Wildlife Protection - Monitoring and Assessment Plan

Eton Range Realignment Project 2015/7552

Queensland Government

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Document control options

Departmental approvals

Refer to the appropriate Risk Assessment Tool for relevant reviewer and approver

Date	Name	Position	Action required *(Review/endorse/approve)*
10/10/2019	Tim Dalton	Environmental Officer	Draft
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Contents

Table of Figures

Table of Tables

Introduction

The Department of Transport and Main Roads (TMR) is currently constructing the Eton Range Realignment Project (the Project). TMR submitted a referral for the Project to the former federal Department of the Environment (DoE) (now Department of Agriculture, Water and the Environment) for impacts to matters of national environmental significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 27 August 2015.

In September 2015 DoE determined the Project a controlled action under the EPBC Act due to potential significant impacts on MNES protected under Section 18 and 18A, Part 3 of the EPBC Act. In March 2016 DoE granted the Project approval with conditions. Construction commenced on the 4 April 2016.

Condition 6 of the approval required TMR to undertake research relating to koala ecology and conservation management in the surrounding Clarke-Connors Ranges. One component of this research was to study koala habitat use and movement patterns in the vicinity of the Eton - Nebo stretch of the Peak Downs Highway (the Highway). This is to assist in fauna sensitive infrastructure investment planning and implementation along this Highway. The research was completed in March 2019 and can be accessed via the project website - https://www.tmr.qld.gov.au/Projects/Name/E/Eton-Range-Peak-Downs-Highway/Eton-Range-Realignment-Koala-Research-Project.

This report describes the wildlife protection infrastructure that has been constructed so far, as recommended by the research. It also includes a plan for the monitoring and assessment of the effectiveness of this infrastructure in delivering a conservation gain for the koala.

This report will be updated as additional fauna sensitive infrastructure is progressively constructed along the Highway.

Aims and Objectives

This plan has been prepared to respond to Condition 12 of EPBC 2015/7552 Approval -

> *Within 12 months of expending funds to design, construct and implement wildlife protection and/or diversion infrastructure as described under Condition 11, the approval holder must provide to the Department and publish on the approval holder's website, a report on the nature of the wildlife protection and/or diversion infrastructure funded and a plan for monitoring and assessing the effectiveness of this infrastructure in delivering a conservation gain for the koala. The published report must remain on the approval holder's website for the life of approval.*

This document outlines a two-year program that aims to determine whether the implemented fauna sensitive infrastructure has assisted in the long-term persistence of koalas on the Clarke – Connors Ranges. Specifically, aims of the monitoring of the infrastructure includes:

1. To determine the effectiveness of the erected fencing in diverting koalas to safe passage underneath the Highway.
2. To identify any potential flaws with the fauna sensitive infrastructure that may reduce its ability to exclude koalas from the road reserve.
3. To gain a greater understanding of temporal movement patterns of koalas near the infrastructure.
4. To determine whether the erection of fencing along the Highway is likely to improve the viability of the regional koala population, thereby determining whether any conservation gain has been achieved.

Koala Research Project Summary

The study was undertaken between August 2016 and March 2019 across the Clarke-Connors Range (Melzer and Black, 2018). This area extends 300 kilometres along the western boundary of the Mackay Whitsunday region, encompassing significant protected areas including Eungella and Homevale National Parks. The range is considered to support the most extensively connected koala population in Queensland.

GPS tracking collars, historical records and opportunistic sightings were used to identify where koalas frequently crossed the Highway. It also studied the regional population, with the intention of determining suitable future management strategies to assist in reducing the number of koalas injured or killed on the Highway.

Using the collected data, locations where wildlife fencing would be the most effective in reducing the number of koalas injured or killed on the Highway were identified. Groups of koala sightings (three or more) were grouped together as a cluster, which was then given a name based on a prominent local feature or property. Ten clusters were identified (Table 1). The area between clusters was designated an inter-cluster. With one exception, inter-clusters were free of koala road kills during the sample timeframe.

Clusters were investigated by road and on foot. Within each cluster, notes were taken of infrastructure and terrain opportunities for investment in protective infrastructure or for the retrofitting of existing infrastructure. The coordinates of the linear extent along the Highway of each cluster was recorded.

Once the clusters were identified and reviewed, criteria were established to prioritise initial infrastructure investment. It was acknowledged that any fauna sensitive infrastructure needed to funnel wildlife to existing infrastructure that provided safe passage underneath the Highway. Bridges provide the best opportunity for safe wildlife crossings as they are associated with significant drainage features that generally have a large cross-sectional area. They also allow for animal movement in the wet season and are easier to connect fencing to.

In contrast, many culverts along the Highway were narrow with low visibility. This is expected to make them less desirable crossing points as predation by carnivores becomes more likely. Many were also located in terrain where the installation of barrier fencing was technically difficult or prohibited for road safety reasons.

It was therefore decided:

1. Initially, to focus on the installation of koala barrier fences at a minimum of 100m either side of targeted bridge locations.

2. TMR would inspect specific culverts located in clusters to determine whether installation of fauna exclusion fencing was practical.

3. Future culvert replacements or upgrades may be required to ensure the culvert aperture width is sufficient for animal movement.

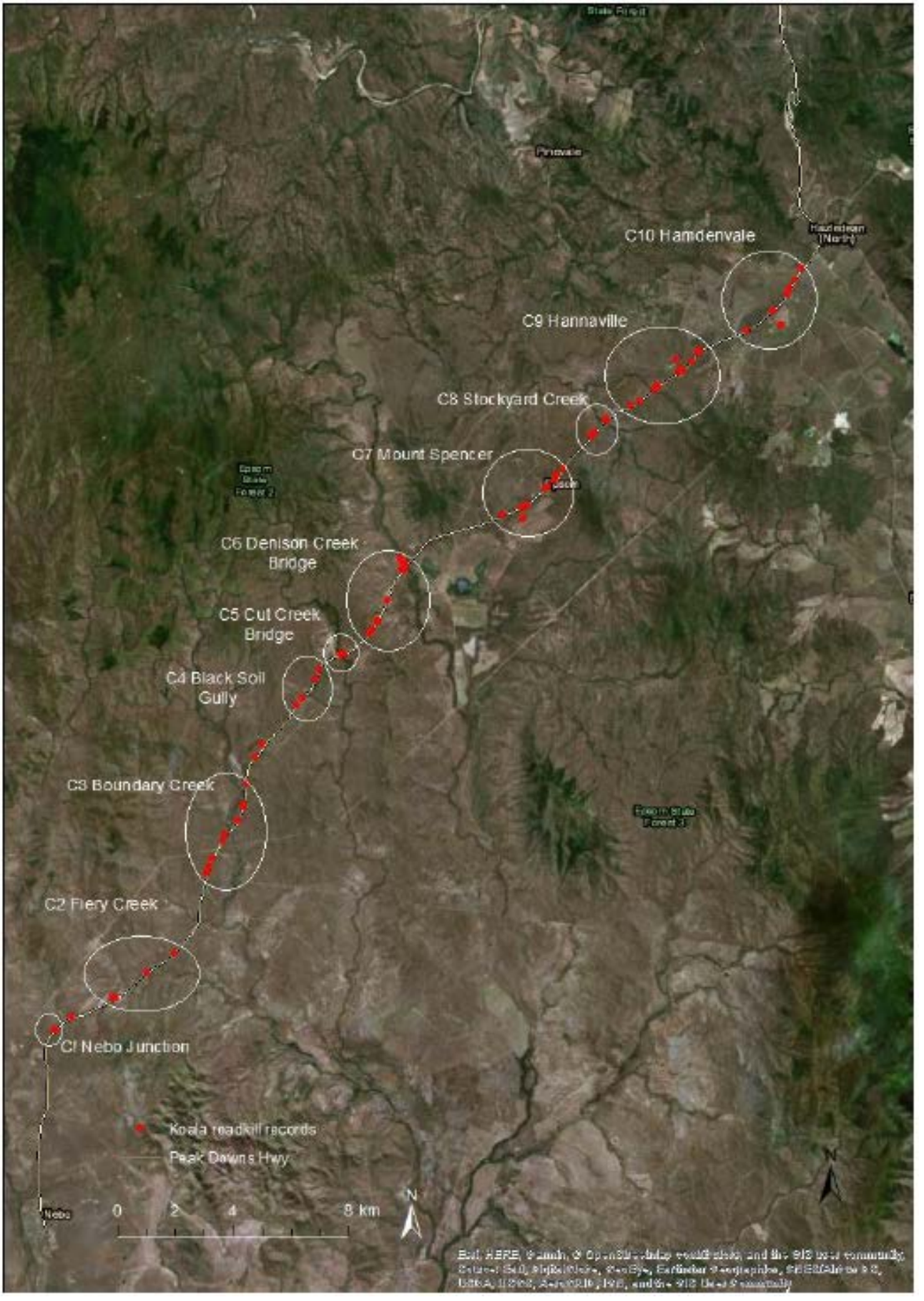


Figure 1: Distribution of koala road kills (Sep 14–Aug 17) between Nebo Junction and Hazledean (Melzer and Black, 2018)

Table 1: Identified fauna sensitive infrastructure investment opportunities along the Highway (Melzer and Black, 2018)

Cluster name	Cluster Code	Koala Records	Chainage (km) Start	Chainage (km) End	Vegetation and land form description	Notes
Nebo Junction	C1	30, 89, 106, 107	6.56	7.46	*Eucalyptus tereticornis*, *E. platyphylla* alluvial flat.	Rises to *E. drepanophylla* woodland on ridges.
Inter-cluster	IC1	0			*Eucalyptus drepanophylla* open forest on ridge crests	
Fiery Creek	C2	83, 145, 88, 102	9.16	12.43	*Eucalyptus platyphylla* woodland with occasional *E. tereticornis* on alluvial flat. *E. drepanophylla* open forest to woodland on adjacent ridges and hills, with *E. tereticornis* and *Melaleuca* sp. open woodland in minor drainage lines and gullies.	
Inter-cluster	IC2	0			*Eucalyptus drepanophylla, Corymbia dallachyana*, *C. erythrophloia* on ridge crests and hills adjacent to stream fringing forest including isolated to very isolated *E. tereticornis*.	At *Strathdee* and including Lonely Creek Bridge
Boundary Creek	C3	77, 104, 248, 78, 27, 96, 244, 103, 60	14.95	18.79	*Eucalyptus tereticornis*, *E. platyphylla* tall open woodland on alluvia. *E. drepanophylla*, *E. platyphylla* +/- *E. tereticornis*, *Corymbia tessellaris* open forest to woodland on adjacent lower ridge slopes. Tall *Melaleuca* fluviatilias and *Corymbia tessellaris* emergent from a forest of rainforest elements fringing the creek.	
Inter-cluster	IC3	239, 76			*Eucalyptus drepanophylla* open forest or woodland on ridges and hill tops; including one broad alluvial flat supporting *E. tereticornis*, *E. platyphylla* woodland	The two isolated records were associated with the alluvial flats.
Black Soil Gully	C4	58, 129, 242, 243,	21.63	23.70	*Eucalyptus tereticornis*, *Corymbia tessellaris*, *E. drepanophylla* woodland on an undulating clay flat or depression.	Depression between *E. drepanphylla* woodland on low hills.
Cut Creek Bridge	C5	39, 68, 245	23.79	24.98	*Eucalyptus tereticornis* emergent from stream fringing forest; *E. platyphylla*, *E. tereticornis* tall woodland on adjacent western alluvial flat, and *E. drepanophylla* woodland on the adjacent eastern ridge.	
Inter-cluster	IC4	0			*Eucalyptus drepanophylla* open forest on ridge crests and hills with isolated *E. platyphylla* and *E. tereticornis* in low pockets.	
Denison Creek Bridge	C6	8, 31, 54, 64, 69, 92, 98, 105, 131, 238	25.24	28.60	*Corymbia tessellaris*, *Eucalyptus raveretiana*, *Melaleuca* sp. and rainforest elements in a stream fringing forest. Adjacent broad alluvial flat supporting a tall open woodland of *E. tereticornis*, *E. platyphylla*, *C. tessellaris* and *C. dallachyana*. Open forest of *E. platyphylla*, *E. tereticornis*, *E. drepanophylla*, *C. tessellaris* on adjacent undulating low rises, lower slopes and associated low ridges.	
Inter-cluster	IC5	0			*Corymbia tessellaris*, *E. platyphylla* +/- *E. drepanophylla*, *E. tereticornis*, *Melaleuca viridiflora* open forest or woodland on low hills and undulating flats.	Abuts extensive clearing down to Lake Epson.
Mt Spencer	C7	42, 51, 82, 90, 108, 132, 205, 216, 247,	31.71	34.94	*Eucalyptus drepanophylla* +/- *E. tereticornis* woodland or open forest on ridges and hills dissected by ephemeral drainage lines supporting *E. tereticornis* open woodland. Ridges slope to the west to *E. tereticornis*, *E. platyphylla* woodland on undulating flats.	
Inter-cluster	IC6	0			*Eucalyptus drepanophylla* open forest to woodland on hills and ridge crests.	Minor drainage lines were absent.
Stockyard Creek	C8	3, 74, 85, 130, 133, 141	35.90	37.46	Stream fringing rainforest community with *Corymbia tessellaris*. *Eucalyptus tereticornis*, *E. drepanophylla* open forest on adjacent low hills.	
Inter-cluster	IC7	0			No data	

Hannaville	C9	1, 29, 62, 73, 86, 87, 100, 101, 112, 146	37.76	41.50	*Eucalyptus drepanophylla* woodland on hills dissected by ephemeral creeks supporting well-developed *E. tereticornis* open forest and *E. tereticornis* on adjacent alluvia.	Alluvial flats are broad in places. *E. tereticornis* may reach 25-30m.
Inter-cluster	IC8	0			*Eucalyptus drepanophylla* tall woodland on hills and ridges.	Minor drainage lines were absent.
Hamdenvale cluster	C10	28, 53, 91, 99, 109, 249, 252	42.57	45.99	Grassland with emergent *Eucalyptus tereticornis*, *Eucalyptus tereticornis* grassy open woodland	Regrowth and relic *E. tereticornis* in pasture. High value koala habitat.

Constructed Infrastructure

Denison Creek

The erection of approximately 1677m of fauna exclusion fencing and associated clear and grub, occurred at the Denison Creek Bridge on the Peak Downs Highway in June 2019. The fencing was installed to address a portion of the Denison Creek cluster (C6). Termination of the fauna exclusion fencing occurred near where property accesses abutted the Highway. There is limited opportunity to further extend the fencing without the installation of additional fauna exclusion gates at these locations. The extent of fauna fencing is shown in Figure 2.

Fauna fencing that was installed was the 'floppy top' design. This design was chosen due to its lower cost, effectiveness in past studies (Taylor and Goldingay 2003; Hayes and Goldingay 2009) and the rural setting (which meant that aesthetics was less important). Floppy top fauna fencing prevents koalas from climbing over the fence to access the road reserve. It is also effective for large macropods, dingos, and some species in the Dasyuridae and Potoroidae family (ie quolls, bettongs).

Denison Creek was identified as a high priority due to the high number of koalas sighted and recorded near the watercourse. The flat, sandy creek bed also contains significant mature vegetation that is likely to be attractive to wildlife (Plate 4). The cross-sectional area underneath the bridge is large compared to the watercourse's narrow low flow channel. This meant that no further modifications were required to ensure suitable fauna passage for most of the year.

Stockyard Creek

The erection of approximately 1300m of fauna exclusion fencing and associated clear and grub, occurred at the eastern approach to Stockyard Creek Bridge on the Peak Downs Highway in autumn and winter 2020. The fencing was installed to address a portion of the Stockyard Creek cluster (C8). As recommended within Aurecon's interim monitoring report, fauna fence returns have been incorporated into the Stockyard Creek Design. Termination of the fauna exclusion fencing occurred just east of the gravel storage pad area near where two private accesses intersect the Highway. The extent of fauna fencing is shown in Figure 3.

Stockyard Creek was identified as a high priority due to the high number of koalas sighted and recorded near the watercourse. The narrow rocky creek bed underneath the bridge is separated into three openings, each separated by a bridge pier. The outer two openings only convey water during significant rainfall events, so they are expected to provide fauna passage during dry conditions. The creek also contains significant mature vegetation that is likely to be attractive to wildlife (Plate 7).

Due to budget and terrain restraints, no fauna exclusion fencing will be installed on the western approaches.

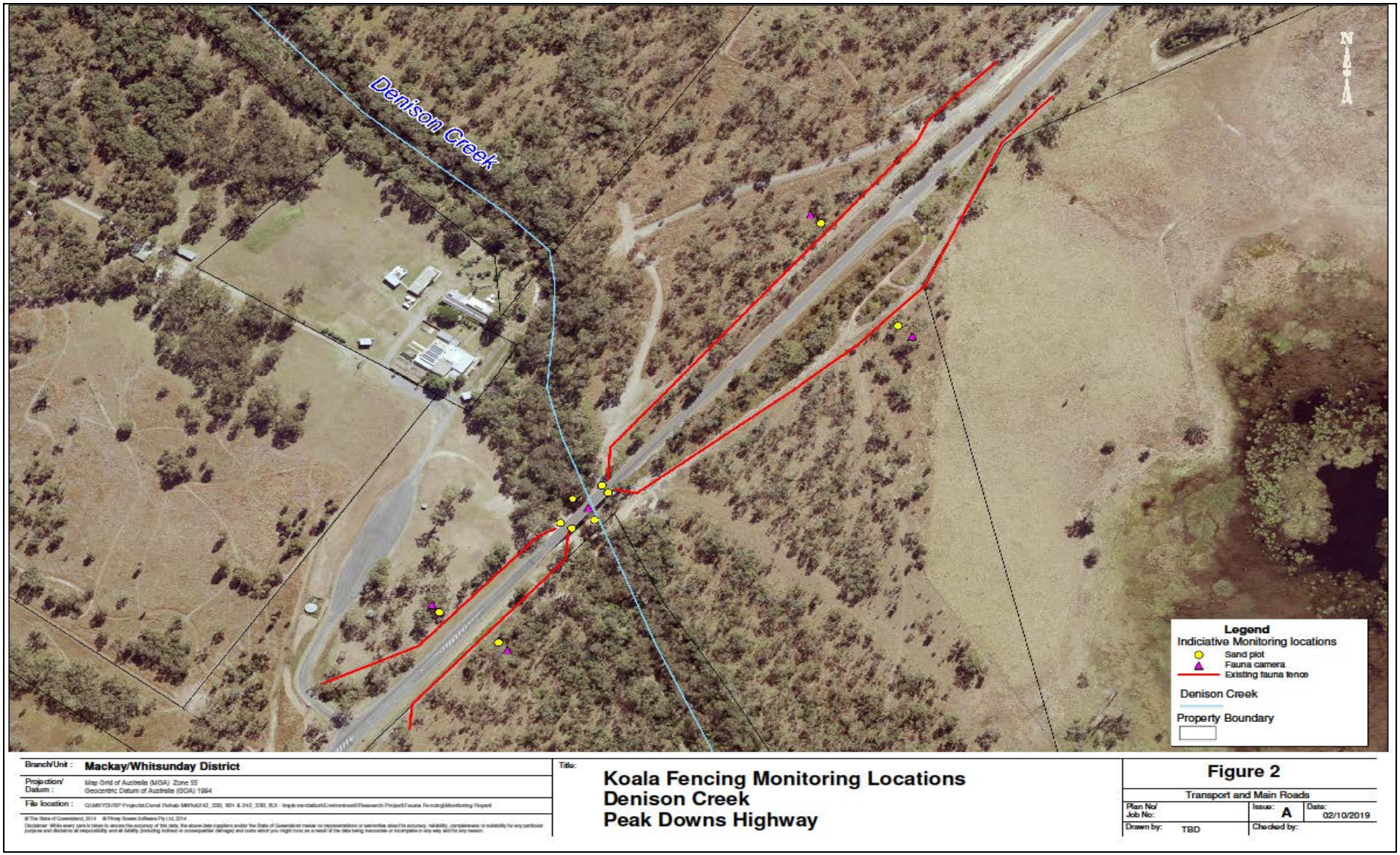


Figure 2: Koala Fencing Monitoring Indicative Locations – Denison Creek

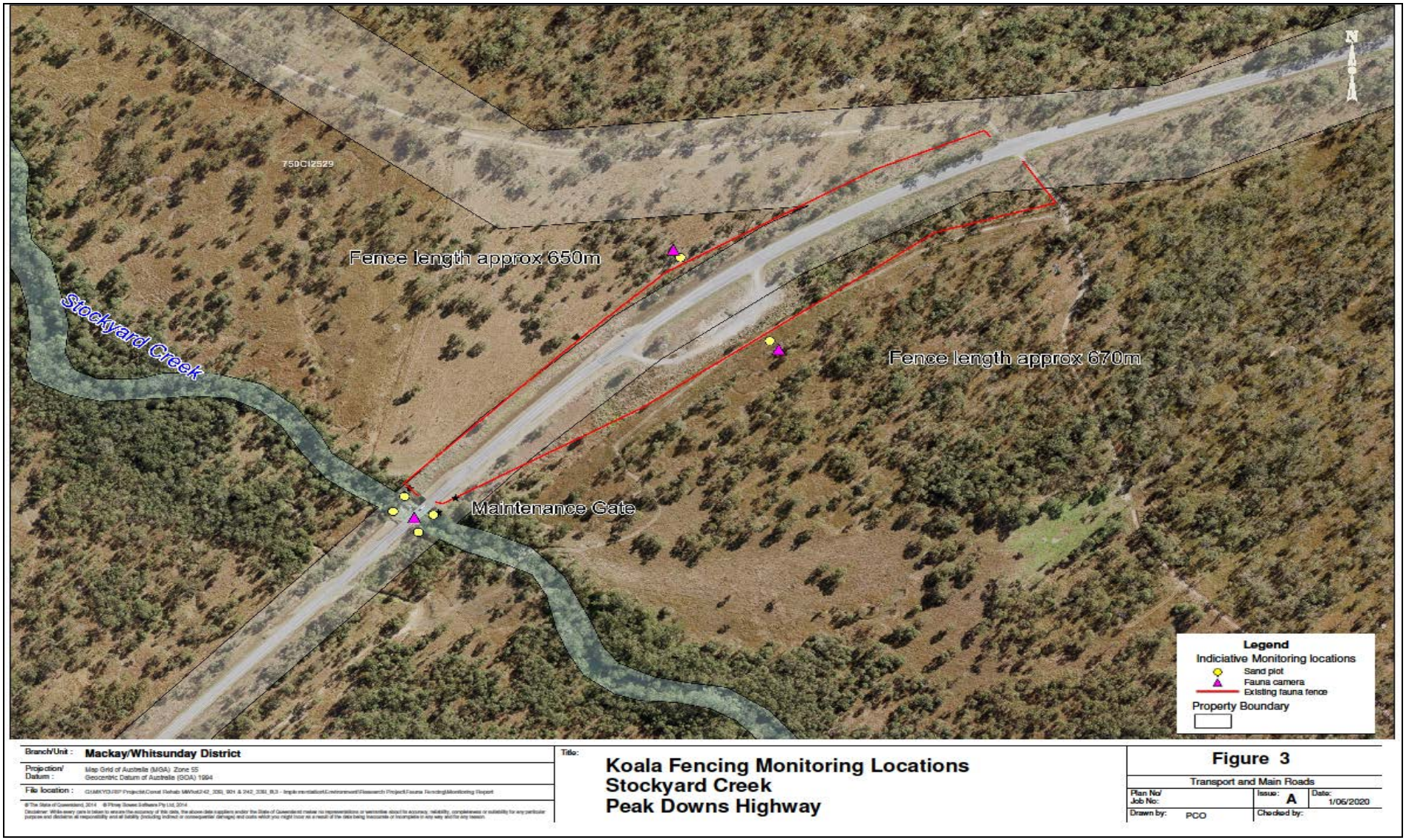


Figure 3: Koala Fencing Monitoring Indicative Locations – Stockyard Creek

Plate 1: Floppy top fauna exclusion fencing erected immediately north of Denison Creek

Plate 2: Fencing tied into Denison Creek bridge abutments to provide safe fauna passage

Plate 3: Floppy top fauna fencing design and grubbed fenceline

Plate 4: Denison Creek. The watercourse generally only receives considerable flows during the wet season, and was therefore determined to be an ideal crossing location during most of the Central Queensland koala breeding season (August – December)

Plate 5: Stockyard Creek fence construction, facing east along the Peak Downs Highway.

Plate 6: Stockyard Creek fence construction, facing west along the Peak Downs Highway.

Plate 7: Completed fauna exclusion fencing at Stockyard Creek

Plate 8: Stockyard Creek and the associated bridge structure. Note the steep banks and narrow low flow channels which forms the creek topography.

Denison and Stockyard Creek Infrastructure Monitoring

Methods

Four detection methods have been incorporated into the monitoring and assessment regime.

1. Sand Plots. This is a widely used, cost effective method for animal tracking studies. Sand plots can obtain a representative sample of underpass use by capturing animal imprints as they move through the plot. Although the method does not allow accurate distinction between individuals, it is effective at capturing crossing frequency data without causing any disruption to an animal's normal movements. Plots do require regular maintenance and can be affected by adverse weather (IE heavy rain/hail). As the animal must walk through the sand plot to be detectable, the sand plots must be installed in a location that limits the opportunities for the animals to avoid them when using the crossing structure.
2. Camera traps. Motion sensor and infrared wildlife cameras can be employed to capture still images and/or video when they detect wildlife motion. They operate continually and silently, provide proof of species presence in an area, and, when positioned carefully, require limited ongoing maintenance. Wildlife cameras are however often unable to differentiate between wildlife and false triggers such as a waving branch or a falling leaf, making the review of collected data erroneous and time consuming. Wildlife cameras are also generally designed for close animal movement, meaning that some attempted wildlife crossings may not be recorded.
3. Scat detection. This technique is an opportunistic approach to confirm the presence of a species within the location where wildlife crossings are expected to occur. It can be undertaken either by humans or scat detection dogs. This method is not able to determine whether that species completed a successful crossing or not.
4. Roadkill monitoring. Roadkill monitoring was undertaken along the Highway for the duration of research work and will continue during the monitoring stages. Roadkill occurrences are logged within the Koala Mapping Mackay & Whitsundays Areas project in the *BioCollect* data collection tool. This data will assist in detecting any flaws in the fencing that may allow animals to access the Highway. It will also identify changes in roadkill patterns after the construction of the fencing.

Sampling Period

Monitoring of the Denison Creek crossing is to occur across two consecutive koala breeding seasons (August – December) with the Stockyard Creek monitoring to occur concurrently during the second season Denison Creek monitoring event. Each monitoring event will take place for a period of five weeks per season, with sampling to be undertaken three days per monitoring week. A three-day sampling interval has been commonly employed in other studies and is considered enough for obtaining a good representation of wildlife movement without track deterioration (Ascensão and Mira, 2007). Although the monitoring program will concentrate on koalas and their utilisation of the bridges, it will log all evidence of other wildlife use.

If adverse weather inundates the study sites, the monitoring periods will be extended (where possible) to ensure that five weeks of data has been collected.

Experimental Design

Sand Plots

Sand plot monitoring and camera traps will be employed at Denison and Stockyards Creek as the primary data collection methods (Figure 2). Both methods are passive tools that do not affect animal behaviour. Scat detection will be taken during tri-weekly sampling of the sand plots by appropriately skilled Contractors of TMR. Roadkill monitoring will be undertaken opportunistically by TMR, Fauna Rescue Whitsundays and members of the public through the Koala Mapping Mackay & Whitsundays Areas mapping project.

Brickies Loam will be utilised to ensure that structural integrity of the prints is kept intact between sampling events. Crusher dust may also be mixed with the Brickies Loam to further assist in maintaining print integrity. Plots will be smoothed over prior to use and then subsequently on the first day of each sampling week. Water will be sprayed on the plots when required. Temporary barbed-wire fencing will be installed around sand plots where required to prevent damage of plots by cattle.

Although the monitoring program aims to focus on koalas, all visible tracks will be recorded, photographed and compared against likely taxonomic groups. Unique characteristics that can distinguish one track type to another will be utilised to identify the track to the species level (where possible). The books 'Tracks, Scats and Other Traces' (Triggs, B. 1996) and 'A field guide to the mammals of Australia' (Menkhorst et al, 2004) will be the primary reference books used in identification. It should be noted that as identification to the genus and species level is often not reliable, tracks may need to stay divided in taxonomic sub groups instead (Leopold-Wooldridge, K. 2008).

Direction of movement will also be noted during sampling events. Tracks recorded underneath the bridges will be separated into two classifications:

1. [1]**Successful crossing**. Where tracks identified as the same assumed animal are found in both sand strips underneath the bridges.
2. **Unsuccessful crossing**. Where tracks of one assumed animal are found on one sand strip underneath the bridges, but not on the other.

Direction of wildlife movement along the fauna fencing will also be recorded to determine whether the fencing was effective at funnelling wildlife towards the bridges. Tracks at these locations will be separated into two classifications:

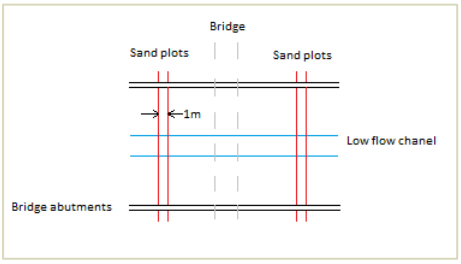
1. **Successful funnel**: Where tracks showed fencing directing wildlife towards the bridges.
2. **Unsuccessful funnel**: Where tracks showed fencing directing wildlife away from the bridges.

It should be noted a successful funnel may not represent a successful crossing under the bridge – only that the fence was effective at directing wildlife in the desired direction.

[1] During the 2019 monitoring event, difficulty occurred in confirming if tracks recorded were from the same koala without photographic evidence. It may be possible that a koala will cross one plot and then changes direction without crossing the next plot. Additionally, there may be more than one koala crossing over multiple days as monitoring does not occur daily.

Sand plots – Denison Creek

Ten sand plots will be constructed at strategic locations underneath the Denison Creek bridge and perpendicular to the fauna exclusion fencing. Sand plots will be, in general, 3cm high and 1.0m wide. The six sand plots underneath the Denison Creek bridge will cover the entire breadth of the underpass and the stepped abutments. The additional plots along the fenceline will be 2-3m long. This is a similar design to other transects utilised in previous Transport and Main Roads monitoring regimes developed for other projects (Leopold-Wooldridge, K. 2008).



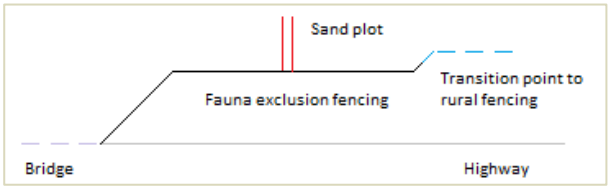


Plate 9 and 10: Generic experimental setup of sand plots at Denison Creek and the exclusion fencing. Plots will be placed perpendicular to the expected direction of movement. Exact location will be dependent on-site conditions.

Sand plots – Stockyard Creek

Six sand plots will be constructed at strategic locations underneath the Stockyard Creek bridge and perpendicular to the fauna exclusion fencing. Sand plots will be, in general, 3cm high and 1.0m wide. The four sand plots underneath the Stockyard Creek bridge will cover the both the eastern and western openings under the bridge but will not traverse the low-flow channel or extend beyond the bridge abutments (Plate 10). As with the Denison Creek fenceline sand plots, the additional plots along the fenceline will be 2-3m long. This is a similar design to other transects utilised in previous Transport and Main Roads monitoring regimes developed for other projects (Leopold-Wooldridge, K. 2008).

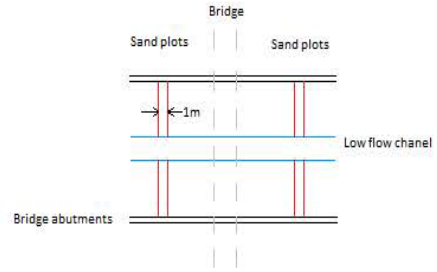


Plate 11: The sand plots at Stockyard Creek will not travers the low flow channel or extend beyond the bridge abutments and will remain confined to the flat surface bed, however the plots within the northeast section of the bridge should be advanced up the abutment to the upper bench where koalas may potentially cross. The sand plots along the fence line will be set up in the same manner as shown in Plate 9 for Denison Creek.

Plate 12 and 13: Approximate locations of sand plots underneath Stockyard Creek Bridge, northeast end of bridge and southwest end of bridge, respectively.

Plate 14 and 15: Locations of sand plots underneath the Denison Creek Bridge as implemented during the 2019 monitoring event

Camera traps

The deployment of camera traps will be undertaken to assist in providing species level identification during crossing attempts. Motion sensor cameras with an infrared red flash will be set up at each site as per Figures 2 and 3, with one expected to be placed at each sand plot location along the fence lines, while the final camera will be located under the bridges. A complete review of the data will be undertaken at completion of each year's five week monitoring period.

Scat detection

Scats will be collected from along the sand plots during the tri-weekly sampling. A ten-minute survey will be undertaken where all observable scats within 1m of the sand plot will be photographed and identified where possible using Triggs (1996) as a reference source. Koalas have distinctive scats with a hard exterior, a slightly ridged and oval (or cigar) shape, and typically smell of eucalypt. Scats will also be reported opportunistically where identified in the vicinity of infrastructure or the bridges.

The collection of scats will assist in providing species/genus level classifications of animals identified from the sand traps.

Roadkill monitoring

Roadkill monitoring is currently being undertaken by TMR, Fauna Rescue Whitsundays and members of the public via the online *BioCollect* data collection tool. A scan of the Highway for any roadkill within

the confines of the fauna fencing and 100m either side will be undertaken during each sampling period. Any roadkill identified with be recorded with a species identification. A GPS location will also be taken.

Data Analysis

After the collection of data over the two-year period for Denison Creek and one-year period for Stockyard Creek, a statistical analysis of the data will be undertaken, and a report will be produced. The report will focus on meeting the aims and objectives of this report. The report will be compliant with Condition 13 of EPBC 2015/7552 approval -

> *Within six months of the conclusion of monitoring activity under the plan described under Condition 12, the approval holder must provide to the Department and publish on the approval holder's website, a report on the outcomes of the monitoring and assessment in delivering conservation gain (if any) for the koala. The published report must remain on the approval holder's website for the life of approval.*

The report will be submitted to the Department of Agriculture, Water and Environment and uploaded on TMR's project website.

References

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