupt gene flow (DCCEEW 2022b). While specific mortality estimates for koalas within the B2G locality are not currently known, the Gore Highway and other major roads present a risk for koala-vehicle collisions. Anecdotal observations were also provided by community members and organisations of koala mortalities, hospitalisations and records in the locality.

Koala specific disease can contribute to population decline and population viability, with wild populations carrying disease pathogens (DCCEEW 2022b). Quigley and Timms (2020) reveal the two major pathogens affecting koalas are *Chlamydia pecorum*, leading to chlamydial disease and koala retrovirus (KoRV). The significant impact of disease, particularly from Chlamydia and koala retrovirus, is routinely highlighted in koala literature (e.g. Narayan 2019) therefore presenting a need to consider mitigating its potential impact for the Project. Following preliminary quantitative assay methods conducted by the UniSQ, Chlamydia was detected in eight of thirty-four individuals. While the severity of infection is considered to be low as of December 2023 and all haematological and serum parameters were within accepted ranges for a healthy population, the detection of the disease is an emerging conservation challenge in the area (Allen, Bista, Emery, Baxter, & Miller, 2023). These emerging koala health issues are also supported by anecdotal observations provided by local wildlife carers and koala hospitalisation records obtained during community consultation sessions.

Introduced plant pathogens, such as *Phytophthora cinnamomi,* have the potential to cause widescale degradation to flora communities and impact on the availability of suitable habitat for arboreal fauna (Summerell, 2023). For the koala, indirect impacts are likely to result from a reduction in suitable foraging habitat and reduced shelter from thermal extremes and may further fragment suitable habitat (Garkaklis, Calver, Wilson, & Hardy, 2008). A Biosecurity Management Plan will be prepared for the Project, outlining specific management measures that aim to reduce the spread of *Phytophthora cinnamomi* through vehicle and machinery hygiene, community engagement, as well as assessing and handling a koala with disease, and specific pesticide requirements where applicable. Additionally, broad management and mitigation measures regarding koala disease (i.e., Chlamydia and KoRV) are outlined in **Section 5.2.3.**

During the consultation workshop with community groups and wildlife carers held on 27 April 2022 during the preparation of this draft KMP, the following key threats were identified:

- Resource availability, in terms of good quality foraging habitat appears to be a key threat in the Southbrook/Yarranlea landscape, with underweight animals delivered to carers;
- Some evidence of collision with vehicles on the Gore Highway, although considered to be less of a threat than habitat loss and availability of good quality foraging habitat; and
- Declines in body condition associated with the impacts of drought, including neurological blindness and starvation.

Throughout the engagement with local community groups, evidence has been provided from wildlife carers that animals are presenting to hospitals in poor health due to malnutrition. This may be a factor of the fragmented arrangement of suitable foraging and breeding habitats surrounding the Project area.

The existing threats expanded upon above can be highlighted within the hotspots discussed in **Section 2.3.1**:

- Signs of environmental stressors (e.g., potentially from previous drought events) were visible in the Pittsworth hotspot, with dieback noted during the ERM/UniSC detection dog surveys;
- Clearing and degradation of habitat is a visible long-term threat to koalas in the Project area, with previous ecological surveys and habitat mapping for the Project describing both the Pittsworth

hotspot and Millmerran hotspot as fragmented patches of foraging and breeding habitat. This can be considered an extensive threat to the continuous landscape of the State Forests within and surrounding the Millmerran hotspot;

- With the Project area being in close proximity to the Gore Highway, potential encounters with vehicles ending in mortality would be a considerable threat across the three hotspots; and
- Encounters with dogs presents a threat throughout the Project area in koala habitat and the continuous landscape within and surrounding the Project area. While this threat level is fairly consistent, areas with higher koala density are likely to be at higher risk of encounters with dogs. The Project will intersect the Wild Dog Check Fence, which was built to protect animals in adjacent cropping and grazing lands in Southern Queensland. In these locations an integrated, co-location arrangement is proposed with the Wild Dog Check Fence and fencing along the rail alignment corridor to be a single structure.
- This fence may play a minor role in protecting koalas, but given koalas can traverse fences, dog encounters may still occur despite the fence.

## 2.5 Potential Impacts of the Project on koalas

Potential impacts of the Project on koalas include:

- Landscape habitat fragmentation and movement barriers;
- Fauna injury and mortality;
- Direct habitat loss and degradation by clearing;
- Wild dog predation;
- Vehicle and train strike;
- Indirect habitat loss and degradation involving noise, light, dust and hydrology;
- Indirect impacts associated with reduced animal health contributing to increased occurrence of disease; and
- Displacement of koalas and koala habitat by weeds and pests.

The Project will result in the clearing of 769.49 ha of koala breeding and foraging habitat and 596.24 ha of koala dispersal habitat. These clearing and disturbance extents is likely to result in a significant impact to habitat critical to the survival of the species throughout the Project area (for a complete assessment against the EPBC Act Significant Impact Guidelines 1.1, refer to the revised draft EIS Appendix O: Matters of National Environmental Significance Report).

**Table 2-3** describes the potential Project impacts and where in the KMP and supporting documentation the impacts and proposed management and mitigation measures are discussed.

All identified impacts, as presented in **Table 2-3**, are addressed in further detail in the following subsections. Specifically, pre-construction impacts are addressed in **Section 4**, construction impacts are addressed in **Section 5**, and operation impacts are addressed in **Section 6**. In each of these sections, the impacts are addressed, followed by their respective management measures. Management measures regarding the pre-construction and design phase (**Section 4**) were incorporated to minimise and avoid potential impacts, with the aim of maintaining koala habitat connectivity within the Project footprint.

## Table 2-3 Potential Impacts Addressed in this KMP and Related Documents

| Potential impact | KMP section and related documents |
|---|---|
| Landscape habitat fragmentation and movement barriers | ■ KMP Section 3 Management Strategies<br>■ Fauna Design Guidelines for the Inland Rail Program (ARTC, 2022b)<br>■ Fauna Sensitive Road Design Manual Vols 1-2, (Department of Transport and Main Roads, 2000-2010)<br>■ Inland Rail Program Wide Fencing Strategy<br>■ Fauna Connectivity Strategy presented in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024)<br>■ Rehabilitation and Landscaping Management Plan developed as a component of the CEMP |
| Fauna injury and mortality | ■ KMP Section 3.3 Management of Injury and Mortality<br>■ Revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024)<br>■ Biodiversity Management Plan developed as a component of the CEMP<br>■ Revised draft EIS Appendix O: Matters of National Environmental Significance Report<br>■ Revised draft EIS Appendix L: Terrestrial and Aquatic Ecology Technical Report |
| Direct habitat loss and degradation by clearing | ■ KMP Section 5.2.5 Habitat Loss from Vegetation Clearing/Removal<br>■ Rehabilitation and Landscaping Management Plan developed as a component of the CEMP |
| Wild dog predation | ■ KMP Section 5.2.4 Weed and Pest Management Measures<br>■ KMP Section 6.2.1 Fauna Fencing<br>■ Revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024)<br>■ Biosecurity Management Plan developed as a component of the CEMP. |
| Vehicle and train strike | ■ KMP Section 5.2.1 Vehicle Management Measures |
| Indirect habitat loss and degradation involving noise, light, dust and hydrology | ■ KMP Section 5.2.8 Management of Indirect Habitat Degradation involving Noise, Light, Dust and Hydrology<br>■ Noise and Vibration Management Plan developed as a component of the CEMP.<br>■ Soil Management Plan developed as a component of the CEMP.<br>■ Erosion and Sediment Control Plan developed as a component of the CEMP.<br>■ |
| Indirect impacts associated with reduced animal health contributing to increased occurrence of disease. | ■ KMP Section 5.2.3 koala Disease Management Measures |

| Potential impact | KMP section and related documents |
|---|---|
| Displacement of koalas and koala habitat by weeds and pests | ■ KMP Section 5.2.4 Weed and Pest Management Measures<br>■ KMP Section 6.2.1Fauna Fencing<br>■ Biosecurity Plan developed as a component of the CEMP. |

## 2.6 Assessment of Potential Impacts

The *Environmental Management Plan Guidelines,* (DCCEEW, 2024) state that once the potential impacts of the proposal are clearly identified a risk assessment should be undertaken for each potential impact. Section 4 of the Guidelines set out a qualitative risk assessment methodology that can be used to undertake the assessment. This section has adapted the methodology from the guidelines align with the Project risk assessment methodology.

Each impact identified in **Section 2.5** is assigned a rating in terms of likelihood and consequence to determine the individual risk rating of each impact (see **Table 2-4**, below). The significance of these impacts has been further described in the revised draft EIS Appendix O: Matters of National Environmental Significance Report.

**Table 2-4 Significance Risk Assessment Approach**

| Magnitude of Impact | Sensitivity | | | | |
|---|---|---|---|---|---|
| | **Major** | **High** | **Moderate** | **Low** | **Negligible** |
| **Major** | Major | Major | High | Moderate | Low |
| **High** | Major | Major | High | Moderate | Low |
| **Moderate** | High | High | Moderate | Low | Low |
| **Low** | Moderate | Moderate | Low | Negligible | Negligible |
| **Negligible** | Moderate | Low | Low | Negligible | Negligible |

All identified risks to koalas as result of the Project have been categorised into their respective phases (i.e., construction and operation) and have been assessed separately to provide guidance on what phase and impact should be the focus of avoidance and mitigation measures (refer to **Table 2-5** below). It should be noted these are initial risks (pre-mitigation) to the koala. Impacts are associated with construction and operation phases and strategies to minimise disturbance to koalas and koala habitat have been identified throughout sensitive design processes undertaken during the pre-construction and design phase.

**Table 2-5 Impact Assessment of the Project upon koala (pre-mitigation)**

| Project Phase | Potential Impact | Sensitivity[1] | Magnitude[2] | Significance[3] |
|---|---|---|---|---|
| **Construction (prior to mitigation)** | Habitat loss from vegetation clearing/removal. | High | High | Major |
| | Barrier effects, habitat fragmentation and loss of habitat connectivity. | High | High | Major |
| | Koala species injury or mortality as a result of vehicle collision | High | Low | Moderate |
| | Displacement of fauna species from invasion of weed and pest species. | High | Moderate | High |
| | Reduction in the connectivity of koala movement corridors. | High | High | Major |
| | Noise, dust, and light impacts | Moderate | Low | Low |
| | Altered hydrology and flooding | Low | Negligible | Negligible |

| Project Phase | Potential Impact | Sensitivity[1] | Magnitude[2] | Significance[3] |
|---|---|---|---|---|
| **Operation (prior to mitigation)** | Fauna species injury or mortality as a result of vehicle and train strikes | High | Low | Moderate |
| | Displacement of fauna species from invasion of weed and pest species | High | Low | Moderate |
| | Barrier effects, habitat fragmentation and reduction in the connectivity of koala movement corridors | High | Moderate | High |
| | Light impacts | Moderate | Low | Low |
| | Altered hydrology and flooding from changes in drainage across the Project | Low | Negligible | Negligible |

1. Sensitivity is defined as the extent to which the specific MNES (ie koala) responds to the impact. Sensitivity categories are applied to each of the MNES to assess significance of potential impacts on that receptor (ie koalas and their habitat).
2. Impact Magnitude is defined as being comprised of the nature and extent of the potential impacts.
3. Significance of Impact is a function of an impacted MNES's sensitivity and the magnitude of the potential impact.

A summary of the risk assessment on koala connectivity, prior to the implementation of mitigation measures is provided in Table 2-6 (WSP, 2024).

## Table 2-6 Impact Assessment of the Project upon koala connectivity

| Species | Number and % of RRD structures within habitat that are suitable | Is appropriate design of crossing structures known and is there evidence of use? | Impact to connectivity of RRD before mitigation |
|---|---|---|---|
| Koala | 146 out of 342 (43%)<br><br>41 out of 124 (33%) within PCZs | Extensive use of culverts and bridge underpasses, including under railways has been reported.<br><br>Koala not recorded using canopy bridges. Will use vegetated land bridges with mature trees or refuge poles.<br><br>Correctly designed fencing (1.8 m cyclone mesh fencing, with sheet metal panels to prevent climbing) will funnel koalas to crossing structures and keep them off the railway. | **High** |

*Note: RRD = Revised Reference Design*

# 3. MANAGEMENT STRATEGIES

To manage the impacts of the Project on koala movement and foraging behaviour, koala injury and mortality because of the Project, or the availability of suitable habitat, the following koala specific measures have been developed across each of the key phases of the Project:

- Design Phase: avoidance and minimisation of losses to foraging and breeding habitat to minimise the overall impact to koala habitat and measures to retain habitat linkages for fauna movement in key locations such as the Priority Connectivity Zones (PCZs) as detailed in the Fauna Connectivity Strategy presented in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024) and to reduce the risk of koala injury and mortality from train strike risk.
- Construction Phase: minimise koala access to the construction areas through the use of koala proof fencing to minimise risk of koala injury and mortality; and
- Operation Phase: Allow opportunities for koala movement throughout the landscape through the maintenance of connectivity to ensure that the rail corridor does not form a barrier and that connectivity is maintained, while minimising risk of koala injury and mortality.

Each of the following sections relates to each of the listed potential impacts identified in sections 2.5 and 2.6 and includes:

- Details of management measures to address impacts;
- Monitoring and performance indicators to evaluate the success of management measures;
- Corrective actions to follow if they are not performing as expected; and
- Details of who is responsible for each measure.

Section 4 to section 6 include details of koala-specific measures and general fauna management measures. Where management actions are detailed in another management plan (such as the Biosecurity Management Plan), this draft KMP will not repeat the details but will refer to the relevant document where relevant.

## 3.1 Previous Management Learnings

The management strategies in this draft KMP have been informed by successful measures implemented as part of the Toowoomba Second Range Crossing Project, Moreton Bay Rail Link project and the rail component for the Carmichael Coal Mine and Rail Project, as well as measures commonly applied to projects approved by the Commonwealth in central and southern Queensland and New South Wales. All measures will be monitored with corrective actions to improve effectiveness where required.

An assessment of effectiveness of impact mitigation measures used in previous projects is summarised in **Table 3-1**, as informed by DTMR personnel on their experience through delivery of the management measures on some of the above listed projects.

## Table 3-1 Impact Mitigation Measures and Evaluation of their Effectiveness

| Potential impact | Mitigation measure | Previous success | Effectiveness |
|---|---|---|---|
| Disruption to movement and gene flow | ■ Koala connectivity within the Project footprint is to be aided by the implementation of fauna infrastructure, including koala crossing structures, koala exclusion fencing (fauna fencing) and fencing escape mechanisms (e.g., escape poles, jump outs) as outlined in revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024)<br>■ Installation of fauna crossing structures<br>■ Ongoing koala scat and genetic monitoring to monitor potential reductions in gene flow and ensure success of crossing structures through adaptive management to rectify any limitations with the crossing structures. | ■ The monitoring of koala genetics and scats provided information on the genetic diversity and dispersal patterns of the koala during pre-construction, construction and operation phase of the Bruce Highway Cooroy to Curra upgrade, ensuring that gene flow impacts were mitigated.<br>■ As per the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024), koalas readily move through culverts, bridges and other crossing structures under linear infrastructure including railways.<br>■ The Moreton Bay Rail Koala Management Program presents evidence of regular koala movement across the rail corridor via bridge underpasses and fauna culverts during operations (Dexter et al., 2017). | Moderate— Monitor and implement corrective actions, if required |
| Injury or mortality during clearing works | ■ Prior to any pre-construction clearing works being undertaken, the clearing extents / boundaries / limits of work as well as koala habitat areas and trees that must be avoided will be clearly demarcated.<br>■ A qualified fauna spotter catcher will undertake pre-clearance surveys of remnant and regrowth vegetation areas required to be cleared for pre-construction purposes. In the event of a detection, any scheduled clearing will be halted until either the koala has moved beyond the impact area or can be suitably relocated.<br>■ The fauna spotter catcher will supervise the subsequent clearing of the necessary remnant and regrowth vegetation areas. | ■ The DTMR Fauna Sensitive Transport Infrastructure Delivery manual (2024) provides guidance on clearing extents and key personnel (i.e., fauna spotter/catcher, ecologist) relevant to the Project. The design manual indicates the presence of fauna spotter catchers has provided success in reducing injury and mortality of fauna during vegetation clearing.<br>■ The use of ecologists and licensed fauna spotter/catchers has been used on numerous projects (including the Woolgoolga to Ballina Pacific Highway | High— Measures have been used in the past and were effective. |

| Potential impact | Mitigation measure | Previous success | Effectiveness |
|---|---|---|---|
| | ■ Design and construction documentation to set out how vegetation clearing within the Project, in koala habitat, will be carried out in a manner to minimise stress on potential individual's as much as practicably possible (e.g., sequential clearing). Where possible, clearing activities will take place outside the koala breeding season, which is October–May.<br>■ If clearing of koala habitat is necessary to occur in breeding season, or the juvenile dispersal period, additional measures will be developed in consultation with koala specialist/ fauna spotter catcher. May include; having a dedicated koala spotter as well as fauna spotter-catchers, planning of sequential clearing to maintain movement corridors and resting/shelter opportunities, increase sections of temporary koala fencing to increase exclusion from active construction zones. These measures can be supported by data collected by UniSQ on koala movements and home ranges.<br>■ Restricted works measures in place should koala be observed within the Project, to allow for safe movement away from the works area.<br>■ Subject to the safety operation and maintenance of Inland Rail, clearing of native vegetation should be minimised to facilitate movement of koalas through functional corridors.<br>■ Installation of temporary exclusion fencing to prevent koala from accessing construction areas.<br>■ If any fauna is to sustain injury, it must be handed over to appropriate wildlife carer personnel or veterinary clinic within 24 hours and correct ARTC personnel notified. | Upgrade) to identify and relocate fauna successfully. | |
| Koala-vehicle collisions within the Project footprint | ■ Koala connectivity within the Project footprint is to be aided by the implementation of fauna infrastructure including fauna exclusion fencing, as outlined in revised draft EIS Appendix P: | ■ Incorporation of connectivity structures and fauna exclusion fencing has been used successfully on many projects across Australia | Moderate—Monitor and implement corrective actions, if required |

| Potential impact | Mitigation measure | Previous success | Effectiveness |
|---|---|---|---|
| | Fauna Connectivity Strategy (WSP, 2024).<br>■ Vehicle speed restrictions to be enforced within the Project footprint, with stricter speed restrictions in areas where koalas are deemed high risk (the hotspot regions). | (including the Moreton Bay Rail Link project and Woolgoolga to Ballina Pacific Highway Upgrade (SES, 2021)) and was found to reduce the number of koala and vehicle collisions within the Project footprint. It should be noted that fauna exclusion fencing is most effective when it funnels animals to crossing structures, there are no fence gaps and maintenance is regular.<br>■ Feedback received from DTMR demonstrated that fauna connectivity infrastructure provides additional monitoring opportunities throughout Project phases to inform potential for further measures to be applied. | |
| Loss or degradation of koala habitat within and outside the construction area | ■ Prior to any clearing works being undertaken, the clearing extents/boundaries/limits of work as well as koala habitat areas and trees to be avoided will be clearly demarcated.<br>■ Identify areas within the Project footprint and surrounding locality where koala habitat restoration can be included in the Rehabilitation and Landscaping Management Plan, in line with the Environmental Management Plan.<br>■ Rehabilitation of temporary construction areas where woodland habitat has been cleared.<br>■ Revegetation plant species will be obtained from a reliable source that is certified free of pathogens.<br>■ Installation of temporary exclusion fencing to prevent koala from accessing construction areas. | ■ The requirement for a Construction Environmental Management Plan (CEMP), with installation of temporary fencing considered standard procedure within linear developments to reduce the risk of clearing outside the construction area.<br>■ DTMR conducted monitoring on offset and revegetation areas as part of the Moreton Bay Rail Link project. The finding of the monitoring indicated the time taken for koalas to utilise offset or revegetation areas was much quicker than expected, with evidence of koalas on revegetated plantations within two years. | High — Measures have been used in past and were effective. |

| Potential impact | Mitigation measure | Previous success | Effectiveness |
|---|---|---|---|
| Loss or degradation of koala habitat when siting ancillary facilities | ■ Construction areas which are not within the Project construction rail alignment (compounds, stockpiles, fuel storage areas, laydown areas, staff parking) will be located and established outside likely koala management corridors/pathways. | ■ Siting of construction areas outside of likely koala management corridors and pathways is considered standard practice across Australian projects, to minimise any direct or indirect impact on koala habitat due to construction activity. | High — Measures have been used in past and were effective. |
| Disturbance of retained habitat due to increased noise, light and dust during construction. | ■ Dust, light and noise managed in accordance with the Project CEMP<br>■ Noise restrictions will be in place and relevant guidelines regarding continuous exposure enforced.<br>■ Dust can be reduced using artificial barriers and watering down of construction areas, where feasible.<br>■ Construction and management processes will minimise the use of excessive artificial light and remove temporary construction lighting on completion of works.<br>■ Light managed in accordance with the Project CEMP, inclusive of directional shields to minimise light spill to adjacent habitats. | ■ Consolidation of dust, light and noise measures is best practice for any project involving construction activities and reduces disturbance to koalas.<br>■ Measures stated within the CEMP have been proven successful in a multitude of large-scale projects and are considered to minimise impacts. | Moderate — Dust, light and noise mitigation measures have been used in the past and were effective, although further research should be conducted. |
| Degradation of koala habitat due to the introduction of invasive exotic plants, koala specific disease and plant pathogens | ■ Pre-construction survey and a Biosecurity Management Plan will include references to relevant guidelines to control potential deleterious pathogens including *Phytophthora cinnamomi* and Myrtle rust associated with the Project activities, both of which may impact eucalypt species and therefore koala.<br>■ Ongoing weed monitoring and control within the rail corridor with specific reference to maintaining preconstruction condition of habitats that adjoin the rail corridor.<br>■ Property-specific weed and pathogen hygiene requirements will be developed in consultation with the relevant landowners/operators prior to construction activities occurring on said property, outside permanent B2G Project footprint. | ■ A Biosecurity Management Plan is a recognized as a key document in accordance with *Queensland's Biosecurity Regulation* (2016).<br>■ The plan outlines relevant guidelines, references, measures and requirements associated with Project biosecurity matters.<br>■ The use of a Biosecurity Management Plan has proven success within large-scale infrastructure projects to prevent the introduction and spread of weeds, koala-specific disease, plant pathogens and pests. | High — Measures have been used in past and were effective. |

# 4. DESIGN PHASE MANAGEMENT MEASURES

## 4.1 Potential Impacts during Design Phase

Potential impacts during design phase to the koala include:

- Impact on koala movement behaviours, foraging behaviours, or habitat, including through habitat fragmentation, loss and edge effects; and
- Impacts to koalas due to weeds, pests including koala specific diseases and diseases with the potential to impact koalas indirectly.

## 4.2 Management Measures

Management measures will be implemented during the design phase to mitigate the impact of the Project on koalas during the construction and operation phase, including:

- The final KMP will be prepared in accordance with the conditions of approval from the Commonwealth and the Coordinator Generals Evaluation Report.
- Where practical, identify opportunities to use existing tracks to minimise introduction of new permanent and temporary tracks.
- Detailed ecological surveys of the B2G Project area were undertaken as part of the reference design phase for this revised draft EIS, in accordance with relevant guidelines for koalas. The data was considered in the Project's design as well as for defining optimal mitigation measures.
- Pre-construction surveys of areas identified as potential habitat for koalas, as per habitat mapping and hotspot confirmation.
- Design and construction documentation to set out how vegetation clearing within the B2G Project, in koala habitat, will be carried out in a manner to minimise stress on potential individual's as much as practicably possible (e.g., sequential clearing). Where possible, clearing activities will take place outside the breeding season for koala (October-May) with management measures outlined in Section 5.2.5 to be implemented when not practicable.
- Restricted works measures in place should koala be observed within the Project, to allow for safe movement away from the works area outlined as corrective actions in table 5-2.
- Establish and maintain a koala management and incident register to record sightings and/or incidents involving koalas during the undertaking of the B2G Project activities and through to rail operations.
- Fauna crossing structures and fencing designed in accordance with the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024).
- Identify opportunities to monitor rates of fauna strike during the operation phase. Data will be used to monitor the effectiveness of koala exclusion fencing to funnel individuals towards crossing structures and to inform potential for further measures to be applied to minimise/eliminate the risk of future incidents.
- A Biosecurity Management Plan will include references to relevant guidelines to control potential deleterious pathogens including *Phytophthora cinnamomi* and Myrtle rust associated with the Project activities both of which may impact eucalypt species and therefore the koala.

Mitigation measures for the design phase of the Project are presented in Table 4-1**.**

## Table 4-1 Design Management Actions

| Applicable Design Impact | Management actions | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|
| Koala injury or mortality | Design integrated systems of koala exclusion fencing and fauna crossing structures in reference to the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024), the Fauna Design Guidelines for the ARTC Inland Rail Program (ARTC, 2022b), the Fauna Sensitive Transport Infrastructure Delivery manual (Department of Transport and Main Roads, 2024), and the Inland Rail Program Wide Fencing Strategy.<br>Seek additional expert guidance in relation to specific design features and infrastructure placement during the detailed design process. | The revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024) will include:<br>■ Assessment of current connectivity prior to Project construction;<br>■ Assessment of expected connectivity during operation (i.e., SMART mitigation goals); and<br>■ Analysis of mitigation measures, including type, number and location of crossing structures (e.g., underpasses), as well as fauna exclusion fencing and revegetation to improve connectivity and reduce koala mortality. | Design has not facilitated fauna movement with the provision of fauna connectivity structures (i.e. increased levels of koala injury or mortality) | Implementing additional fauna connectivity structures and/or further optimising structure design.<br><br>A monitoring, maintenance and adaptive management plan will be developed as part of the Wildlife Connectivity Plan. | ARTC |
| Barriers to koala movement | Implement connectivity design principles to provide / maintain koala movement throughout the Project footprint. Connectivity design principles include:<br>■ Dedicated fauna culvert underpasses;<br>■ Combined drainage underpasses;<br>■ Rail bridges over waterways; and<br>■ Rail bridges / culverts over roads. | Design to be prepared prior to construction | Design has not facilitated fauna movement | Implementing additional fauna crossing structures and/or further optimising structure design. | ARTC, Contractor |

| Applicable Design Impact | Management actions | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|
| Habitat Degradation | Schedule construction activities to minimise time of disturbance to koala habitat | To be addressed prior to construction | Design has not considered koala activity periods | Delay works until undertaken. | Contractor |
| | Develop and implement a Soil Management Plan and associated Concept Erosion and Sediment Control Plan | To be prepared prior to construction | Soil Management Plan and associated Concept Erosion and Sediment Control Plan not implemented prior to construction. | Delay works until undertaken. | Contractor |
| Temporary construction lighting | Assess and incorporate into the detailed design attenuation measures to minimise light spillage, such as selection of appropriate light fittings/shields and/or at-receptor treatments. | Record hours of operation of lighting during construction.<br>Weekly monitoring of direction and intensity of lighting during nightworks. | Light disturbance to nearby vegetation and fauna | Once nightworks in areas of vegetation have ceased, lighting intensity is reduced in the area of works | Contractor |
| | Incorporate lighting to the minimal level required to meet operational road and rail safety requirements for the Project in detailed design | | | Lighting intensity is reduced in the area of works | |
| Weeds, pests and disease | Develop and implement a Biosecurity Management Plan detailing weed and pest management measures. | Daily inspections of the extent of works<br>The effectiveness of weed hygiene measures will be monitored as a component of the environmental monitoring procedure for the Project. | Increase in weed or pest spread across the Project area that can be attributed to construction activity or negligence. | Implement all weed and pest management controls.<br><br>Consider additional or alternative management controls<br><br>Weed and pest management is implemented and reported in accordance with the Biosecurity Management Plan and agreed upon solutions | Contractor |

| Applicable Design Impact | Management actions | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|
| | | | | with GRC, DES and the Darling Downs – Moreton Rabbit Board. | |
| | Develop property-specific weed hygiene requirements in consultation with the relevant landholders/operators prior to construction activities occurring on that property outside of the permanent Project footprint, Protocols where agreed, will be documented in individual property management agreements. | Specific weed hygiene requirements to be provided in individual property management agreements. | | Delay works until undertaken. | Contractor |
| | Further liaise with Goondiwindi Regional Council (GRC) and DDMRB will be undertaken during detailed design to confirm the fencing specifications for the wild dog check and rabbit exclusion fencing, respectively | To be finalised during detailed design. | | Delay works until undertaken. | ARTC |
| | Establish a complaint hotline for the Project and advertise to enable the public to notify ARTC of issues regarding weeds and pests. | Monthly internal report of complaints. | Complaints are managed in accordance with internal procedures and provided to administrating authority as required. | Assess the effectiveness of complaint management and possible improvements. | ARTC |

### *4.2.1 Detailed Design Priorities for koala Habitat Connectivity*

Without appropriate mitigation measures, the linear nature of the project has the potential to cause long-term impacts to the koala from habitat fragmentation and insufficient landscape connectivity. A koala connectivity impact assessment and management strategy has been undertaken in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024). Functional movement corridors relevant to the preservation of connectivity have been identified for target fauna including the koala. Performance criteria and mitigation measures have been identified that will be implemented through the project's design to manage and mitigate the potential impacts to ecological koala connectivity. The measures are relevant to the design delivery stage and are considered to represent best practice environmental management for fauna connectivity. Details of the mitigations will be documented in the Wildlife Connectivity Plan, prepared by suitably qualified and experienced persons based on the approach and outcomes in the Fauna Connectivity Strategy and the draft KMP (this document) and will guide detailed design for the Project to support on-gong functional fauna movements.

The design and placement of mitigation measures and other treatments for the Project will be considered on a case-by-case basis and detailed in the Wildlife Connectivity Plan based on the rationale and approach outlined Fauna Connectivity Strategy. Consistent with the safe operation and maintenance of Inland Rail, connectivity mitigations will and will include a range of the following:

- The provision of species-specific fauna crossing structures in locations where suitable crossing opportunities are currently absent and considered required for fauna connectivity purposes;
- Modification of existing drainage structures (size, configuration, shape etc) to facilitate fauna movement through the structure (e.g., converting pipe culverts to box culverts or bridges, or modification of dimensions);
- Design and construction planning to minimise clearing of native vegetation in areas identified as important for functional movement corridors (watercourse crossings and other PCZs) to reduce the size of gaps in vegetation-cover to facilitate movement;
- Measures to facilitate fauna movement such as fauna furniture within and adjacent to entrances and exits of crossing structures;
- Fencing to funnel fauna into crossing structures and prevent them from accessing the railway to reduce the risk of wildlife-train collision;
- Installation of koala refuge poles and rails within and adjacent to crossing structures;
- Noise and light controls mitigation where required where noise and light impacts have been identified as having the potential to impede the use of the fauna crossing structures; and
- Landscaping and strategic revegetation within PCZs and in approach to fauna crossing structures to enable consideration of ground coverings for fauna movement.

The three koala hotspot identified in Section 2.3.1 have been considered and recognised in the identification of locations important for the preservation of remaining habitat connectivity.

#### Pittsworth inclusive of Yarranlea

Dominated by heavily fragmentation, remnant vegetation found along roadsides and agricultural land offer important opportunities for maintaining connectivity. Locations for koala crossing structures will be most suitable where remnant vegetation is still present and potentially impacted by the Project. Possible locations include:

- Kahler road and the South Western System located west of Pittsworth;
- Geitz Road located North East of Yarranlea; and

- Although major creek lines within the hotspot are heavily cleared, Half Mile Creek and those crossed by the Gore Highway may still offer suitable opportunities.

### Canning Creek inclusive of Whetstone and Bringalily State Forest

This hotspot is dominated by large expanses of continuous vegetation (including parts of Whetstone, Bringalily, Yelarbon and Devine State Forests) providing koala habitat and connectivity throughout the landscape. In order to ensure connectivity is maintained, crossing structures at suitable intervals should be implemented across the Project footprint. Riparian vegetation running parallel to the Project also offers potential opportunities for ensuring broader landscape connectivity, particularly with Yelarbon State Forest located south of the Project. Potential crossing structure locations include:

- Bringalily State Forest;
- Whetstone State Forest;
- Canning Creek Offset Property; and
- Millmerran Inglewood Road.

### Millmerran

While koala habitat is largely fragmented within the Millmerran hotspot, riparian zones of major creeks and rivers, and remnant vegetation along roadsides offer valuable opportunities for the implementation of koala crossing structures. These areas provide existing koala dispersal habitat and are likely important for maintaining broader connectivity throughout the landscape. Potentially suitable locations include:

- Schwarten Road/Millmerran Inglewood Road;
- Condamine River; and
- Grasstree Creek.

## *4.2.2 Connectivity Design Principles*

The following sections provide general information on the design principles to be considered to maintain koala habitat connectivity and are to be applied across the alignment. The design principles consider the following:

- Vehicles;
- Fencing;
- Fauna crossing structures in accordance with the rationale and performance outcomes in the Fauna Connectivity Strategy;
- Rail bridges over waterways;
- Rail bridges/culverts over roads;
- Landscaping and strategic revegetation within PCZs and in approach to fauna crossing structures to enable consideration of ground coverings for fauna movement; and
- Connectivity monitoring.

During the writing of this draft KMP, the Koala-sensitive Design Guideline (DES, 2022) have been updated to incorporate two new threats to koalas being the following:

- Drowning in pools; and
- Entrapment and injury during construction or operational-use phases of the development.

The Fauna Connectivity Strategy presented in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024) provides overarching guidance on the environmental outcomes, performance criteria, management plans, proposed mitigation measures, monitoring, correctives actions and reporting for the fauna connectivity aspects for the Project, including the process for the development of the following as part of the Wildlife Connectivity Plan during the projects design development:

- Post -construction monitoring, evaluation, reporting; and
- Adaptive management thresholds and triggers
- Predator control program

This draft KMP should be reviewed and finalised prior to commencement of project activities to maintain consistency with the documents above as they are updated and finalised.

#### *4.2.2.1 Vehicles*

Mitigation measures regarding potential vehicle impacts have been developed with reference to the DTMR Fauna Sensitive Transport Infrastructure Delivery manual (2024), the Department of Environment and Science (DES) Koala-sensitive Design Guideline (2022) and ARTC Fauna Design Guideline (2022b). Koala movement across the highly fragmented Project area is high (ERM, 2024); and opportunities for maintaining koala connectivity and minimising mortality and injury will be identified through sensitive design. The process and rationale for the provisions of safe and suitable fauna crossing locations is outlined in the revised draft EIS Appendix P: Fauna Connectivity Strategy; and will include the following:

- Vehicle speed restrictions during the pre-construction and construction stages will apply to all unsealed routes used by construction vehicles, including internal roads and haul routes, and will be determined through consultation with the relevant local government. These vehicle speed restrictions will be documented in the Project's Traffic Management Plan.
- Vehicle speed restrictions during operation to the agreed safe limit will be enforced within the Project area, with stricter speed restrictions in koalas hotspots.
- Rail maintenance access roads will be speed limited to no more than 40 km/hr to reduce the risk of vehicle strike.
- Koala awareness signage should be installed where high-traffic areas intersect koala habitat.
- Exclusion fencing will be installed at areas of known high koala density and movement as a priority and in areas where there is a high risk of vehicle strike.

#### *4.2.2.2 Trains*

The Project has been designed to maximise the use of existing rail corridors and associated infrastructure where possible. Without consideration of the provision of fauna movement across the corridor, train strikes pose a significant risk to koalas. The revised draft EIS Appendix P: Fauna Connectivity Strategy has identified mitigation measures in line with the Koala-sensitive Design Guidelines (DES, 2022), Fauna Sensitive Transport Infrastructure Delivery manual (DTMR, 2024), and the ARTC Fauna Design Guidelines (ARTC, 2022b). Mitigation measures aimed at minimising risk of train strikes include but are not limited to:

- Koala exclusion fencing to deter koala movement into the rail corridor;
- Dedicated fauna crossing structures in koala habitat areas to ensure landscape permeability and habitat connectivity remains while also minimising the risk of injury and mortality associated with train strikes during operation;

- All fauna detected within the rail corridor including healthy, injured, sick or dead fauna will be recorded and reported in the operations fauna management and incident register.

#### *4.2.2.3 Fencing*

##### *Construction*

The construction methodologies and design of temporary fencing will be developed through the detailed design phase. The Koala-sensitive Design Guideline (DES, 2022) has guided design choices for the Project.

Without consideration of the provision of fauna movements through the landscape, fencing has the potential to cause a barrier to koala movement across a rail corridor or can discourage koala movement. The Koala-sensitive Design Guideline indicated that although koalas are excellent climbers and most fencing types are unlikely to cause a complete barrier, they may deter movement across the corridor. Koalas try to go through, under and then around a structure before attempting to climb over. Consequently, temporary fencing is considered best way to mitigate impacts to koalas (DES, 2022).

##### *Operation*

Koala exclusion fencing is proposed along the majority of the rail corridor, excluding major flood plains. Regularly maintained, koala exclusion fencing will provide impermeable barriers to koala movement in order to funnel individuals towards crossing structures. This approach will also minimise the risk of koala mortality and injury as a result of train strike while providing a semi-permeable rail alignment that does not impact on broader habitat connectivity. Koala exclusion fencing design should have the following considerations:

- As outlined in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024), fencing is not proposed on floodplains due to the risk of flood debris getting caught in the fencing. During operation, mitigation measures should be in other forms, which encourage koalas to cross the alignment (See **Sections 6.4** for examples). Revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024) states bridges and culverts as a suitable form of crossing structure within the floodplain to assist with dispersal events.
- Koala exclusion fencing will be used surrounding koala crossing structures to funnel individuals towards the crossing structure and restrict access to the rail corridor. The locations of these exclusion fencing will be subject to the proposed crossing structure locations described in the Koala Connectivity Report.
- The koala escape poles as described in the revised draft EIS Appendix P: Fauna Connectivity Strategy should be installed at appropriate intervals along the rail corridor.
- Subject to safe operation and maintenance of Inland Rail and the outcomes of the Wildlife Connectivity Plan, where fencing, such as Wild Dog Check Fence, design does not allow for koala movement (due to other safety or operational considerations), it is proposed to reinstate in these locations in an integrated/ co-location arrangement. That is, the rail alignment corridor and Wild Dog Check Fence to be one structure, with two-way koala escape poles proposed for these integrated fence portions only. Final design specifications will be outlined in the Wildlife Connectivity Plan.
- Barbed wire should not be used and where barbed wire cannot be avoided, replacing the top strand with plain wire can reduce the risk of fauna entanglement.
- Fencing types, koala rails and refuge poles also need to be considered in the context of any all relevant crossing structures (culverts, bridge underpasses) and must tie into these structures to encourage safe movement across the corridor.

- The potential application of koala grids will be investigated to prevent fauna from accessing unfenced sections of the railway, particularly in koala hotspot areas. These grids will require maintenance to ensure the space beneath the bars does not fill up with dirt. Further trials are required before this option is viable, to test the grate diameters and spacing.
- Jump-outs are specially designed gaps in fauna exclusion fencing that allow trapped animals to jump down and out into adjacent habitat areas, while restricting movement into the rail corridor. Final design specifications will be outlined in the Wildlife Connectivity Plan.
- One-way gates may be effective in allowing trapped fauna to escape into adjacent habitat. One-way gates have a self-closing mechanism which closes the gate behind the animal as it passes through, allowing koalas to egress from the rail corridor only. Although potentially effective, one-way gate maintenance is considered onerous, with regular inspections required to ensure functionality. While one-way gates may offer potential design solutions to reduce wildlife-vehicle/train strikes, further testing is required to understand the effectiveness and optimal design of these gates, particularly in comparison to other available measures. It should be noted that the specifications of any such gate will need be designed to allow female koalas carrying back young to pass through without separation.

#### *4.2.2.4 Fauna crossing structures*

Construction methodologies and planning will allow a staged approach so that the completion of fauna crossing structures minimises the duration of interruption to koala dispersal habitat.

The Fauna Connectivity Strategy outlines the process for the selection of required mitigation measures that will be integrated in the Project's detailed design and form the Wildlife Connectivity Plan to manage and mitigate the potential impacts to koala connectivity. The details of the fauna crossing structures and other connectivity mitigations will be documented in the Wildlife Connectivity Plan, prepared by suitably qualified and experienced persons.

#### *4.2.2.5 Combined drainage underpasses*

The Koala-sensitive Design Guidelines (DES, 2022) suggests alternative solutions when best-practise solutions are not an option, including combined drainage underpasses; noting the below considerations:

- Combined crossings must be located and installed so that entrance and exit slopes are not steeper than 3H: 1V, are not constructed of rocky material, and must provide suitably wide dry fauna passage.
- Any scour protection associated with the entries and exits to combined drainage/fauna crossings must accommodate and provide for the safe and effective passage of fauna, be constructed with the smallest practicable rock size with minimal gaps.

#### *4.2.2.6 Rail bridges over waterways*

The design of bridge structures over waterways will consider the following:

- Bridges should be designed with a natural substrate at the abutment, such as soil or vegetation, where feasible and reasonable to encourage fauna movement through the structure.
- Clearing of vegetation adjacent to bridges across waterways is to be minimised. Design and construction methodology is to retain as much vegetation within the riparian zone as is practicable.
- If combined with drainage, identify the 'drainage' area and the 'wildlife movement' area of the underpass. Wildlife movement areas should be on both banks of the waterway and be of a minimum of 3m in width.

- Bridge piers should not restrict movement of wildlife along designated wildlife movement areas.
- Revegetation works should be completed as soon as practicable following construction and include restoration of natural riparian vegetation underneath the bridge structure and in structure approaches. Refer to the revised draft EIS Appendix O: Matters of National Environmental Significance Report.

### *4.2.3 Habitat enhancement and restoration*

During the detailed design phase, opportunities for koala habitat enhancements and restoration will include the following:

- Design and construction will be planned to minimise clearing requirements of native vegetation at locations identified as important to the functionality of fauna movement corridors.
- Landscaping, strategic revegetation and placement of key habitat features within areas identified as important for the preservation of habitat connectivity (such as PCZs) and in approach to fauna crossing structures to enable habitat linkages.
- Identification of areas within or adjacent to the Project alignment that can be planted with preferred forage eucalypt species, consistent with any lost foraging habitat.
- Reduction of threats such as managing the risk of wildfires, proliferation of weeds and introduction of myrtle rust.

## 4.3 All Consolidated Design Management Measures

Table 4-2 outlines the design measures for koalas that consideration should be given to prior to undertaking construction.

## Table 4-2 Design Phase Performance Thresholds and Corrective Actions

| Main Management Goal | Measure | Frequency | Trigger for corrective action | Corrective Action if trigger is reached |
|---|---|---|---|---|
| Impacts to foraging and breeding habitat is minimised by identifying opportunities to refine design to avoid areas of this habitat type. | Habitat definitions have been written and informed new habitat mapping for the koala. These have been written to include paddock trees. These now form part of the species profile.<br>In turn, all areas of impact have been recognised/refined in line with this koala habitat mapping. | One off | Works commencing without the refined design being in place | Final detailed design plans to include measures to avoid and minimise impacts to koala habitat. |
| Fauna movement opportunities and fauna fencing strategies finalised in accordance with ARTC Fauna Design Guideline (ARTC, 2022b) and specific strategies in the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024) | A finalised set of guidelines to steer and inform the pre-construction, construction, and operational phases on creating and upholding appropriate fauna crossing and movement passages, including exclusion processes, for koalas. | One off | Works commencing without the plan being in place | Final detailed design plans to include details on the fauna movement infrastructure, including fencing and crossing locations. |
| No impact to koala habitat outside designated clearing areas and the Project footprint | Scheduling of construction activities to minimise duration of works in or adjacent to sensitive habitat areas i.e., waterways, riparian zones, known koala habitat. | As per each stage of clearing | Schedule signed off and approved | Delay works until undertaken |
| No impact to koala habitat outside designated clearing areas and the Project footprint | Prior to any pre-construction clearing works being undertaken, the clearing extents/boundaries/limits of work as well as koala habitat areas and trees that must be avoided will be clearly demarcated. | As per each stage of clearing | Demarcation signed off and approved | Delay works until undertaken |
| No impact to koala habitat outside designated clearing areas and the Project footprint | Where the Project footprint interacts with the wild dog check fence, it will be reinstated outside the rail corridor in accordance with the agreed upon solution with Goondiwindi Regional Council in the design phase. | One off | Application of fence signed off and approved | Delay works until undertaken |
| No impact to koala habitat outside designated clearing areas and the Project footprint | Where the Project footprint crosses the Darling Downs- Moreton Rabbit Board fence, the fence will be reinstated outside the rail corridor, and a rabbit trap will be established in line with the | One off | Application signed off and approved | Delay works until undertaken |

| Main Management Goal | Measure | Frequency | Trigger for corrective action | Corrective Action if trigger is reached |
|---|---|---|---|---|
| | agreed solution with the Darling Downs- Moreton Rabbit Board during the design phase. | | | |
| To identify areas where koala habitat can be restored within or adjacent to the Project footprint to provide for foraging and breeding habitat resources and improved dispersal opportunities. | Opportunities for restoration within or adjacent to the B2G Project footprint are identified. These will provide opportunities for foraging and breeding habitat resources and improved dispersal. | One off | Works commencing without the plans for restoration being in place. | Delay works until plans created and signed off/acknowledged by all participating members |

# 5. PRE-CONSTRUCTION AND CONSTRUCTION MANAGEMENT MEASURES

## 5.1 Potential Impacts during the Pre-construction and Construction Phase

### *5.1.1 Vehicles and personnel*

The Project footprint consists of an approximately 217.6km rail alignment following a linear pathway. During the construction phase of the Project there is an increased risk of vehicle strike to koalas causing injury or mortality to koalas due to construction traffic in and around the work area. Additionally, there is the risk of koalas entering the construction corridor and becoming trapped, as well as potential interactions with construction personnel.

### *5.1.2 Weeds, Pests and Disease*

The introduction of weed and pest species may impact habitat compositions and the availability of foraging and breeding habitat. This would inevitably lead to displacement of koala due to habitat fragmentation. Additionally, koala specific disease including *Chlamydia pecorum* and KoRV are two major pathogens affecting the koala population that may be introduced during the construction phase of the Project. Other diseases that have the potential to impact koalas indirectly, such as loss of habitat caused by *Phytophthora cinnamomi,* may also be introduced during construction, and have the potential to impact koalas

### *5.1.3 Habitat Loss from Vegetation Clearing*

As stated in the *National Recovery Plan for the koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory) 2022, 'Land use practices causing the loss and fragmentation of habitat are considered the primary ecological threatening process to koalas, to which they are particularly sensitive (McAlpine 2006a and b; Reed and Lunney 1990; Rhodes et al. 2006, 2008)'.* Supporting the outcome that koala populations are heavily impacted by this human-related activity, which has seen the reduction of suitable habitat and fragmentation of high-quality habitat, as well as disturbance and degradation of adjoining habitat directly leading to koala injury or mortality. To add to this as a result of clearing processes, koalas can become trapped in the construction corridor and suffer injury or mortality. Overall, clearing of habitat presents the greatest direct threat to koala populations and individuals for The Project.

The draft EIS Technical Ecological Assessment identified:

- Koala breeding and foraging habitat was identified as discrete areas of any forest or woodland where trees are the dominant plant form and the percentage canopy cover of the tallest tree layer ranges from 0% – 30% for woodland and 30% - 70% for open forest;
- Dispersal habitat was mapped as the areas adjacent to koala habitat where the dominant plant form is grasses, or areas that include bare ground and other rural land-uses (and related infrastructure). Individual scattered trees (paddock trees) are included in the dispersal habitat areas;
- Not suitable habitat was mapped as all areas that were not mapped as koala habitat; and
- Overall, breeding and foraging habitat was mapped as 769.49 ha and dispersal habitat was mapped as 596.24 ha.

#### *5.1.3.1 Reduction in Connectivity and Movement*

A reduction of connectivity of koala movement corridors can further exacerbate the impacts of habitat fragmentation, edge effects, and alter the ecological functioning of the koala. These movement corridors are inclusive of contiguous forest, riparian vegetation and suitable trees that allow for safe passage of koalas across the landscape. Impacts to these movement corridors are likely to result in changes to the daily activities such as foraging and sleeping patterns, in addition to larger scale impacts such as genetic gradients. It is noted that koalas have the ability to disperse through open paddocks, where they are connected to areas of remnant vegetation. It has been noted within the revised draft EIS that connectivity currently is only present to the south of the impact assessment area, where native vegetation and high order watercourses are present.

### *5.1.4 Noise, Dust and Light*

Noise, dust and light pollution created by machinery and vehicles during the construction period, may lead to indirect disturbance to koalas. Although noise, dust and light are indirect impacts, knowledge about the relationship between these impacts and koalas, is limited.

Continuous excessive noise has the potential to cause koalas to avoid noisy areas, potentially resulting in temporary habitat fragmentation. Potential impacts as a result of temporary habitat fragmentation may also include stress and avoidance reactions, or changes to reproductive or nesting behaviour (Narayan, 2019). Indirect temporary impacts of noise on koalas can present as interfering with communication and masking the sound of predators. It is likely that train disturbance is species specific and varies with train design, speed and traffic frequency (Lucas et al. 2017). Kinsella, G. (2014) found the probability of a koala responding to a human disturbance was twice as great in the densely populated site (0.55) as it was in the natural park (0.27). These results demonstrated that regular exposure to human activity can hypersensitize wild animals to human disturbances, rather than desensitize them.

Project construction may lead to localised increases of airborne dust. Elevated levels of dust can lead to respiratory problems within fauna and thresholds for acceptable airborne dust levels will be outlined in the Environmental Management Plan.

Artificial light will be installed for night construction works and along operation infrastructure, which may impact koalas by impacting their visibility, as they already have poor vision, and susceptibility to predation. Indirect impacts of artificial light installation to aid construction, and the resultant light spill, has the potential to alter koala foraging patterns and habitat selection.

The majority of these impacts are likely to occur temporarily where project activities intersect vegetated areas and known habitats, during construction. Impacts such as these can result in evacuation of the koalas from their home tree/area, which may or may not result in permanent relocation.

## 5.2 Management Measures

### *5.2.1 Vehicle*

During the pre-construction and construction phase of the Project, the following vehicle management measures will be implemented:

- Enforcement of strict vehicle speed restrictions to the agreed safe limit, particularly in areas where koalas are deemed high risk;
- The installation of interactive koala awareness signage will be installed in high-traffic areas;
- Vehicle speed limits will be controlled onsite to no more than 40 km/hr.

- Fauna infrastructure (e.g., culverts) will be installed in appropriate locations to maximise the opportunity for safe koala movement;
- All vehicle restrictions will apply to sealed and unsealed routes; and
- Vehicles and construction machinery are not to operate outside the designated zones.
- Implement community education program regarding vehicle management measures.

### 5.2.2 Fencing

During the pre-construction and construction phase of the Project, the following fencing management measures will be implemented:

- Install temporary exclusion fencing to prevent koalas from accessing construction areas;
- Reinstate the wild dog check fence in accordance with the agreed upon solution with GRC and DES to ensure flow of koala movement where in koala hotspots;
- Reinstate the rabbit fence in accordance with the agreed upon solution with the Darling Downs – Moreton Rabbit Board to ensure flow of koala movements, where located in koala hotspots; and
- Always erect exclusion fencing prior to clearing works and maintain it for the life of the construction stage of the Project.

### 5.2.3 Koala Disease

The Biosecurity Management Plan (as outlined in the revised draft EIS Appendix O: Matters of National Environmental Significance Report) will detail necessary measures accordingly for the diseases in relation to koala retrovirus and the pathogen *Chlamydia pecorum,* including;

- Handling and assessing of koalas for Chlamydia by experienced personnel, those with suspected infection to be sent to veterinarians/wildlife carers for treatment prior to release; and
- Monitoring for indirect impacts associated with reduced animal health contributing to increased occurrence of disease. This should include liaising with site personnel and the community for knowledge on ‘sick’ koala incidences.

The Biosecurity Management Plan will include reference to relevant guidelines to control potential deleterious pathogens, including *Phytophthora cinnamomi* (dieback caused by root-rot fungus) and *Puccinia psidii* (myrtle rust) associated with Project activities; both of which may impact eucalypt species and therefore koala (*Phascolarctos cinereus*). The Biosecurity Management Plan (as outlined in the revised draft EIS Appendix O: Matters of National Environmental Significance Report) will detail necessary measures, including;

- Reduction of spread of *Phytophthora cinnamomi* utilising vehicle washdown (light and oversized vehicle), wheel washes and rumble grids;
- Identifying and prioritising the protection of biodiversity assets;
- Community engagement on impacts of *Phytophthora cinnamomi*;
- Encouraging research on options of how to manage *Phytophthora cinnamomi*; and
- Requirements in relation to pesticide and herbicide use, including any limitations on use.

### 5.2.4 Weeds and Pest

A Biosecurity Management Plan would be in place and implemented during construction (as a part of the CEMP). This will detail measures to control weeds and pests, including:

- Weed surveillance and treatment during construction activities, including fleet moving from high-risk to low-risk weed areas, as well as weed certification requirements for vehicle, plant and material arriving on the construction site;
- Property-specific weed hygiene requirements will be developed in consultation with the relevant landowners/operators prior to construction activities occurring on property, outside the permanent footprint;
- Goondiwindi Regional Council and Toowoomba Regional Council manage the Wild Dog Check Fence between Yelarbon and Millmerran which encompasses much of Whetstone and Bringalily State Forests. The fence is approximately 1.8 metres (m) tall and made of rabbit-proof wire mesh that is in variable condition. The specific goal of the Wild Dog Check Fence is to control the movement of wild dogs and dingoes and prevent them moving into farming areas to kill sheep and cattle. Numerous sections of the existing Wild Dog Check Fence that intersects with the Project will be dismantled and rebuilt as part of the Project and will be re-aligned at five sections. Fence escape mechanisms will also be installed for koalas on the Wild Dog Check Fence at the five sections where it interacts with the project.
- Where the Project intersects the existing Darling Downs- Moreton Rabbit Board rabbit fence (DDMRBRF), a rabbit trap like that of which is installed on Millmerran-Inglewood Road is proposed to be installed to maintain the integrity of the rabbit fence. Further liaison during detailed design will be required with the Darling Downs- Moreton Rabbit Board to confirm the fencing and trap design specifications.
- A complaint hotline for the Project is to be established and advertised to enable the public to notify ARTC of issues regarding weeds and pests relevant to the Project. Following complaints, complaints are managed in accordance with internal procedures and provided to administrating authority as required, and an assessment of the effectiveness of complaint management and possible improvements is reported;.
- Efforts to collaborate with the local councils and landowners to uphold current weed and pest management measures being undertaken in the localities across the Project; and
- Prioritisation of management measures for koala hotspots, regarding existing weeds and pest.

### *5.2.5 Habitat Loss from Vegetation Clearing/Removal*

Measures to minimise impacts to koalas during vegetation clearing include:

- Presence of a qualified fauna spotter/catcher onsite during clearing operations;
- Suspension of clearing works until koala/s vacate target vegetation or have been relocated; and
- Vegetation clearing should allow fauna movement and not restrict movement between connected vegetated areas.
- Development of a site-specific vegetation and fauna management plan, with direction from the Queensland Government, will include the following relevant procedures and directions:
  - Clearing procedures:
    - Roles and responsibilities of fauna spotter/catchers, contractors and construction personnel;
    - Inspection of target vegetation for habitat structures;
    - Assessment of fauna activity within tree canopies and understorey;
    - Pre-clearance survey procedures and suitably qualified personnel;

  - Guidelines for encountering fauna during clearing, with species-specific guidance where appropriate, e.g., koala;
  - Treatment procedures for injury and/or sick fauna with species or fauna group specific, including a specific procedure for koalas;
  - Fauna health assessment and relocation protocol; and
  - State that direction given by Fauna Spotter-Catcher and/or Environmental Officer must be followed.

- Fauna Spotter-Catcher methodology for best-practice and humane treatment of fauna onsite, which states:
  - All animal handling is to be undertaken by a suitably qualified and experienced person;
  - Sequential clearing will be utilised to assist fauna in relocating to nearby habitat on their own accord;
  - All fauna interactions for the length of the construction phase are to be recorded, including; capture/release locations, time and date of interaction, species identification, sex, age class, health condition, outcome of interaction and any significant details of situation;
  - If any fauna is injured, it must be handed over to appropriate wildlife carer personnel or veterinary clinic within 24 hours and correct ARTC personnel notified; and
  - If fauna can be left to relocate of their own accord, they should be allowed to do so.
- Specific koala procedures include:
  - Prior to the construction phase beginning, qualified koala specialists will undergo baseline surveys (Koala scent detection dogs, visual assessments (can include the use of drones)) to determine areas of high-Koala activity and focal areas for heightened koala management. The surveys may commence up to six months prior the construction process;
  - Throughout the construction phase, any koala with a high risk of entering the vicinity of the location of active works (job front) will be monitored;
  - Each morning prior to works, the ‘clearing team’ will meet to discuss and understand the measures needed to be taken in regard to koalas. The Fauna Spotter-Catcher in conjunction with the koala specialists will assess if any koalas are in present danger of clearing works that day, and for all stages of clearing;
  - If any koalas are present or have the likelihood of entering the job front, restricted work measures should be in place, to allow safe movement away from the work area;
  - Clearing of trees will be carried out in stages to allow koalas enough time to move out of the clearing site without human intervention;
  - Implementation of measures such that between each stage and the next there is at least one period of 12 hours that starts at 6 pm on a day and ends at 6 am on the following day, during which no trees are cleared in that site;
  - Implementation of measures such that no tree in which a koala is present, and no tree with a crown overlapping a tree in which a koala is present, is cleared;
  - If a koala is not injured but refuses to move from the clearing area of its own accord after two days, the Fauna Spotter-Catcher can liaise with ARTC to contact Queensland Government and negotiate appropriate methods for removal and relocation. Under no

circumstances must the tree and the koala be disturbed until the koala has been relocated; and

- If an animal is incapable of moving from the clearing area, as it is in direct harm from clearing equipment or unable to on its own due to injury or illness, it will be captured by a qualified Fauna Spotter-Catcher with experience in handling koalas, and either relocated into suitable habitat or taken for medical assistance.

Training programs, induction, toolbox talks and audits should be put into place for all staff, allowing workers at all levels to identify areas of significance to koala and threats to koala, as well as the importance of following clearing and rehabilitation protocols.

Activities being undertaken in the construction phase of the Project should have a Construction Work Method Statement prepared. This will ensure proper environmental practices are implemented and reduces the risk of system failures or incidences. They would be prepared in accordance with all koala mitigation measures considered and implemented.

Prior to any construction clearing works being undertaken, the clearing extents/boundaries/limits of work as well as no-go areas will be clearly demarcated. The use of temporary exclusion fencing to prevent koalas from accessing an active jobsite is necessary. Fauna exclusion fencing will be installed to align with the objectives of the revised draft EIS Appendix P: Fauna Connectivity Strategy, being:

1. ‘Maintain ecological connectivity which encompasses both daily activity movements and dispersal of fauna across the Project through implementation of mitigation measures; and
2. Minimise the risk of injury and mortality of fauna from wildlife-train collisions’ (WSP, 2024).

### *5.2.6 Koala encounter procedure*

**Table 5-1** describes the koala encounter procedures for various scenarios which are consistent with the following policies:

- Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland – Nature Conservation Act 1992 (Qld);
- Nature Conservation (Koala) Conservation Plan 2017;
- Koala-sensitive Design Guideline – A guide to koala-sensitive design measures for planning and development activities (DES, 2022);
- Operation policy – Release of rehabilitated koalas and the take and release of koalas in imminent danger (2019); and
- Nature Conservation (Animals) Regulation 2020.

**Table 5-1 Koala Encounter Procedures**

| Procedure | Guidance |
|---|---|
| Encountering koala | ■ If the proposed clearing is located within a koala habitat area (i.e., breeding and foraging habitat, and dispersal habitat) and will result in the clearing of koala habitat trees that have a trunk diameter of more than 10 cm at 1.3 m above the ground, the clearing must be undertaken in the presence of a koala spotter who has the primary role of locating koalas in trees.<br>■ Clearing of koala habitat trees is carried out in a way that ensures koalas occupying the area that is being cleared have enough time to move out of the area being cleared without human intervention.<br>■ The clearing must be carried out in stages. |

| Procedure | Guidance |
|---|---|
| | ■ Between each stage and the next there is at least one period of 12 hours (starting at 6 pm on a day and ending at 6 am on the following day) during which no trees are cleared on the site.<br>■ If a koala is in a tree, that tree is not to be cleared. If the crown of a tree overlaps with a tree that a koala is in, that tree is not to be cleared until the koala has been relocated.<br>■ Koalas will only be handled by licensed Fauna Spotter Catchers where appropriate. |
| Treating sick/injured koala | ■ DESI is the agency responsible for the assessment and licensing of individuals and organisations for the purposes of wildlife rehabilitation.<br>■ Contact to be made with DESI or a person who holds a permit that specifically provides for the rehabilitation of koalas.<br>■ A person who rescues a protected animal, but is not a licensed rehabilitator, must surrender it to a licensed rehabilitator or conservation officer within 72 hours of taking the animal into care as stated in section 56 (2) of the Nature Conservation (Animals) Regulation 2020.<br>■ The principles surrounding injury/illness of koala include: a duty of care; avoiding harm; avoiding risk to human health and safety, relieving suffering; and taking fair, reasonable and appropriate measures.<br>■ Koalas subject to handling will be examined and, if susceptible to Chlamydia infection, will be taken to a predesignated veterinarian/wildlife care facility for treatment prior to release. |
| Relocation of koala | ■ An appropriately qualified person may take an apparently healthy koala from the wild when it is found to be in clear and imminent danger.<br>■ The koala should be released back to its prescribed natural habitat. If a koala is to be released outside its prescribed natural habitat, the appropriately qualified person is to apply for approval.<br>■ The release is in accordance with procedures outlined in the Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland – *Nature Conservation Act 1992* (Qld). |

### *5.2.7 Direct injury and/or Mortality of koalas*

#### *5.2.7.1 Drowning*

Fencing can be used to encourage koala movement through koala safe crossings (i.e., culvert underpasses and bridges) as well as fencing to exclude koalas from the construction zone. This exclusion and control of koala movement mitigates the risk of a koala drowning in water basins and dredged dams during the construction phase. The CEMP will be prepared prior to construction works and support the species-measures detailed in the KMP.

#### *5.2.7.2 Entrapment and injury*

Similar to the measures to prevent drowning, entrapment and injury mitigation measures include fencing to encourage koala movement through koala safe crossings (i.e., culvert underpasses and bridges) as well as fencing to exclude koalas from the construction zone. This exclusion and control of koala movement mitigates the risk of a koala drowning in water basins and dredged dams during the construction phase.

### *5.2.8 Noise, Dust and Light*

Construction management processes will minimise the use of unnecessary artificial light and remove temporary construction lighting on completion of works, with no light spill to occur in areas identified as ‘Koala hotspots’ in this KMP. Further, noise restrictions will be in place and relevant guidelines regarding continuous exposure will be enforced. Dust can be reduced using watering of construction

areas, where necessary. During construction, night works near ecologically sensitive receptors will be scheduled at a restricted number of nights per week, with nighttime traffic redirected away from noise-sensitive receptors. More information and measures in regard to noise, dust and light mitigation Chapter 24: Draft Outline Environmental Management Plan.

## 5.3 Main Goals for Management Measures

The main goals for management measures during the pre-construction and construction phases of the Project are:

- No impact to koala habitat outside designated clearing areas and the Project footprint; and
- Avoidance of koala reported dead or injured directly attributed to the B2G Project.

## 5.4 All Consolidated Pre-Construction and Construction Management Measures

All of the listed management measures for the construction phase (including pre-construction) of the Project are further described in **Table 5-2**, including the performance criteria, corrective actions and responsible party for each.

Note in the table below where column says ‘Application to koala hotspots’ this shows additional measures for identified koala hotspots described in section 2.3.1.

## Table 5-2 Pre-Construction and Construction Management Measures

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| Weeds and pests | Implement a Biosecurity Management Plan detailing weed and pest management measures. | No additional actions required. | Daily inspections of the extent of works<br>The effectiveness of weed hygiene measures will be monitored as a component of the environmental monitoring procedure for the Project.<br>Weed and pest management is implemented and reported in accordance with the Biosecurity Management Plan and agreed upon solutions with GRC, DESI and the Darling Downs – Moreton Rabbit Board. | The introduction of new weed or pest species within the Project footprint when compared to pre-construction.<br><br>The spread of weed or pest species across the Project footprint when compared to pre-construction. | Consider additional or alternative management controls based on early detection and corrective action. | Contractor |
| | Develop property-specific weed hygiene requirements in consultation with the relevant landholders/operators prior to construction activities occurring on | No additional actions required. | Specific weed hygiene requirements to be provided in individual property management agreements. | The introduction of new weed or pest species within the Project footprint when compared to pre-construction.<br><br>The spread of weed or pest species across the | Delay works until hygiene protocols undertaken. | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | properties within the temporary Project footprint, Protocols will be documented in individual property management agreements. | | | Project footprint when compared to pre-construction. | | |
| | Reinstate the wild dog check fence in accordance with the agreed upon solution with GRC and DES. | Ensure flow of koala movement in koala hotspots where the Project intersects the wild dog check and rabbit exclusion fencing. | Ecologist to inspect installation of fencing post-construction | Broken fencing.<br><br>Broken movement structures leading to restricted koala movement in koala hotspots. | Repair and/or modify structures as required to address any faults with the installation.<br>Increase onsite supervision by ecologist/s during the installation process to avoid future installation errors | Contractor |
| | Reinstate the rabbit fence in accordance with the agreed upon solution with the Darling Downs – Moreton Rabbit Board. | Ensure flow of koala movement in koala hotspots where the Project intersects the wild dog check and rabbit exclusion fencing. | Ecologist to inspect installation of fencing post-construction | Broken fencing.<br><br>Broken movement structures leading to restricted koala movement in koala hotspots. | Repair and/or modify structures as required to address any faults with the installation.<br>Increase onsite supervision by ecologist/s during the installation process to avoid future installation errors | Contractor |
| | Establish a complaint hotline for the Project and advertise to enable the public to notify ARTC of | Hotline should not be restricted to weeds and pests but also to report | Monthly internal report of complaints. | A complaint is made by the public | Complaints are managed in accordance with internal procedures | ARTC |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | issues regarding weeds and pests. | koala sightings, especially in the koala hotspots. | | | and provided to administrating authority as required.<br><br>Assess the effectiveness of complaint management and possible improvements. | |
| Habitat Loss | Minimise Project footprint and vegetation clearing extents to the area necessary for construction. | Supply construction managers and necessary workers the location of the koala hotspots via environmental constraints maps to allow for reduction in impact to the koala hotspots. | Weekly updates of clearing locations and limits. | Clearing outside of the clearing location and limits. | Rehabilitate unnecessary cleared areas. | Contractor |
| | Brief all contractors on clearing requirements and restrictions (including fines) to prevent over clearing of these areas. | No additional actions required. | Daily inspections of the extent of works to ensure management action compliance. | Contractors are not briefed and clearing occurs outside of clearing extent. | Delay works until all contractors are appropriately briefed and supplied with<br>All permits and environmental constraints maps. | Contractor |
| | Supply location of sensitive areas. | Supply the location of the koala hotspots to construction managers and workers via environmental constraints maps.<br>Supply **Table 5-1**: koala encounter procedure to | Daily inspection of clearing activities in sensitive areas. | An injury or mortality to koalas in sensitive areas. | Stop construction activities in area until all personnel are made aware of sensitive areas and koala encounter procedures. | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | | construction managers as per guidance | | | | |
| | Clearly mark designated revegetation/rehabilitation zones and other no-go areas (including large significant trees) prior to any vegetation clearing. High visibility tape, barricade webbing or similar to be used.<br><br>Always erect exclusion fencing prior to clearing works and maintain it for the life of the construction stage of the Project. | Supply the location of the koala hotspots to construction managers and necessary workers via environmental constraints maps.<br>Supply **Table 5-1**: koala encounter procedure to construction managers and workers as per guidance. | Daily inspection during the revegetation / rehabilitation works. | Vegetation clearing undertaken in no-go zones and revegetation/rehabilitation areas. | Stop construction activities in area.<br><br>Conduct revegetation if needed to area.<br><br>Repair fencing breach and monitor breached area as per the requirements of the Rehabilitation and Landscaping Management Plan.<br><br>Review of sign off/approval process of construction exclusion fencing and demarcation of clearing extents to avoid it happening again. | Contractor |
| | Always comply with no-go zones and B2G Project limits. | No additional actions required. | | | | Contractor |
| | Undertake rehabilitation and landscaping sequentially as work fronts are completed and | *Note that research into known koala food tree species from the koala hotspots is being* | No evidence of bare ground within disturbed areas after construction | Rehabilitation works are not undertaken or are not successful. | Rehabilitation activities undertaken as soon as possible. | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | according to the Rehabilitation and Landscaping Management Plan. | *undertaken to guide seed stock decisions.* | activities are complete.<br><br>Rehabilitation undertaken in accordance with contract specifications.<br>Availability of resources for fauna is adequate | | If unsuccessful, review Rehabilitation and Landscaping Management Plan and undertake rehabilitation accordingly. | |
| Koala injury or mortality | Provide training to all B2G Project personnel and contractors on fauna requirements of this and other related management plans (i.e., KMP and Fauna management plan). Delivered through inductions, pre-start meetings and/or toolbox talks. | Supply the location of the koala hotspots to construction managers and workers via environmental constraints maps.<br>**Table 5-1** koala encounter procedure to construction managers as per guidance. | To be addressed prior to construction. | Training has not been provided to Project personnel and contractors. | Delay works until all training regarding the management plans has been provided. No individual is to commence works until training has been provided. | Contractor |
| | The Fauna Spotter Catcher will supervise the clearing of remnant and regrowth vegetation, as well as habitat features | **Table 5-1 koala** encounter procedure to construction managers and workers as per guidance.<br><br>*Noting only an appropriately qualified person may take an apparently healthy koala from the wild when it is* | Daily inspection of clearing activities | Clearing occurs outside of the designated clearing zone. | Rehabilitate unnecessary cleared areas. | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | | *found to be in clear and imminent danger (Operational Policy 2019).* | | | | |
| | The Fauna Spotter Catcher will be responsible for handling and relocating fauna to suitable habitat and ensuring injured and/or sick fauna are assessed and treated according to the requirements of the Biodiversity Management Plan | Supply the location of the koala hotspots to necessary workers via environmental constraints maps.<br>**Table 5-1** koala encounter procedure to workers as per guidance.<br><br>*Noting only an appropriately qualified person may take an apparently healthy koala from the wild when it is found to be in clear and imminent danger (Operational Policy 2019).* | Koala injuries or mortalities to be recorded in an incident register. | An injury or mortality to koalas. | Stop construction activities in area.<br><br>Koala must be handed over to appropriate wildlife carer personnel or veterinary clinic within 24 hours and correct ARTC personnel notified. | Contractor |
| | Clearly mark designated no-go areas. Use high visibility tape, barricade webbing or similar. | No additional actions required. | Daily inspections of the extent of works. | Integrity of no-go zone fencing is compromised (i.e., broken, holes, decrease in high visibility of tape etc.) | Repair fencing breach.<br><br>Review of sign off/approval process of construction exclusion fencing and demarcation of clearing extents to avoid it happening again. | Contractor |
| | Install temporary exclusion fencing to | No additional actions required. | Temporary fauna exclusion fencing | Decrease in integrity of fauna exclusion fencing | Repair fencing breach | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | prevent koalas from accessing construction areas. | | will be inspected and maintained daily during construction.<br><br>A fauna incident log will be maintained. | A koala is sighted in the construction area | Investigate likely origin of fauna entry to rail corridor and assess whether additional fauna exclusion fencing is required. | |
| | Any translocation of koalas during pre-clearance surveys will result in koalas being moved to areas where there are suitable feed trees (specific to the koala's locality) and no increased threatening process (e.g., areas where there is an increased risk of dog attacks or vehicle strikes).<br>ARTC will consult with wildlife carers and other persons with relevant local knowledge of suitable locations to release koalas. | Translocations will be in accordance with relevant legislation and the 'take', 'move' and 'release' of koalas appropriately authorised by the Department of Environment and Science as per *Operational Policy 2019.*<br><br>Should offer to support wildlife carers in the koala hotspots. | Monitoring of translocated koalas to ensure the move has been successful.<br>The population monitoring program outlined in Section 7.2 will assess the success of koala translocations. | Survival and health rates of translocated koalas have declined.<br><br>Evidence of dog attacks and vehicle strikes have increased.<br><br>Evidence of clinical disease of a koala individual. | Implementation of dog control methods and vehicle management measures (i.e., speed limits, signage).<br><br>Treatment of diseases and implementation of a chlamydia vaccination program (refer to Hanger et al. 2017).<br><br>As a last resort, translocation of koalas to more suitable areas and increased monitoring of survival and health until health rates are stabilised/increased. | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| Light, noise, dust | Assess and incorporate into the detailed design attenuation measures to minimise light spillage, such as selection of appropriate light fittings/shields and/or at-receptor treatments | No additional actions required | Reporting in CEMP | Disturbance to a koala due to lighting | Delay works until undertaken.<br>No extensive night works in ecologically sensitive areas | Contractor |
| | Implement a Noise and Vibration Management Plan | No additional actions required | Report to be developed prior to construction | Disturbance to a koala due to noise and vibration | Delay works until undertaken. | Contractor |
| | Incorporate lighting to the minimal level required to meet operational road and rail safety requirements for the Project in detailed design | No additional actions required | Reporting in CEMP | Disturbance to a koala due to lighting | Delay works until undertaken.<br>No extensive night works in ecologically sensitive areas | Contractor |
| | Avoid night works to the greatest possible extent, especially in ecologically sensitive areas (i.e., koala hotspot) | No additional actions required | Daily inspections of the extent of works | Disturbance to a koala due to lighting, noise and dust | Delay works until procedures are implemented.<br><br>No extensive night works in ecologically sensitive areas | Contractor |
| | Where possible, direct artificial light during construction away from vegetation communities | No additional actions required | Reporting in CEMP | Disturbance to a koala due to lighting | Delay works until undertaken. | Contractor |
| | Implement procedures for safe and effective fuel, oil and chemical storage and handling. This includes | No additional actions required | Daily inspections of storage and handling areas for spills and leaks | A spillage or leak has occurred | Delay works until spillage or leak has been contained or cleaned. | Contractor |

| Applicable Pre-construction and Construction Impact | Management actions | Application to koala Hotspots | Monitoring/ reporting | Triggers for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | storing these materials within roofed, bunded areas. The bunding will have floors and walls that are lined with an impermeable material, to prevent leaching and spills. | | | | Undertake investigation as to the cause of the leak and implement additional mitigation measures. | |
| | Carry out plant maintenance and refuelling in accordance with ARTC work instructions, with appropriate interception measures in place to avoid impacts to waterways, aquatic habitats, and groundwater | No additional actions required | Daily inspections of the extent of works | Interception measures are not in place | Delay works until control measures are undertaken | Contractor |
| | Undertake rehabilitation and landscaping sequentially as work fronts are completed and according to the Rehabilitation and Landscaping Management Plan to reduce the effect of light disturbance from trains during operation. | *Note that research into known koala food tree species from the koala hotspots is being undertaken to guide seed stock decisions.* | Rehabilitation undertaken in accordance with contract specifications. | Major light disturbance into surrounding koala habitat a as result of train operation. | Rehabilitation activities undertaken as soon as possible. | Contractor |

# 6. OPERATION MANAGEMENT MEASURES

## 6.1 Potential Impacts During Operational Phase

Impacts to koalas, as a result of operation of the Project, include:

- Degradation of koala-sensitive fencing and koala exclusion fencing (see Section 4.2.2.3 for explanation of fence types) within proximity to crossing structures leading to vehicle strike, train strike, or koala trapped in the corridor;
- Degradation of koala habitat rehabilitated areas;
- Wild dogs targeting koala at designated fauna movement opportunities within the B2G Project area; and
- Koalas not using the designated fauna movement structures implemented within the B2G Project area.

## 6.2 Management Measures

### *6.2.1 Weed and Pests*

During the Operation phase of the Project, ongoing weed and pest surveys within the rail corridor will occur on a regular basis to be defined in a Biosecurity Management Plan. Additionally, a complaint hotline for the Project will be established and advertised to enable the public to notify ARTC of issues regarding weeds and pests.

### *6.2.2 Direct Injury and/or Mortality of koalas*

Koala exclusion fencing will be installed on the Project in high priority areas and where suitable crossing structures for koalas have been installed. These fences are designed to prevent koalas from accessing the railway and to funnel them towards crossing structures (WSP, 2024). During the Operation phase of the Project, fauna fencing will be regularly maintained to reduce the likelihood of injury or mortality due to train strikes, as detailed in the Inland Rail Fencing Strategy.

During the Operation phase of the Project, mortality of koalas will be measured from train driver reporting, tracking results and targeted wildlife-train collision surveys conducted during and after construction.

### *6.2.3 Fauna Fencing*

Management and maintenance of fencing structures will be required during the operation of the Project, including:

- Inspect and maintain fauna fencing structures to ensure koala movement is primarily via crossing structures;
- The use of crossing structures by koala is measured using camera traps and tracking of koalas in vicinity of the Project; and
- Inspect and maintain fauna movement/passage infrastructure during operation to retain the integrity of fauna movement opportunities.

## 6.3 Main Goals for Management

The main SMART goals for management during the operation phase include:

- The movement of koalas around and across the railway will reach pre-construction levels within five years of opening to train movements
- Koalas use the crossing structures (e.g. culverts and bridge underpasses), at five years after construction, for daily movements and dispersal at rates in proportion to their occurrence in the landscape in the vicinity of each crossing structure; and
- Sufficient gene flow across the Project within 10 years of operation that ensures no genetic differentiation of populations on opposite sides due to the Project.

## 6.4 All Consolidated Operation Management Measures

All of the above listed management measures regarding the operation phase of the Project are further described in **Table 6-1,** including the performance criteria, corrective actions and responsible party for each.

Note in the table below where column says ‘Application to koala hotspots’ this was included to show any additional measures that should be taken in identified koala hotspots described in section 2.3.1.

## Table 6-1 Operation Management Measures

| Applicable operation impact | Management actions | Application to koala Hotspot | Monitoring/ reporting | Trigger for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| Koala Injury and Mortality | Koala exclusion fencing will be installed on the Project in high priority areas and where suitable crossing structures for koalas have been installed, to reduce the likelihood of injury or mortality due to train strikes.<br><br>Fencing will be planned and designed specifically for koalas. | Preference for fauna fencing and crossing structures to be located in the koala hotspots. | Fauna structures, fencing and surrounding vegetation will be regularly inspected and maintained during operation.<br><br>A fauna management and incident register will continue to be maintained to record sightings and/or incidents involving fauna species during the operation of the Project. | Mortality due to train strike. | Investigate likely origin of fauna entry to rail corridor and assess whether additional fauna exclusion fencing is required.<br>Repair fencing as required.<br><br>Ensure the fauna management and incident register is clearly accessible and staff are trained to use it. | ARTC |
| | Inspect and maintain koala movement/crossing infrastructure during operation to retain the integrity of fauna movement opportunities. | Fauna fencing and crossing structures to be checked and maintained in the koala hotspots | A fauna management and incident register will continue to be maintained to record sightings and/or incidents involving fauna species during the operation of the Project. | Mortality due to train strike attributed to the B2G Project.<br><br>Damage to fauna movement infrastructure. | Repair damage to fauna movement infrastructure.<br><br>Ensure the fauna management and incident register is clearly accessible and staff are trained to use it. | ARTC |
| Weed and pests | Ongoing weed and pest monitoring within the rail corridor, particularly within koala hotspots. | Pest and weed controls to be checked and maintained in the koala hotspots. | Ongoing weed and pest monitoring within the rail corridor will be conducted in accordance with ARTC's rail corridor maintenance | The introduction of new declared weed species populations within koala hotspots. | Consider additional or alternative management controls based on early detection and corrective action. | ARTC |

| Applicable operation impact | Management actions | Application to koala Hotspot | Monitoring/ reporting | Trigger for corrective actions | Corrective actions | Responsibility |
|---|---|---|---|---|---|---|
| | | | procedures and policies and the Operation Environmental Management Plan (Operation EMP) | The introduction of new or increased populations of pest species within koala hotspots. | | |
| | Ongoing weed and pest surveys within koala hotspots. | Inform operation managers and workers are aware of the location and spatial extent of the koala hotspots via environmental constraints maps.<br><br>Supply **Table 5-1**: koala encounter procedure as per guidance | Annual report | The introduction of new declared weed species populations within the Project footprint. | Consider additional or alternative management controls based on early detection and corrective action. | ARTC |
| | Establish a complaint hotline for the Project and advertise to enable the public to notify ARTC of issues regarding weeds and pests. | Hotline should not be restricted to weeds and pests but also to report koala sightings, especially in the koala hotspots. | Monthly internal report of complaints. | Complaints made by the public | Assess the effectiveness of complaint management and possible improvements.<br><br>Complaints are managed in accordance with internal procedures and provided to administrating authority as required. | ARTC |

## 6.5 Koala Connectivity Impact Assessment Post-Mitigation

A summary of the risk assessment on koala connectivity, following the implementation of mitigation measures is provided in Table 6-2 (WSP, 2024). Following the implementation of mitigation measures, the residual impact to koala connectivity is considered low.

## Table 6-2 Impact Assessment of the Project upon koala connectivity (post-mitigation)

| Species | Number and % of RRD structures within habitat that are suitable | Is appropriate design of crossing structures known and is there evidence of use? | Impact to connectivity of RRD before mitigation | Management of Project Footprint to enable target species to access crossing structures | Number of proposed new structures (and % increase of structures that are suitable with implementation) | Outcome of revised reference design with assumptions, actions to improve structure suitability, management of footprint, and addition of new structures | Residual impact to connectivity after mitigation |
|---|---|---|---|---|---|---|---|
| Koala | 146 out of 342 (43%)<br><br>41 out of 124 (33%) within PCZs | Extensive use of culverts and bridge underpasses, including under railways has been reported.<br><br>Koala not recorded using canopy bridges. Will use vegetated land bridges with mature trees or refuge poles.<br><br>Correctly designed fencing (1.8 m cyclone mesh fencing, with sheet metal panels to prevent climbing) will funnel koalas to crossing structures and keep them off the railway. | **High** | Appropriately sized culverts and bridge underpasses every 400 m within foraging habitat and 800 m in dispersal habitat to allow for daily and dispersal movements.<br><br>Ideally, trees required in Project Footprint and refuge poles.<br><br>No barbed wire or fencing preventing access to culverts and bridge underpasses. | 23 (4%) | Connectivity likely to be maintained with large culverts and bridge underpasses every 400 m in foraging habitat or 800 m in dispersal habitat. This spacing is the approximate radius of average home range size of koalas tracked in the study area by USQ.<br><br>Reduce clearing width and install refuge poles within and outside Project footprint at koala crossing locations.<br><br>Increase height of bridges and culverts where required. | **Low** |

*Note: RRD = Revised Reference Design*

# 7. PROPOSED MONITORING PROGRAMS

The overarching monitoring objectives for the proposed koala monitoring programs are as follows:

- Assess compliance with the draft KMP under the Construction and Operation Environmental Management Plans, and any relevant conditions of approval.
- Determine the effectiveness of mitigation measures to inform adaptive management frameworks including performance indicators and corrective actions.
- Support mutually beneficial research programs and projects through access to data and information, and in other ways i.e. the USQ koala tagging and monitoring plan.

Further koala monitoring actions are proposed as part of three separate monitoring programs focusing on the key performance areas of:

1. Maintaining koala populations and health using an adaptive management approach to threats;
2. Maintaining koala movement using connectivity structures; and
3. Maintaining and improving koala habitat via revegetation and landscaping measures.

Specific objectives of each proposed monitoring program are outlined in the sections below. The results of the proposed monitoring programs will inform the review and reporting procedures outlined in Section 8.

It is noted that the following monitoring programs are proposed and will be updated in the final KMP in consideration with the development of other Project Management Plans, including the Wildlife Connectivity Plan. The Wildlife Connectivity Plan will incorporate predatory control programs and monitoring, evaluation and reporting (MER) protocols.

## 7.2 Proposed Population Monitoring Program

The proposed population monitoring program objectives are as follows:

- Determine koala habitat usage and ranging behaviour to inform pre-emptive mitigation measures such as fauna passage placement, vegetation clearance reduction, exclusion zones and translocation areas;
- Gather pre-construction, construction and post-construction field data to monitor impacts of the Project on population size, movement, health, reproductive rates and mortality of koala, with control / reference areas located outside of the Project footprint;
- Detect koala mortality and determine the cause of death, where related to the Project, to inform adaptive management frameworks;
- Detect disease outbreaks in koala populations, where related to the Project, to inform adaptive management frameworks; and
- Monitor other threats to koala welfare and conservation, where related to the Project, to inform the adaptive management framework.

Prior to commencement of construction works, the completion of baseline surveys of koala density and general distribution within the Project footprint is required. This survey work has commenced and is continuing with the ERM/UniSC detection dog surveys defining a “baseline”. This information will be used to inform the development of the final KMP and any corrective actions.

Baseline surveys have been conducted by subject matter experts to define existing koala habitat and its quality. It is proposed that for each of the hotspots, additional data on koala density be obtained, to contribute to the baseline data collection, prior to construction commencing for the Project. It is proposed that koala surveys (use of direct counts of indirect methods) be undertaken to define koala density within each of the three hotspots prior to construction commencing (e.g., within 6 months prior

to construction commencement). Survey locations should sample within the different koala habitat types (up to 1km from the Project alignment to ensure consistency with ERM/UniSC koala genetics study) and undertaken where access can be safely managed. The field survey methods for direct count and indirect methods (i.e., pellet searches) will be informed by the detection dog surveys. Monitoring is proposed during the pre-construction, construction and operation (up to two years post construction) phases of the Project, as specified in **Table 7-1**

## Table 7-1 Proposed Population Monitoring Schedule

| Monitoring Type | Project Phase | Timing | Description | Performance Criteria | Corrective Actions |
|---|---|---|---|---|---|
| Habitat Quality | Design | Once (already undertaken) | Habitat quality assessments at up to 8 locations for each habitat type within each hotspot using methodology as per *Bio-condition Assessment Manual* (2015). | No reduction in the quality of habitat in the 2 year post-construction surveys due to the Project. This will be assessed by a comparison of the survey to the baseline assessment. | Trigger:<br>A reduction in koala habitat quality (i.e., reduction in quality, invasion or spread of weeds, unprecedented/unmanaged fire) of one score using the Methods for Habitat Quality Assessment (MHQA) as a result of the Project<br><br>Action:<br>ARTC to identify the area where there is a decline in habitat quality due to the Project and apply remediation efforts (i.e., increase weed incursion will require weed management). |
| | Operation | Once 2 years post-construction (in same season) | | | |
| Koala Surveys | Design | Once (already undertaken) | Up to 4 locations within each habitat type per koala hotspot. Methodology as per EPBC Act guidance *A review of koala habitat assessment criteria and methods* (DAWE 2021). | No significant variation in koala population / abundance when compared to the baseline assessment due to the Project. | Trigger:<br>A significant variation in koala population/ abundance accounting for a 15% reduction annually due to the Project.<br><br>Action:<br>ARTC to identify and remediate connectivity across the landscape, due to the Project, to allow koalas to reinhabit the area. As an example, this may include the promotion of food trees. |
| | Pre-construction and Construction | Once annually (in same season) | | | |
| | Operation | 2 survey events (in same season) | | | |
| Genetic Sampling | Design | Once (already undertaken) | As a repeat from the Genetic Study (ERM, 2024), utilising methodology description provided in the study. | No significant variation in koala distribution and abundance within the area, when compared to the baseline assessment due to the Project. | Trigger:<br>A decline in Observed Heterozygosity ($H_o$) of 15% due to the Project.<br><br>Action:<br>ARTC to identify and remediate connectivity across the landscape, due to the Project, to allow koalas to reinhabit the area. As an example, this may include the promotion of food trees. |
| | Operation | 2 years post construction. | | | |
| | Operation | On-going with USQ researchers | | | |

## 7.3 Proposed Crossing Structure Monitoring Program

The monitoring objectives for the proposed crossing structure monitoring program are as follows:

- Assess the effectiveness of koala exclusion fencing and crossing structures;
- Assess the impact of the Project on koala movement;
- Assess the success of fauna furniture and vegetation in encouraging the use of crossing structures;
- Detect predation at crossings;
- Detect train strike hotspots; and
- Detect structure faults and repair.

Monitoring to assess the effectiveness of the structures will be undertaken in accordance with the Wildlife Connectivity Plan. Monitoring includes:

- As per Soanes et al. (2018), showing a suitable method for fauna crossing monitoring, locations will be chosen using the BACI (before-after-control-impact) method – with locations selected at random and replicated before and after crossing structures erected. Monitoring will be undertaken at randomised multiple points across the linear transect, within the determined koala hotspots;
- The number of monitoring locations will be selected that best reflect the length of the Project and number of crossings decided in the Wildlife Connectivity Plan during the detailed-design phase with guidance from the results from the revised draft EIS Appendix P: Fauna Connectivity Strategy (WSP, 2024);
- Monitoring will evaluate the rate of use of crossing structures and the effectiveness of achieving the SMART goals (e.g., tracking population size, koala movement, gene flow and distribution);
- Monitoring will utilise motion detection cameras in combination with other relevant technologies to capture evidence of use, using a paired survey design whereby one camera monitors a structure, and one camera monitors the approach to a structure (Dexter et al., 2016). This monitoring approach will allow for the tracking of koala movement within the Project area and indicate whether koala movement within the Project area is maintained. Repeat assessments of koala genetics will be undertaken and compared to the baseline results acquired pre-construction. This will involve the use of non-invasive detection-dog surveys to identify fresh koala scat suitable for sequencing as evidence of the impacts of the Project to koala gene flow;
- Monitoring will also include scat, track, scratch and deceased fauna searches 100 m from each side of the fauna crossings when installing cameras and checking camera batteries. All results including suspected cause of koala mortality will be recorded; and
- Additional monitoring will be undertaken as needed if crossing structure reveals to be ineffective, this would be in line with reaching set performance indicators.

Monitoring is proposed immediately after construction (ensuring effectiveness), within 12 months of construction, two years post-construction and two-yearly intervals thereafter, unless major environmental events (e.g., flooding) occur, where monitoring will be undertaken as soon as it is considered safe. Refer to

**Table** 7-2 for a breakdown of monitoring and timing of events.

Where monitoring events identify in-effectiveness of crossing structures, ARTC has further committed to:

- Any required maintenance for urgent ecological repairs will be completed within one month of the inspection and within 12 months for non-urgent action.
- Ecological inspections of environmental assets focus on aspects of the structure that will limit or enhance use of the structures by wildlife, such as:
  - Presence and depth of soil substrate in culvert.
  - Density of vegetation growth and weeds that limit the visibility or access through the culvert or in the bridge underpass.
  - Extent, depth and duration of ponding of water at culvert entrances and/or within the culvert or bridge underpass.
  - Condition of fauna furniture that encourages use by fauna and/or provides protection from predators.
  - Presence of holes, gaps underneath or vegetation growth on fences that enables fauna to cross the fence.

## Table 7-2 Proposed Crossing Structure Monitoring Schedule

| Monitoring Type | Project Phase | Timing | Description | Performance Criteria | Corrective Actions |
|---|---|---|---|---|---|
| Crossing Structure Monitoring | Pre-construction | For six (6) months before construction | Monitoring of success of crossing structures within the Project footprint using remote sensing cameras to track koala movement. | Koala movement is maintained within the area. | Trigger:<br>A reduction or decline of 15% in koala usage of crossing structures.<br><br>Action:<br>ARTC to identify the areas of concern and causing factor (i.e., repair crossing structures if faulty/damaged, revegetate to remediate connectivity including promotion of koala food trees). |
| | Operation | Every second year after operation for 10 (10) years giving a total of five (5) years of surveys. | | | |
| | Construction and Operation | Annually, prioritising October – May (breeding season) and June – December (juveniles) | Monitoring of crossing structures within the Project footprint, particularly during the months where koalas are most active with the highest mortality rates. | | |
| Inspection and maintenance | Construction | — Immediately after construction to ensure it meets the design specification; and<br>— At least once within 12 months of construction to ensure it remains compliant and any repairs needed can be quickly applied | Regular inspection and maintenance of crossing structures and other treatments (including repairs, removal of debris, etc). | | |
| | Operation | Two (2) years post construction | | | |
| | Operation | — Two (2) yearly intervals after year 2.<br>— Within three months after major flood events, or as soon as safe to undertake inspections. | | | |

## 7.4 Proposed Revegetation Monitoring Program

The monitoring objective for the proposed revegetation monitoring program, is to assess the effectiveness of revegetation and inform adaptive management requirements.

Areas proposed for revegetation of habitat for koalas will require monitoring to assess the condition of these areas, and to assess the success at establishing or improving existing koala habitat in these areas, including:

- Monitoring in accordance with the Rehabilitation and Landscaping Management Plan of the Construction Environmental Management Plan;
- Monitoring locations stratified by habitat type and quality that will be subject to restoration works as part of the Project design, and that were a part of the rehabilitation program guided by Landscape Design Specification; and
- Additional monitoring as needed (i.e., if rehabilitation was not reaching set performance indicators).

Refer to **Table 7-3** for a breakdown of monitoring and timing of events.

**Table 7-3 Proposed Revegetation Monitoring Schedule**

| Monitoring Type | Project Phase | Timing | Description | Performance Criteria | Corrective Actions |
|---|---|---|---|---|---|
| Revegetation | Construction / Operation | For three (3) years | Monitoring of revegetation works for three years after the initial establishment of vegetation. | Koala movement is maintained within the area.<br><br>There is no reduction or decline in koala habitat quality.<br><br>There are no new declared weed species within the area. | Trigger:<br>A reduction in koala habitat quality (i.e., reduction in quality, invasion or spread of weeds, unprecedented/unmanaged fire) of one score using the Methods for Habitat Quality Assessment (MHQA)<br><br>Action:<br>ARTC to identify and remediate connectivity across the landscape to allow koalas to reinhabit the area. As an example, this may include the promotion of food trees or implementing further weed control measures. |
| Maintenance | Construction / Operation | For three (3) years<br>Spring / summer | Maintenance of revegetation works during the spring/summer and according to the Rehabilitation and Landscaping Management Plan | | |

# 8. EVALUATION AND REPORTING

## 8.1 Evaluation

The draft KMP monitoring regime will be used to evaluate its success at minimising impact to koalas in accordance with the management, mitigation and monitoring actions of this draft KMP. It will look at how well prevention of koala death or injury has occurred over the construction and operation phases of the Project as well as the general population characteristics in the area in this time period. Monitoring and auditing of the draft KMP will undergo 6 monthly evaluation during construction, and annually during operation. Monitoring and auditing of the draft KMP will allow weaknesses in the processes to be identified and corrected, with the outcome being adaptive best-practice management.

Evaluation of monitoring successes will include:

- A review of management actions, monitoring outcomes and corrective actions (when triggers and corrective actions were applied) and how these were managed including any ongoing performance;
- Ongoing collection and analysis of koala DNA samples from near and far from the Project and an analysis of gene flow at five-yearly intervals for 20 years. Koala DNA samples to be collected from a range of sources, including scat samples, tissue biopsies to be collected as part of ongoing research sponsored by ARTC, roadkill animals, rescued animals, etc;
- The use of crossing structures by koala will be measured using camera traps and tracking of koalas in vicinity of the Project;
- The movement of individual koalas as revealed by GPS tracking will display similar patterns (e.g., direction and speed of movement, crossing of the railway, home range size, use of key habitats) before, during and after construction and near and far from the railway. This will be conducted by Dr Ben Allen at University of Southern Queensland, Toowoomba;
- Mortality of koalas will be measured from train driver reporting, tracking results and targeted wildlife-train collision surveys conducted during and after construction;
- Outcome reporting from each clearing event as evidence that the standard operating procedure for vegetation clearing is effective;
- A fauna log is to be kept and reviewed regularly for any deaths or near misses to koala, and investigations undertaken;
- Measures to be taken in response to changing conditions onsite;
- Feedback from construction personnel on koala ‘toolbox talks’ or education events when held onsite;
- Feedback from ongoing consultation with community groups, such as records of hospital admissions, as well as sightings and anecdotal observations; and
- Evidence of weed and pest management undertaken and its success level for each occurrence in line with management outcomes described in the Biosecurity Management Plan.

## 8.2 Adaptive Management Approach

An initial management framework has been included to enable identified environmental outcomes to be achieved across three phases of the Project. Outcomes of the evaluations undertaken, as per Section 8.1, will inform updates to the adaptive management in the draft KMP as required.

Adaptive responses to identified and emergent threats will be timely, appropriate and proportionate measures that can be practically implemented. The adaptive management response to threats is an

implicit and integral part of the KMP and will be informed via the consultation with community groups and monitoring and reporting measures described in this document.

The adaptive management framework for the Project will be finalised during detailed design.

A representation of this initial adaptive management approach is provided in **Figure 8-1**.

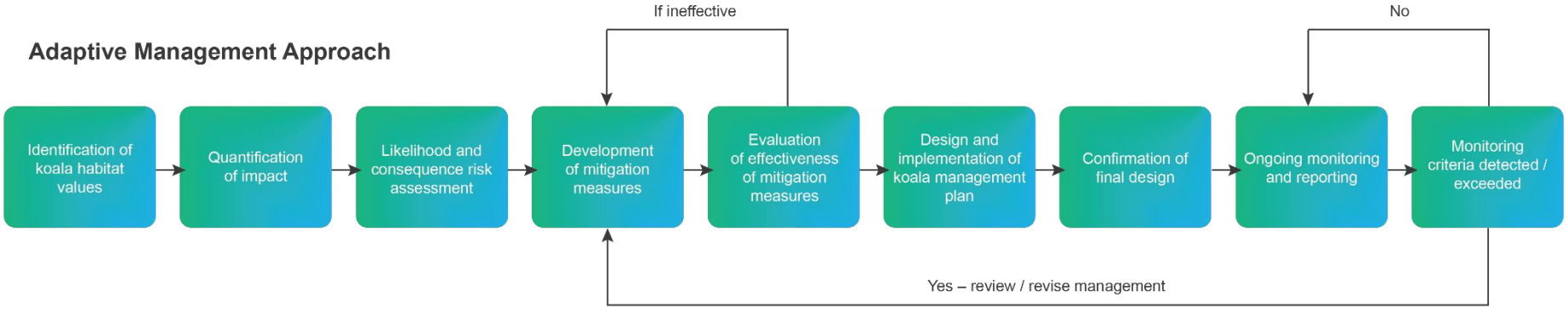


**Figure 8-1 Adaptive management approach for the B2G KMP**

Criteria used to measure effectiveness will take into consideration the following key threats and ecological requirements for koalas in the local area:

- Habitat connectivity;
- Spatial arrangement of habitat types adjacent to the permanent footprint;
- Allowance for dispersal and re-colonisation during the construction and operation phases;
- Biological requirements met, including provision of suitable foraging and breeding habitat, and maintenance of dispersal functions across the landscape; and
- Maintenance of meta-population process and ecosystem services.

One of the over-arching aims of this KMP (as defined in section 1.1) is to reduce the risk of koala injury and/or mortality during the pre-construction, construction, and operational phases through effective monitoring across the site. Measures will be put into place to mitigate and monitor the impact of the Project on koalas during each phase, with the KMP presenting actions to be implemented shows the general threshold triggers and management actions to be implemented throughout the design, construction, and operations phases, consistent with the adaptive management approach. Table 4-1 and Table 5-2 to Table 6-1 outline tailored management actions to be in place, the performance indicators, guidance on corrective actions, who is responsible for the action as well as how the monitoring / reporting will be undertaken.

## 8.3 Reporting

Specific reporting requirements for koala management will be updated to reflect the requirements of the final OEMP including approval conditions. As a minimum, reporting requirements include:

- Location of sighting;
- Current status (i.e., injured or health, habitat description);
- If injured or deceased, cause of injury or death; and
- Any other relevant information regarding the status of the koala population.

Any sightings and/or incidents involving koalas during the construction and operation of the Project are to be recorded in the fauna management and incident register. This is to include records of koala encounters, captures, incidents, injuries and mortalities. Additionally, any mortality of koalas will be reported directly to DCCEEW and DESI within required timeframes (i.e., as per approval conditions). Records will be included in environmental records which will be posted on the Project website.

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