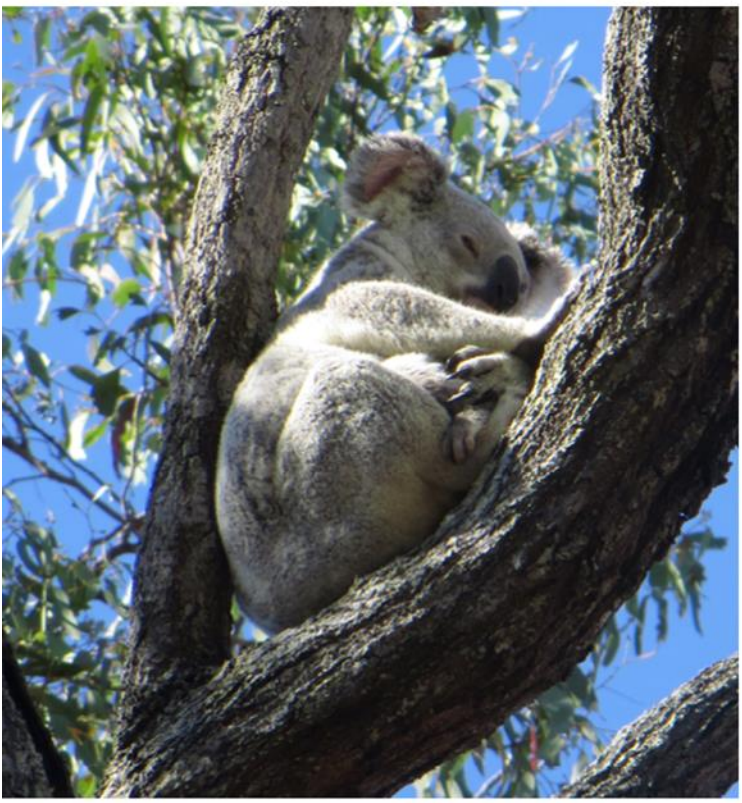
Eton Range Realignment Project – Fauna Underpass Monitoring Final Report

State Route 70, Eton QLD, 4741

NCA21R133212

7 February 2022



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EXECUTIVE SUMMARY

Kleinfelder Australia Pty Ltd (Kleinfelder) was engaged by the Department of Transport and Main Roads (TMR) to undertake monitoring, analysis and reporting on the effectiveness of fauna exclusion fencing and the fauna underpasses constructed for the Eton Range Realignment Project (ERRP).

The purpose of the monitoring was to identify;

- *The effectiveness of the fauna exclusion fencing and fauna underpasses in providing safe passage for Koalas and other wildlife.*
- *Fauna movement passages, behaviours and interactions with constructed fauna and culvert crossings.*
- *Statical analysis of fauna movement data for two monitoring periods in 2020 and 2021.*
- *Potential flaws in the design.*
- *Provide recommendations on modification or future monitoring and maintenance requirements.*

Monitoring fauna and their interaction with constructed fauna and culvert crossings was required to be undertaken to comply with the ERRP Commonwealth Approval 2015/7552, Conditions 3, 4 & 5.

Kleinfelder completed a desktop analysis, construction, and installation of eight sand plots and ten remote sensor monitoring cameras. Monitoring was completed in two progressions over two consecutive years in the months of November and December 2020 and October 2021 where fauna, and particularly Koala movement, is high. Trending results and statistical analysis indicated that improved fauna interactions with culverts was identified from the previous year's monitoring with an increase of fauna movement between the culvert and the Koala Garden on the inner vegetative area. No Koala movement through the culverts was recorded during either monitoring period however modified and improved egress and signs of Koala movement along the fence lines indicates learned behaviours and may eventually lead to successful crossings. It was also observed that Feral Cats have become habitual to the fauna culverts, and this may result in ambush and increased predation of animals using the underpasses.

Recommendations include.

- *Continue to use multi trapping methods such as Sand Plots and Camera Traps in conjunction for future monitoring.*
- *Continued vegetation management on the outer fence boundaries to provide encouraged funnelling and access.*
- *Implement a Feral Cat removal program, this could involve trapping, baiting, and or shooting.*
- *Installation of permanent improved gate fixtures, constructed with a concrete base to prevent fauna crawling underneath.*
- *Extension and / or addition of winged aprons on the extremities of the fence to redirect fauna away from the highway.*
- *Revegetation and management of weeds on the westbound route on the outside aprons to provide overhead ground cover and protection for terrestrial species, encouraging funnelling.*
- *Further monitoring is recommended to better understand the nature of the fauna movement and where to improve measures to encourage Koala passage for the ERRP and other projects.*
- *Any future monitoring is suggested to be conducted between September and October to reduce likelihood of weather impacts and capture Koala breeding season movements.*

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1 INTRODUCTION

1.1 BACKGROUND

The Peak Downs Highway traverses the Eton Range approximately 40 kilometres south-west of Mackay in Central Queensland. It is a major thoroughfare for vehicles travelling from the Regional City of Mackay to the Bowen Basin with a large amount of heavy vehicle movement servicing the mining and agricultural industries. In 2014, the Department of Transport and Main Roads (TMR) commenced initial investigations on the Range to realign the highway as part of a hazard reduction safety initiative. The Eton Range Realignment Project (ERRP) was designed to upgrade the infrastructure to reduce hazards associated with vehicles crossing the Eton Range and improve traffic movement, specifically increasing capacity to two lanes in each direction, with a split carriageway for part of the Range.

Historical data indicated that a number of fauna species were being struck at various locations over the Eton Range (Melzer 2018). The Koala (*Phascolarctos cinereus*), listed as Vulnerable under State and Commonwealth legislation, was one species to be regularly impacted by vehicle strike due to the transient nature of the species, a healthy population across the Eton Range, and the high vehicle movement.

In September 2015 the Department of the Environment (Cth) determined the ERRP to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to potentially significant impacts to the Koala (EPBC Ref 2015/7552). Fauna exclusion fencing and fauna underpasses were to be constructed to mitigate the impacts to fauna movement between the two carriageways and ensure positive connectivity. Under the ERRP Commonwealth Approval (2015/7552), Conditions 3, 4 & 5, TMR were required to monitor fauna and their interaction with constructed fauna and culvert crossings. The Conditions specifically stipulated:

For the ongoing protection of the koala in the project area, the approval holder must design, construct and implement koala protection measures, including fencing and a fauna underpass, prior to completion. These protection measures must be maintained by the approval holder for the life of approval (Condition 3).

To inform adaptive management after completion, the approval holder must monitor the use of the fauna underpass and roadkill within the project area, sufficient to assess the level of koala mortality from road strike and the ability of koalas to safely cross the Peak Downs Highway within the project area (Condition 4).

TMR was then required to publish the results of the monitoring (Condition 5).

1.2 PURPOSE AND SCOPE

The Department of Transport and Main Roads required monitoring, analysis, and reporting on the effectiveness of fauna exclusion fencing and the fauna underpasses.

The purpose of the monitoring was to identify:

- The effectiveness of the fauna exclusion fencing and fauna underpasses in providing safe passage for Koalas and other wildlife.
- Fauna movement passages, behaviours and interactions with constructed fauna and culvert crossings.
- Statical analysis of fauna movement data for two monitoring periods in 2020 and 2021.
- Potential flaws in the design.
- Provide recommendations on modification or future monitoring and maintenance requirements.

Kleinfelder Australia Pty Ltd (Kleinfelder) was engaged to provide methodologies and conduct surveys to monitor and evaluate the effectiveness of the constructed exclusion fencing, culverts, and fauna movement passageways. The monitoring was completed over two consecutive years in the months of November and December 2020 and October 2021 when fauna movement, and particularly the Koala, is high. This report details the results of the two

monitoring periods and provides recommendations for consideration where relevant. Works were conducted under Kleinfelder's Scientific Purpose Permit WA00224582 and ethics approval CA2019/06/1290.

1.3 Study Area

The ERRP is situated on the Peak Downs Highway approximately 40 kilometres south-west of Mackay and 52 Kilometres north-east of Nebo, Central Queensland **(Figure 1)**. The Project lies within the Clarke Conners Ranges which encompasses a large contiguous parcel of remnant eucalypt woodland with a good diversity of Koala feed trees supporting the known population.

The study area was located on top of the Eton Range towards the western extent of the Project footprint over a section of the split carriageway. One drainage culvert (3 x 1800mm reinforced concrete round pipe) and one fauna underpass (2100mm x 2100mm reinforced concrete box culvert) has been installed under each newly split carriageway and labelled as Culvert 1 – 4 (**Figure 1**). Culverts 1 & 3 are the box style fauna underpass and 2 & 4 being the drainage pipe. The area in between the carriageways contains small stature native vegetation; this area was retained to allow for shelter and encouraged movement and has been contained by fauna exclusion fencing. It is referred to as the Koala Garden. Additional measures such as fauna furniture including overhead habitat logs and resting poles were included within the underpass to encourage use by Koalas and other animals and to assist in protecting against predation (see **Appendix B** for representative photos).

1.4 Previous Reports and Studies

A number of studies have been completed on the Koala and other fauna occurrence on within the Clarke Coners range and the Eton Range area. Fauna sensitive infrastructure studies and wildlife mortality accounts of the Nebo to Eton section of the Peak Downs Highway were completed by Central Queensland University in 2018 (Melzer 2018). Additionally, specific Koala population and health studies were undertaken in the Clarke Connors Ranges to understand localised Koala movement across the range and associated Koala patterns within the broader region (Ellis, W et al. 2018).

A report released on the Peak Downs Highway (between Eton and Nebo), described radio tracking methods used to identify the typical habitat range, daily movement, Chlamydia burden and overall population health of Koalas within the Clarke-Connors Ranges (Ellis, W et al. 2018). The report found a stable and genetically healthy population of Koalas was present, of which would be at risk from traffic and infrastructure (Ellis, W et al. 2018). Koala movements were described as highly variable, between 60-110m daily.

A Koala Ecological Equivalence Assessment was undertaken for the Project as part of investigation and preliminary design management for mitigation measures (Kleinfelder, 2015); the findings supported the information describing an extensive Koala population and high value Koala habitat on the Ranges, and the importance of undertaking further and more detailed studies around this population and the potential impacts created by the Peak Downs Highway. Arboreal mammal surveys of Koala and gliding marsupials were undertaken on the ERRP to identifying key Koala use areas, and potential fauna crossing concerns and solutions prior to the completion of construction (Kleinfelder, 2020).

1.5 Legislation

This project was undertaken in accordance with, and/or consideration of, the following Acts and Regulations:

Commonwealth:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

State:

- *Nature Conservation Act 1992* (NC Act).
- *Nature Conservation (Animals) Regulation 2020* (NC(A)R).
- *Vegetation Management Act 1999* (VM Act).

2 METHODS

2.1 DESKTOP ASSESSMENT

A desktop analysis of the locality was used to identify Threatened wildlife records or potentially occurrence within 10km from the study area, and any vegetation communities that would provide suitable habitat for Threatened wildlife. Four database searches were used to assess for any 'endangered' (E), 'of concern' (OC) 'vulnerable' (V), 'near threatened' (NT) and 'special least concern' (SL) listed vegetation communities and / or wildlife.

The four databases used were:

- Regulated Vegetation Management Report & Map (MSES) (DoR 2020), including Essential Habitat Mapping.
- Wildlife Online (Queensland Government 2020).
- Atlas of Living Australia (Atlas of Living Australia 2020).
- EPBC Act Protected Matters Report (MNES) (DAWE 2020).

The search area for Wildlife Online (WO), Atlas of Living Australia (ALA) and the EPBC Act Protected Matters Report (PMR) was from a central point (-21.3394, 148.9371). Wildlife records focused specifically on EVNT species records. The Regulated Vegetation Map and the Protected Matters Report used the same central coordinates.

2.2 PLOT CONSTRUCTION AND MONITORING

Plot construction and monitoring methods are described **Table 1** below. Methodologies were replicated for the two monitoring events in 2020 and 2021.

Table 1: Summary of Field Methods

Task	Methodology
Sand plots	**Sand Plot Construction** Sand Plot construction involved the installation of eight Sand Plots at proposed monitoring locations (**Figure 1**). Installation included: ▪ Site preparation including brush cutting grass / removal of debris of plot area. ▪ Construction of Sand Plots with a brickies loam substrate with a plastic sheet underlay. 'Brickies Loam' has a high content of clay particles that help retain footprints as the sand dries out. • Plots in culverts covered the entire breadth of internal culvert slab (2.1m x 1m x 3cm sand depth) (**Plate 1**). • Plots on culvert aprons covered entire breadth of the apron track (7m x 1m x 3cm sand depth) (**Plate 2**). • Plots along fence lines were orientated perpendicular to the fence structure (5 x 1m x 3cm sand depth) depending on width of travel path and fauna movement (**Plate 3**). **Monitoring** • Three site visits per week for a four-week period (consecutively) to undertake Sand Plot analysis. Monitoring was conducted during November / December 2020 and October 2021. Monitoring per visit included: ▪ Fauna identification of tracks / traces, recording count, direction (movement towards or away from culverts), and locations on all eight plots, including a photograph log. ▪ Resetting of plots after each site visit including, screeding, wetting and restocking sand where required.

Task	Methodology
Camera Traps	**Camera Trap Installation** • Installation of eight motion sensor cameras (one per Sand Plot location) and two additional cameras positioned to capture fauna movements between areas outside of the Sand Plots **(Figure 1)**. Installation included: ▪ Site preparation by brush cutting and removal of small vegetation and grass that would trigger spurious captures though movement by wind. ▪ The cameras were placed to view each Sand Plot location and at locations where fauna movement was likely. ▪ Time and date on the Camera Traps were synchronised to determine the passage of wildlife from the fences to the underpasses and from one underpass to the other. ▪ The Camera Traps were set to take a series of three photographs from each (rapid set) trigger. **Monitoring** • Cameras were checked once weekly and the batteries were replaced, SD cards were downloaded and refreshed to mitigate against the risk of data loss in case of camera theft or damage. • Photograph quality and camera position were tweaked after reviewing initial return data. • All evidence of fauna (identification, direction of travel, date and time, species) was recorded.
Other Field Methods	• Collection and identification of nearby scats (field Id consisting of visual / breakdown and comparison to reference material). • Identification and recording of roadkill within the confines of the ERRP and fauna exclusion fencing for the project duration. • Incidental fauna sightings and evidence of fauna use of the culverts and Koala Garden area.

During construction of monitoring sites, Kleinfelder also made modifications to access gates and drainage lines where fauna was likely to breach the exclusion fencing. This involved lowering gate hinges and realignment with the fence to reduce the gap. Additionally, installation of a rigid block out screen on the bottom of the gates and sections of the fence was used to prevent under passing (**Plate 4** & **Appendix B** Site Photos). The barbed wire fencing leading into Culverts 1 and 2 was removed to encourage fauna to funnel towards the culverts after traversing the fence lines. Fences were reinstated upon completion of monitoring. Removal and brush cutting of thick Guinea Grass and other vegetation at the funnel points was also completed.

Plate 1: Culvert Inner Sand Plot

Plate 2: Fence Sand Plot

Plate 3: Culvert Sand Plot

Plate 4: Gate Modifications

2.3 Data and Statistical Analysis

The data from the Sand Plots and Camera Traps was statistically analysed to determine if the fauna assemblages observed at sites along the fence, on the outside of the culverts, and on the inside of the culverts was similar. Fauna groups that could safely move across the roads without using the culverts (e.g., birds) were not included in the data analysis. The Sand Plot and Camera Trap data was combined for statistical analysis due to:

- The relatively low volume of data.
- The Sand Plots and Camera Traps at the same location had different species, and when combined provided a clearer picture of all fauna using that location.
- The fauna culverts had wildlife passage structures that the fauna could use to avoid the Sand Plots.

The sites and locations are listed in **Table 2**. Three distinct survey locations were used to analyse the data: Fence Plots (4 sites), Culvert Outer Plot (1 site) and Culvert Inner Plots (3 sites).

Table 2: Locations of Survey Sites.

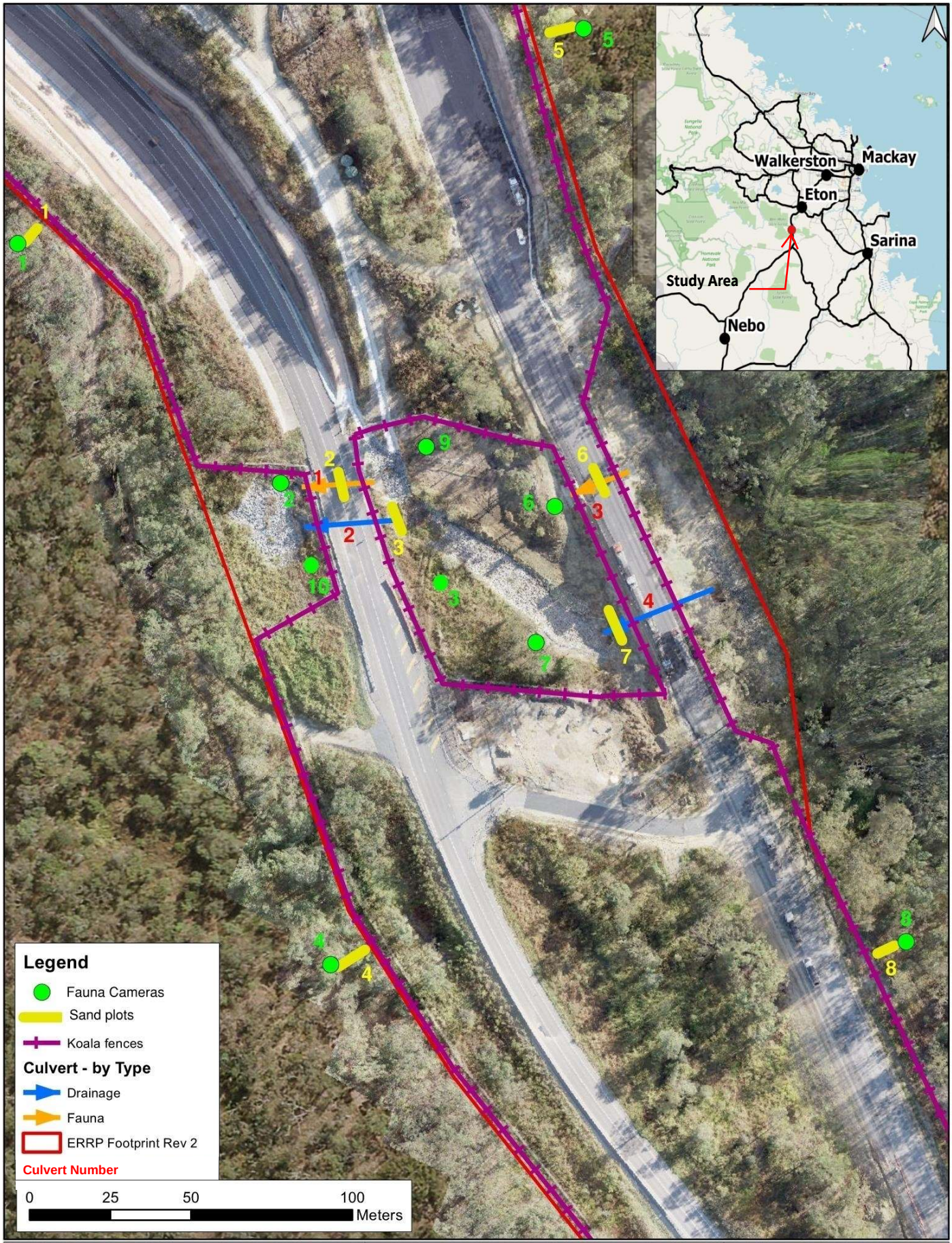
Site	Sand Plot ID & Camera Trap #	Location
1	1, 1	Fence
2	2, 2	Culvert Outer
3	3, 3	Culvert Inner
4	4, 4	Fence
5	5, 5	Fence
6	6, 6	Culvert Inner
7	7, 7	Culvert Inner
8	8, 8	Fence

Camera Trap sites 9 and 10 were not included in the data analysis due to:

- Camera Trap 1 (Refer to **Figure 1** for location) was stolen early in the data collection of 2021 and Camera Trap 10 was used to replace it.
- Camera 9 was mounted on the fauna rail leading up to the culvert to capture arboreal animals. Only birds were only recorded and no other fauna that would use the culverts were observed in 2020 or 2021.

Statistical analysis of the data was undertaken using univariate and / or multivariate analysis. Differences in the species richness and abundance between the Locations was tested using a Kruskal-Wallis Anova from the Statistical analysis package. The Kruskal-Wallis Anova (univariate) is a non-parametric test that does not require the data to have a standard distribution or equal number of samples at each location.

Multivariate analysis to test differences in the fauna assemblages between years and locations included non-parametric Multi-dimensional Scaling (MDS) and Anova of Similarity (ANOSIM) using Primer 7. Fauna assemblages were determined by species and their abundance at each site.



Brach / Unit : **Mackay Whitsunday District**	Title : **Eton Range Realignment Project** **Koala fence and culverts** **Koala Monitoring Locations**	Queensland Government **Transport and Main Roads**
Projection GDA94		Plan / Job No: 242/33B/8 Date: 07/09/2020
File Location:G:\MKYD\Road Corridor\Corridor Management\Environment\Contra	**Figure 1**	Modified by Kleinfelder 27/01/2022

3 RESULTS

3.1 RESULTS

3.1.1 Desktop Analysis

The desktop assessment of threatened fauna returned three different species. EVNT Wildlife Online records are listed in **Table 3**.Vegetation communities resulted in three Regional Ecosystems (REs) being present within and or adjacent to the study area. Regional Ecosystems and their short descriptions as mapped by the Queensland Herbarium are listed in **Table 4.** All three REs provide suitable habitat and food tree species for Koala. The PMR listed three Threatened Ecological Communities (TEC), however these areas were not present within the ERRP footprint.

Table 3: Wildlife Online Records – EVNT Fauna

Species	Records	NC Act Status	EPBC Status
Phascolarctos cinereus (Koala)	14	V	E
Macroderma gigas (Ghost Bat)	1	E	V
Calyptorhynchus lathami erebus (Glossy Black-cockatoo (Northern))	1	V	NL

V = Vulnerable, E = Endangered, NL = Not Listed

Table 4: Regional Ecosystems

Regional Ecosystem	Short Description	VM Act Status*	Bio Status*	EPBC Act*	BVG1M *
8.12.12a	*Corymbia intermedia* and/or *Eucalyptus platyphylla* open forest to woodland (occasionally closed forest) (12-25m tall) with several other canopy co-dominants or subdominants always present, which may include *E. drepanophylla, E. tereticornis, C. tessellaris and E. portuensis.* **Suitable Koala habitat**	Q-LC	BS-NC	-	9c
8.12.5a	*Lophostemon confertus* and/or *Eucalyptus portuensis* (or *E. exserta*) open forest to closed scrub (5-38m tall). Other occasional co-dominant or associated species include *Corymbia trachyphloia, Acacia spirorbis* subsp. *solandri, E. drepanophylla* and *Acacia falcata* **Suitable Koala habitat**	Q-LC	BS-NC	-	9d
8.12.7a	*Corymbia citriodora* and *Eucalyptus portuensis* open forest to woodland (12-27m tall). *Corymbia trachyphloia* and *C. intermedia* are occasional subdominants, whilst *E. drepanophylla, E. tereticornis* and *E. exserta* may be associated canopy species. **Suitable Koala habitat**	Q-LC	BS-NC	-	10b

*F-V or F-E indicates 'vulnerable' or 'endangered' under Federal legislation EPBC Act; (Q-LC, Q-NC, Q-NT, Q-V, Q-OC or Q-E indicates listed as 'least concern', 'no concern at present', 'near threatened', 'vulnerable', of concern or 'endangered' under NC Act and or VM Act, Bio = Biodiversity, Bolded = remnant RE and underlined = HVR.

3.1.2 Sand Plot Results

Sand Plot results are presented in

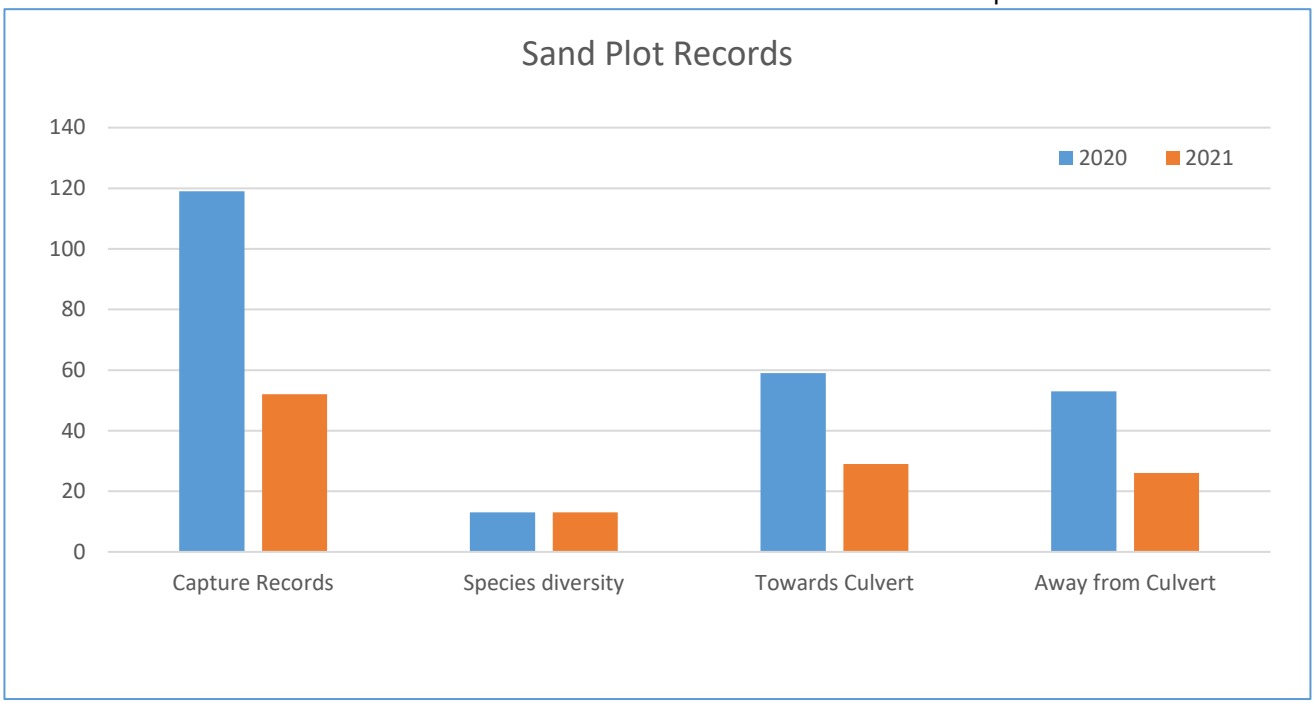


Figure 2 where the graph displays the results in comparison to year and capture types, including the differences in species diversity between years. **Table 5** also presents a summary of the fauna identification data is presented for 2020 and 2021 comparatively, displaying capture records and diversity in relation to plot number and total counts for fauna movement records (whether the animal was moving towards the culverts or away from them).

Fauna interactions identified three types of movement:

- Complete pass – where the animal travelled through both culverts from one side of the highway to the other.
- Successful funneling - where animal travelled through the culvert to the Koala Garden but then returned via the same culvert.
- Unsuccessful funneling – where the animal entered the culvert then exited without travelling through to the Koala Garden.

In the 2020 monitoring period there were 15 fauna interactions within the culverts, including ten successful funneling instances and three unsuccessful instances, 2 were indiscriminate actions with fauna residing in the culverts. No complete passes were recorded.

In the 2021 monitoring period there were 20 fauna interactions within the culverts, including six occasions where fauna was observed to successfully travel through both culverts (complete pass), eight successful funneling instances, and five unsuccessful instances.

No Koalas were observed to completely pass or successfully funnel through the culverts in either monitoring periods. Koala observations were restricted to the movements of two animals with one Plot 1 and one Plot 5 of 2020, and one animal in Plot 5 in 2021 (fence sand plots). In 2021 the Koala repeatedly traversed the fence line towards the culverts, however without entering them.

Both the 2020 and 2021 monitoring periods were affected by rain with several plots displaying “no records” due to be rained or out. Overall, fauna species diversity was equal across both years with 13 species recorded in each period. Feral Cat tracks were identified in 2021, they were recorded in five of the eight Sand Plots.

A complete record of fauna identifications and interactions has been provided in **Appendix A**. Examples of fauna records (images) are presented in **Appendix B**.

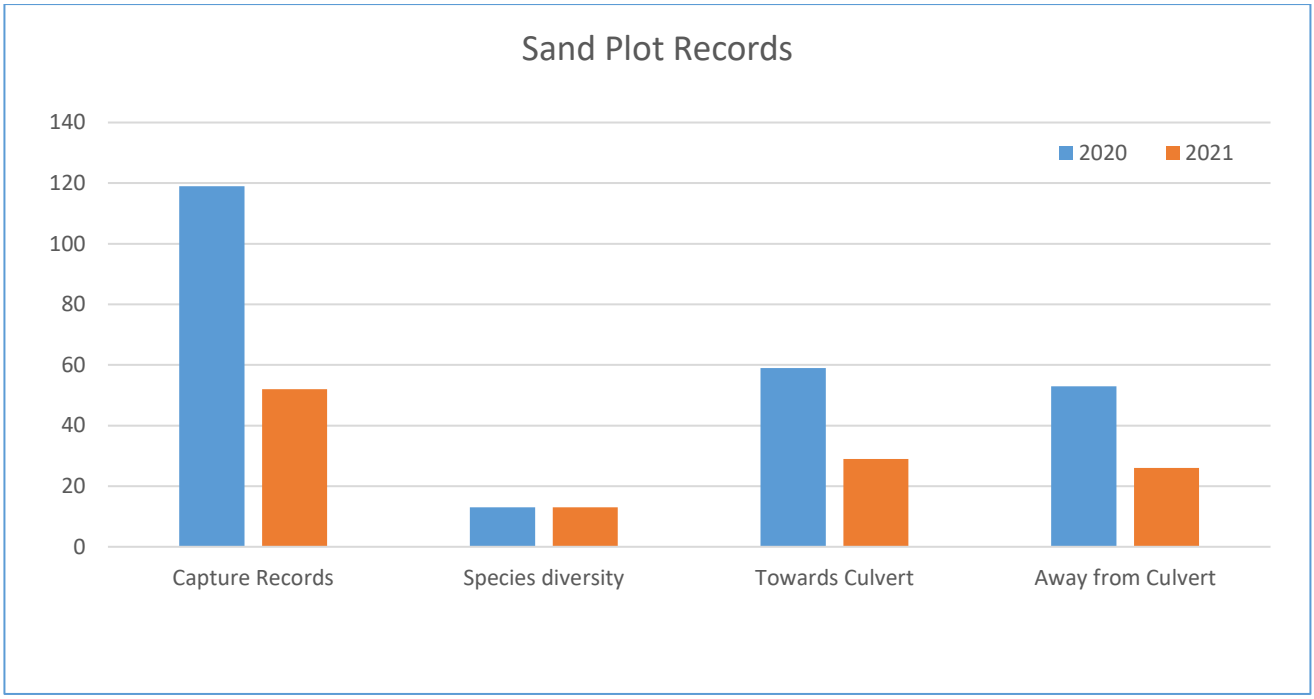


Figure 2: **Sand Plot Records.**

Table 5: **Sand Plot Results Breakdown Summary**

Plot Number	Capture Records		Species Diversity*		Towards Culvert		Away from Culvert	
	2020	**2021**	**2020**	**2021**	**2020**	**2021**	**2020**	**2021**
1	20	6	12	3	4	5	14	1
2	15	5	7	4	12	2	4	4
3	17	3	6	3	9	1	7	1
4	12	5	9	3	5	1	3	4
5	23	8	8	4	12	3	10	5
6	17	15	6	6	10	11	8	7
7	6	6	5	5	3	3	3	3
8	9	4	2	3	4	3	4	1
Totals	**119**	**52**	**13**	**13**	**59**	**29**	**53**	**26**

* Total count refers to overall species diversity for that monitoring period.

3.1.3 Camera Results

Sand Plot results are presented in

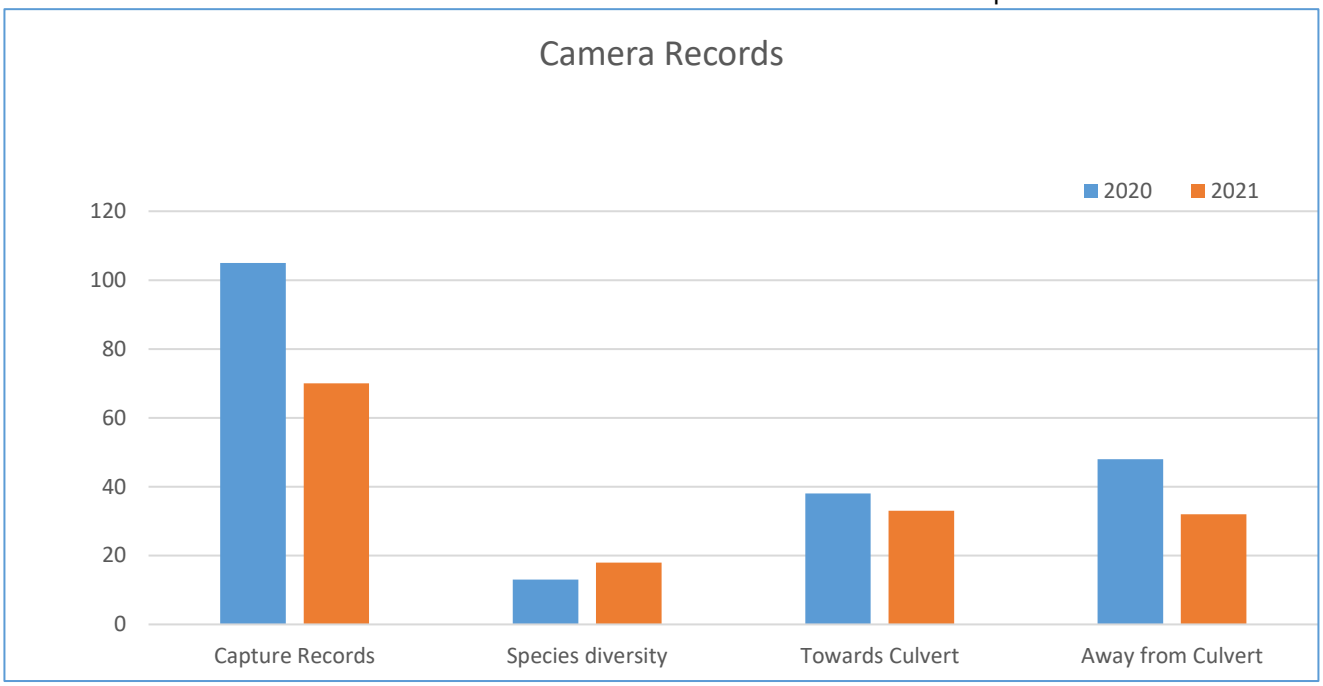


Figure 3 where the graph displays the results in comparison to year and capture records, including the differences in species diversity between years. A summary of the capture records from the Camera Traps is presented in

Table 6**;** data is presented for 2020 and 2021 comparatively including capture records and diversity in relation to the plot number and total counts for fauna movement. Fauna interactions again identified three types of movement (complete pass, successful funneling, and unsuccessful funneling).

In the 2020 monitoring period, animals were successfully funneled into the culvert on five occasions and one complete pass through was captured. The same result was recorded in 2021.

The Camera Traps captured the same two Koalas recorded in the Sand Plots in 2020 (Camera Traps 1 and 5), and in 2021 at camera Trap 5.

Species diversity was greater in 2021 with 18 species recorded in comparison to 13 the previous year. A Feral Cat was captured on three of the eight cameras in the 2021 monitoring period. It was determined to be the same animal in all images.

A complete record of fauna identifications and interactions has been provided in **Appendix A**. Examples of fauna records (images) are presented in **Appendix B**.

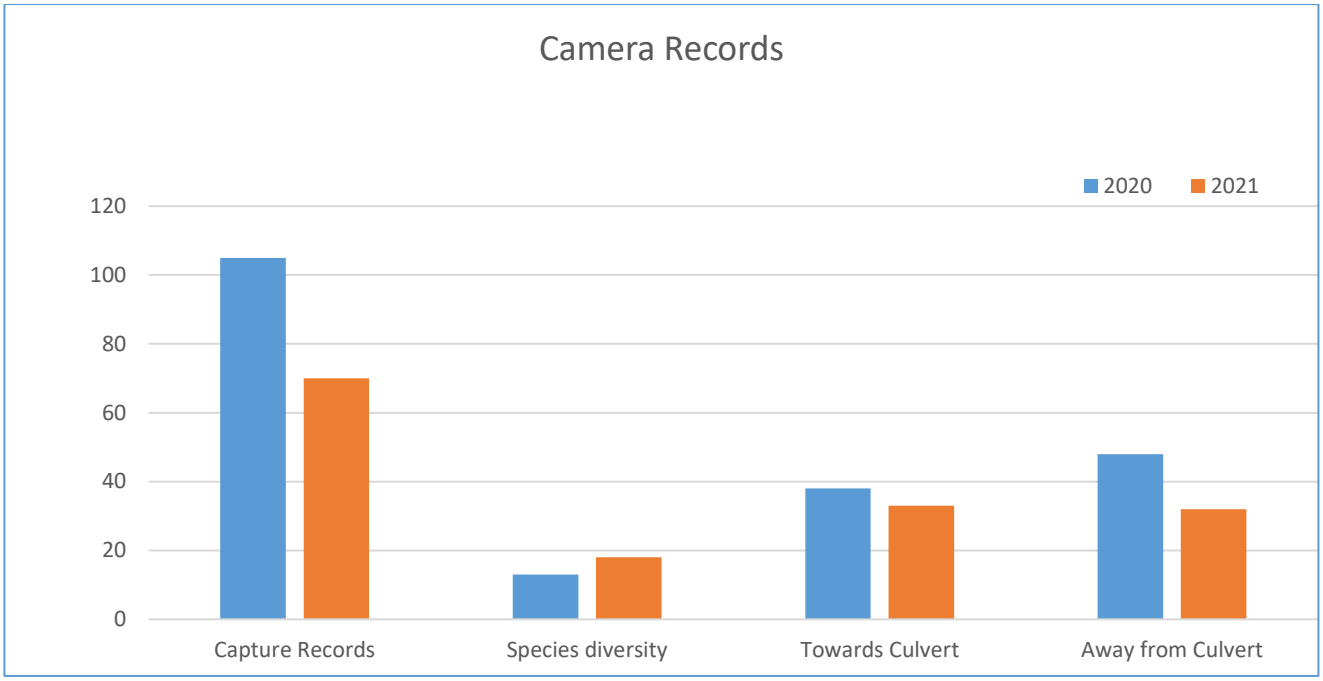


Figure 3: Camera Records.

Table 6: Camera Results Breakdown Summary 2020 & 2021

Camera Number	Capture Records		Species Diversity		Towards Culvert		Away from Culvert	
	2020	**2021**	**2020**	**2021**	**2020**	**2021**	**2020**	**2021**
1	8	4	4	3	4	2	6	3
2	13	10	6	3	6	7	6	3
3	15	6	4	2	4	2	4	4
4	3	5	3	3	0	4	2	1
5	31	22	6	10	16	9	18	13
6	11	7	3	3	3	5	4	2
7	7	3	4	2	0	1	2	2
8	16	6	2	3	5	3	6	3
9	1	7	1	3	0	0	0	0
10	0	0	0	0	0	0	0	0
Totals	**105**	**70**	**13**	**18**	**38**	**33**	**48**	**31**

3.1.4 Incidental Fauna Sightings

Aside from birds and small reptiles, only one Koala was incidentally observed during both monitoring periods. The Koala (**Plate 5**) was located on the westbound route near Plot 5 and was frequently observed. It is believed to be the same Koala was recorded on the Camera Traps and Sand Plots several times throughout the monitoring period.

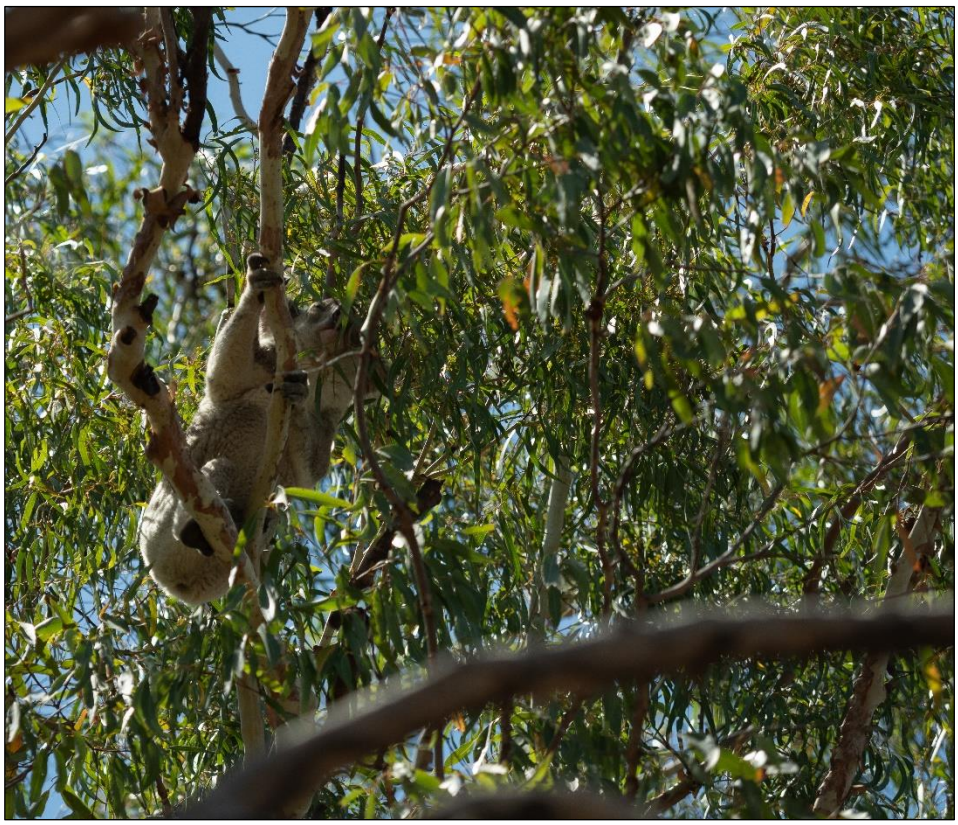


Plate 5: Koala in proximity to Plot 5 (2021)

3.1.5 Fauna Road Strikes

Fauna road strike data for years 2020 and 2021 are presented in **Table 7** below.

Table 7: Fauna Road Strike Results 2020 & 2021

Year	Species	Location	Reasoning
2020	No road strike observed within the ERRP in 2020 monitoring period.		
2021	Rufous Bettong / *Aepyprymnus rufescens*	Eastern side base of range	Vehicle Strike
	Agile Wallaby / *Macropus agilis*	Western side base of range	Vehicle Strike
	Brushtail possum / *Trichosurus vulpecula*	Eastern carriage way mid-range	Vehicle Strike
	Rufous Bettong / *Aepyprymnus rufescens*	Western side base of range	Vehicle Strike

Ongoing monitoring of local koala occurrence, including roadkill within the Eton Range Project extent, is also being undertaken via the K*oala Mapping Mackay & Whitsundays Areas Project* on BioCollect. The mapping project is managed by Padaminka Nature Refuge Koala Rescue and Care and is supported by TMR and other

Agencies and organisations. An analysis on this data completed by comparing all records within the ERRP area and confines of the constructed fauna exclusion fencing displays that prior to the fence and road construction completion there was five Koala death records (vehicle strike) records. This is in comparison to after the fence completion where two koala death (vehicle strikes) have been recorded to date. Results are displayed in **Table 8** below.

Table 8: Bio-Collect Data Koala Road Strike Results

Period	Species	Count	Reasoning
Prior to exclusion fence	Koala / *Phascolarctos cinereus*	5	Vehicle Strike
Post exclusion fence	Koala / *Phascolarctos cinereus*	2	Vehicle Strike

3.1.6 Scats Results

Fauna Scat data for years 2020 and 2021 are presented in **Table 9** below. Koala scats were recorded in both years and align with the results obtained from the Plots (Plots 1 and 5 in 2020 and Plot 5 in 2021). Encouragingly, a greater diversity of animal scat was recorded in 2021.

Table 9: Summary of Scat Results 2020 & 2021

Year	Species	Location (Nearest Plot ID)	Inside / Outside Fence
2020	*Macropus Sp.* (Kangaroo or Wallaby)	1, 4, 5, 8	Outside
	Phascolarctos cinereus (Koala)	1, 5	Outside
	Amphibia sp. (Frog)	2, 3	Inside
2021	*Tachyglossus aculeatus* (Short-beaked Echidna)	2	Outside
	Macropus Sp. (Kangaroo or Wallaby)	1, 2, 3, 4, 5, 6, 7, 8	Inside & Outside
	Felis catus (Feral Cat)	2	Outside
	Phascolarctos cinereus (Koala)	5	Outside
	Myotis adversus (Large footed myotis)	2, 7	Inside Culvert
	Squamata sp. (Lizard)	2, 3	Inside
	Amphibia sp. (Frog)	2, 3	Inside

3.2 Statistical Analysis

3.2.1 Species Richness and Abundance

Although there appeared to be some differences in the species richness and abundance (**Figure 4** and **Figure 5**) between each year and the monitoring locations, none of these were significant. The single sample for the Culvert Outer could have lessened the likelihood of significant differences. However, when the Culvert Outer location was omitted from the analysis there was still not significant difference between the Fence and Culvert Inner locations. The high abundance at the Fence sites in 2020 was due to the high number of observations of the Northern Brown Bandicoot and Eastern Grey Kangaroo that year (**Appendix C**).

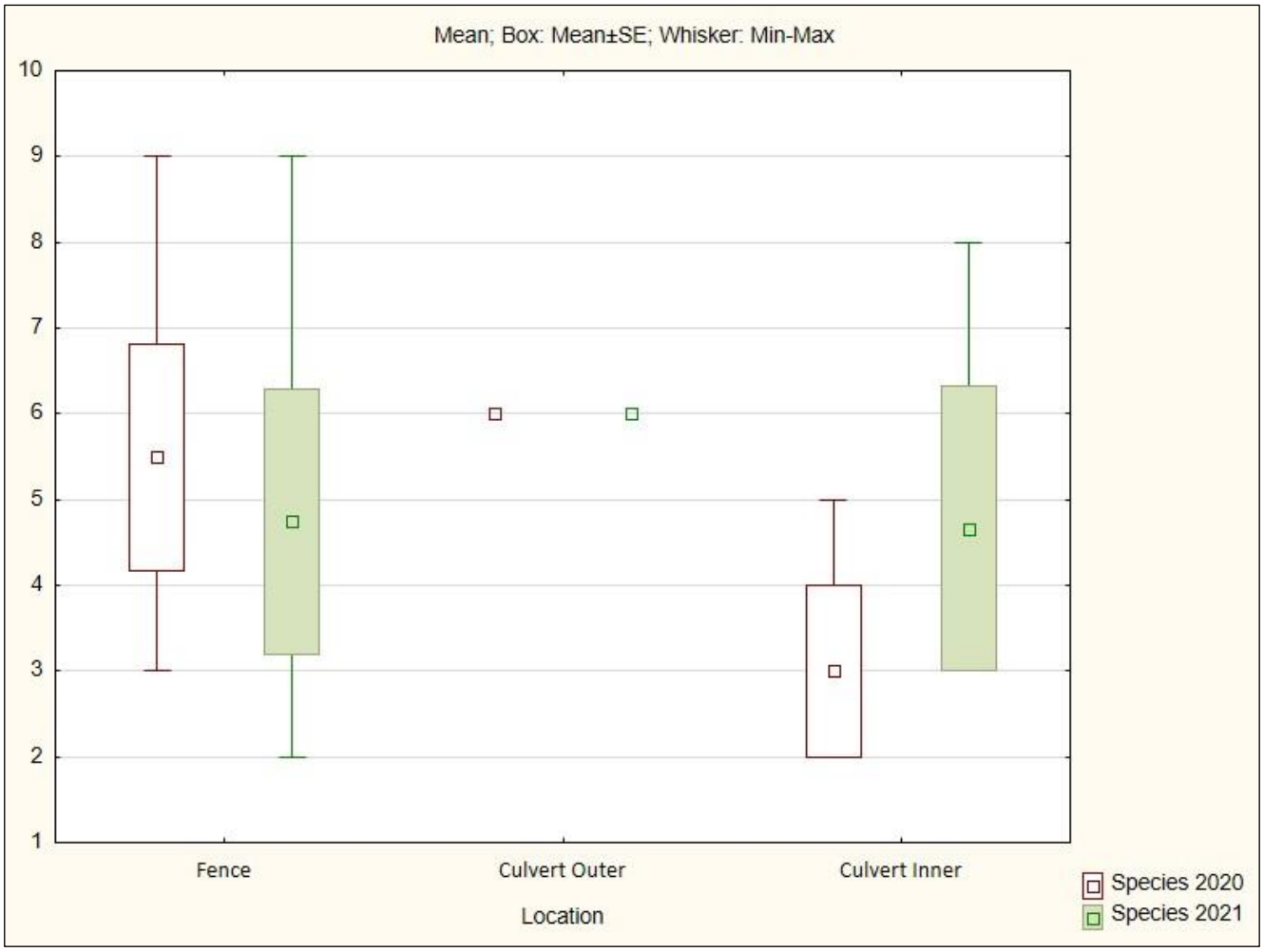


Figure 4: Species Richness.

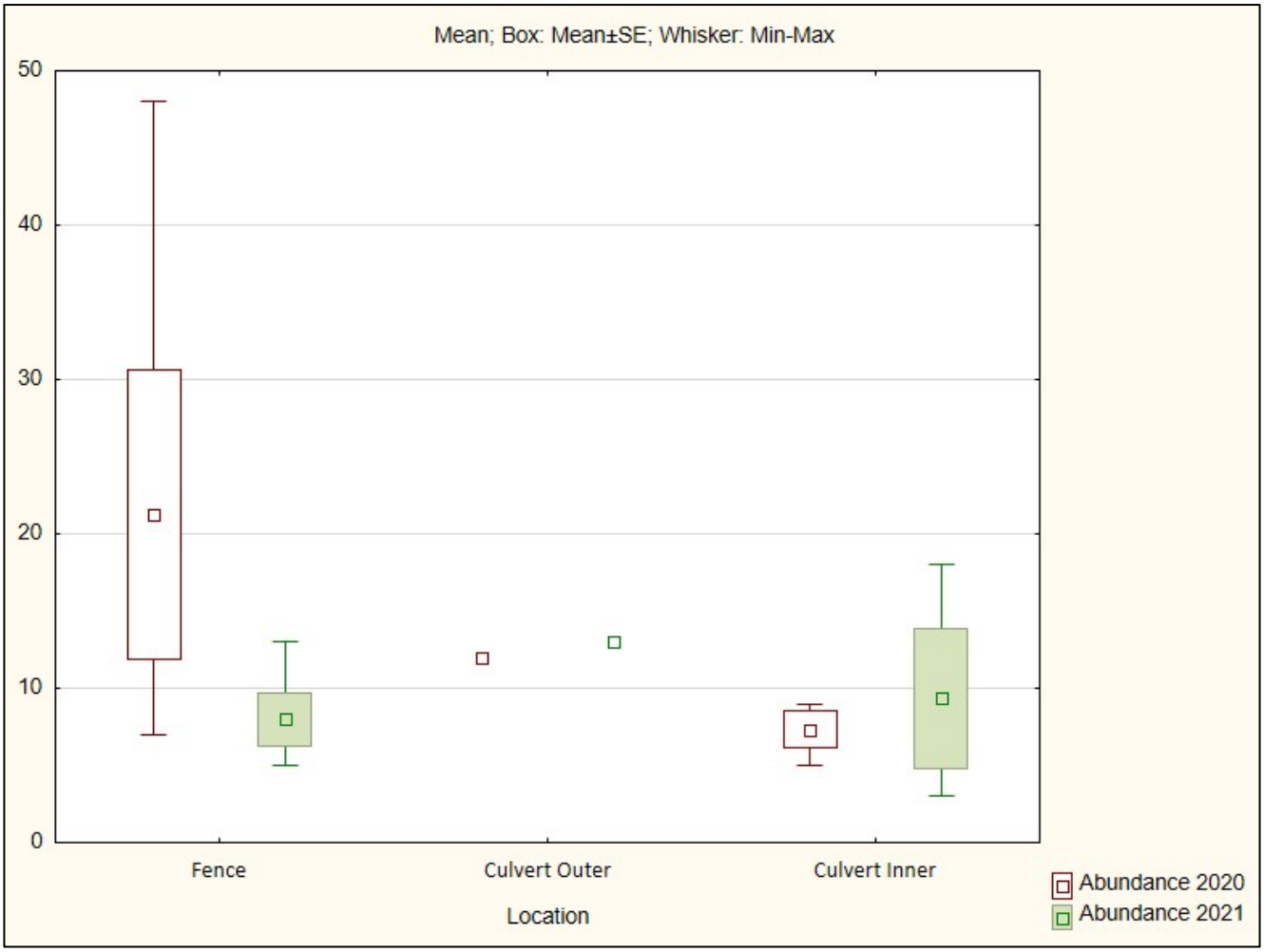


Figure 5: Abundance.

The multivariate analysis did find differences in the fauna assemblages. There was a significant difference between years 2020 and 2021 (R^1 = 0.352, p^2 = 0.01) and there was a significant difference between the Fence and Culvert Inner locations (R = 0.312, p = 0.05) (**Figure 4** and **Figure 5**). However, the strength of the relationships was low (low R value). If the fauna was travelling from the Fence into the Culvert Outer and then into the Culvert Inner, there would not be any differences in the assemblages at the locations for any particular year.

[1] R= Regression Likelihood of a correct outcome
[2] P= Probability

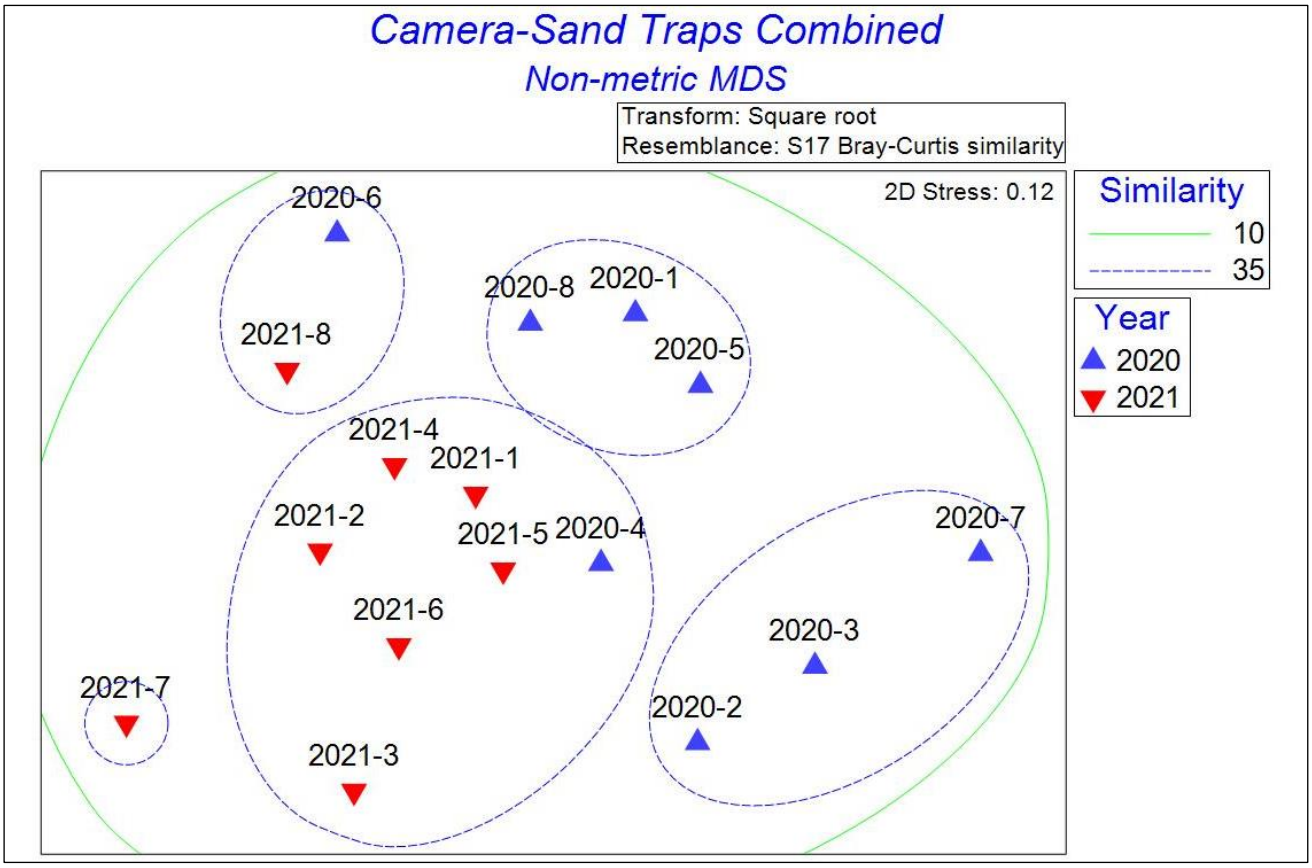


Figure 6: MDS based on year.

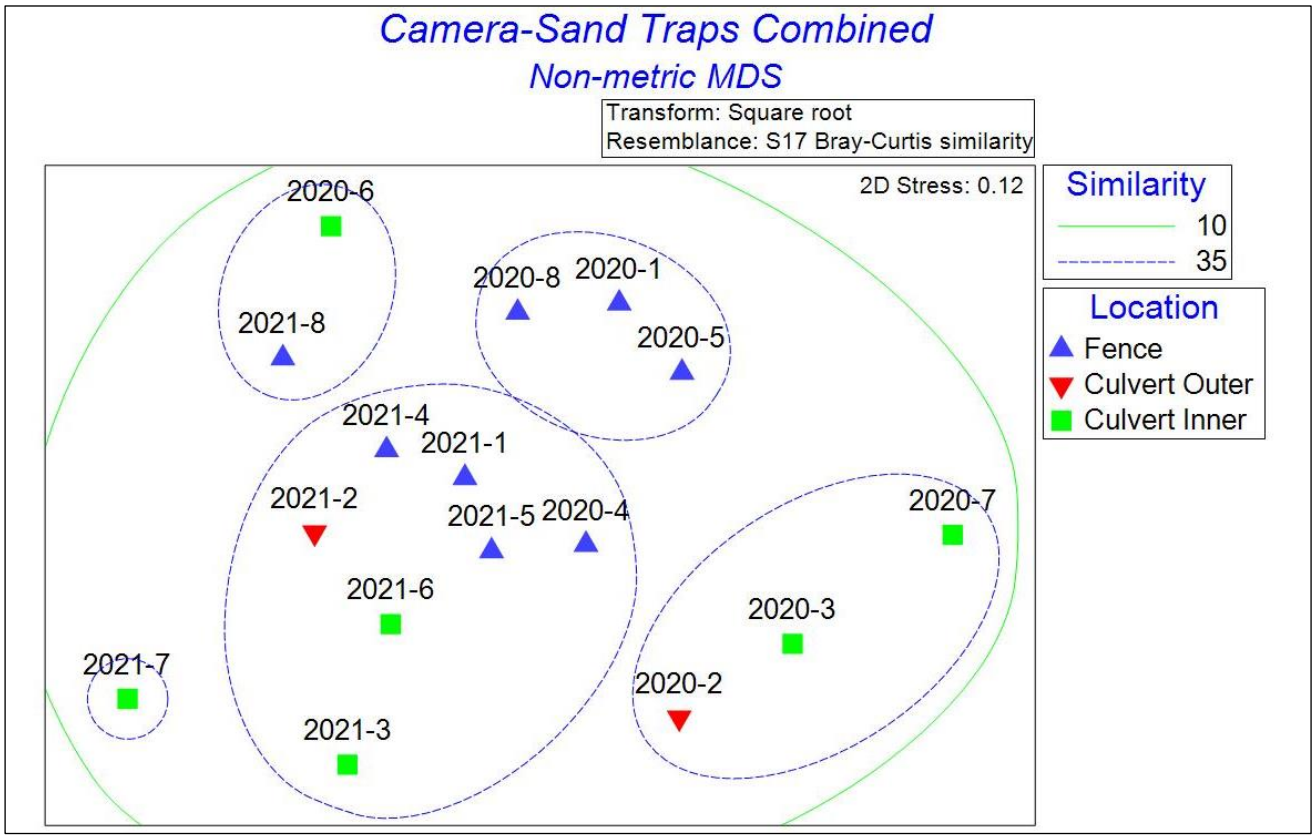


Figure 7: MDS based on location

4 DISCUSSION AND RECOMMENDATIONS

4.1 DISCUSSION

The fauna culverts and exclusion fences installed for the ERRP have been demonstrated to be effective in assisting fauna passage during this assessment. The 2020 monitoring period identified one animal completing a pass through of both culverts, seven animals were recorded completing this in 2021. Successful funnelings was consistent between the two periods with 15 records in 2020 and 13 in 2021. Unsuccessful funnelings increased from three to five. This increase in usage potentially demonstrates learned behaviours of animals that have a home range overlapping with the study area. The Sand Plot and Camera Trap capture results were inconsistent, with the Sand Plots appearing to be more effective, particularly with cryptic animals. However, this does highlight the importance of using both types of traps for future monitoring.

Tracking fauna through the culverts can be difficult due to the possibility of animals avoiding the cameras or large animals (macropods) jumping the sand plots. An amalgamation of the data from the Camera Traps and Sand Plots clearly showed that fauna observed by the Camera Traps did not leave prints on the Sand Plots and vice versa. The statistical analysis grouped both together to determine if similar fauna assemblages in both 2020 and 2021, and were similar in the different locations (Fence, Culvert Outer and Culvert Inner). The univariate analysis determined there were not any significant differences in species richness and abundance between the locations. However, the multivariate analysis did show that there were differences in the assemblages between the Fence and Culvert inner locations.

Although the number of identifiable species and fauna recorded each year, at all sites combined, was alike, eight species were recorded in both years. The differences in the fauna assemblages between the two years was the result of the five species that were particular to each year. In addition, the numbers of some species common to both years had a large variation between the years (Koala, Northern Brown Bandicoot, Agile Wallaby and Eastern Grey Kangaroo). Data and fauna results are presented in (**Appendix C**).

The numerical difference in the fauna assemblages between the Fence and Culvert Inner locations was the four species which were only observed at the Fence locations each year, additionally three species only were observed at the Culvert Inner location (**Appendix C**). There were eight species common to both locations.

Koala activity in the Sand Plots and on the Camera, Traps appeared to increase in 2021. However, movements were restricted to a single individual that was captured (repetitively) on Plot and Camera 5 (in 2021). In the previous monitoring period interactions from two Koalas were recorded on Plot and Camera 1, and Plot 5. No Koalas successfully funnelled or completed passes of the culverts in either year. Their behaviour resembled localised movements around a particular patch of vegetation most likely due to fresh regenerative preferred food sources. Although no Koalas used the culverts, there is evidence of Koalas travelling along the boundary fence, potentially searching for a crossing. Tracks and images recorded Koala going back and forth along the fencing but not travelling far enough to locate the culvert entrance. While this demonstrates the effectiveness of the exclusion fencing, the appeal of the culverts should be considered for improvement area with vegetation reinforcement and / or easier egress.

Species diversity increased overall between the two monitoring periods, a positive outcome for the environmental management of the ERRP. One notable individual, a bandicoot, was seen crossing multiple times on Camera 6 through Culvert 3. It was observed that this bandicoot was accessing the Koala Garden and resting area to feed with numerous diggings and foraging signs.

Feral Cats were recorded utilising the fauna culverts (Culverts 1 & 3) to either cross the highway, or when following potential prey. Feral Cats were captured on the Camera Traps immediately following small mammals such as the recorded Bandicoot and recorded only at night. Although Feral Cats are detrimental to native fauna, this behaviour shows that in comparison to previous season monitoring, learned behaviour and interactions with the culverts is increasing. It is suggested that Feral Cat presence may become detrimental to native fauna crossing and they may potentially be using the culverts as an ambush location. A Feral Cat management program should be investigated. This could involve trapping, baiting, and / or shooting.

Additional measures implemented during monitoring plot construction to prevent fauna from eluding culverts and entering the carriageways have seemingly reduced fauna strikes within the exclusion fenced system (anecdotal evidence supplied by project personnel). Only one record during the 2021 monitoring period, a Brushtail Possum, breached the fencing; these animals are capable of climbing over the exclusion fences. Although no fauna was found to be struck in the 2020 monitoring period, leading up to the 2021 monitoring period it was reported that two Koalas and other fauna had been struck on the range. Other fauna that was recorded as road strikes were at the outer extents of the fence system. *Koala Mapping Mackay & Whitsundays Areas Project* BioCollect data showed a 5/2 comparison of Koala death records from Vehicle strike on the Eton range prior to and post installation of exclusion fencing. This shows that the fencing is working however reason for the two post records may be due to gate operational error. Consideration of extension and / or diversion wings on the outer limits of the exclusion fencing is also recommended to encourage fauna traversing the fence to be redirected back into the bushland rather than around and onto the road. Permanent improved gate fixtures constructed with a concrete base should also be considered to prevent animals crawling underneath.

A significant increase of macropod and other fauna species scats, both within the inner area and leading to the culverts, was recorded. This information suggests that culvert interaction and entries has improved from the previous season. However, the statistical analysis did not encase enough data to provide significant deviations. Further monitoring, and / or extended monitoring periods during future assessments, would allow for comparisons to be better analysed and result in greater accuracy of interpretation. Additionally, any future monitoring is suggested to be conducted between September and October to reduce likelihood of weather impacts and capture Koala breeding season movements.

Prior to the 2021 season monitoring, TMR had engaged a contractor to remove and mulch five metres of vegetation on the outer perimeter fences. It was evident that a number of sections observed in the previous monitoring were inaccessible to fauna due to vegetation thickness. Also, trees that were either overhanging or in contact with the fence would have allowed fauna to climb and cross over the fence. This allowed for improved access and encouraged funnelling towards to culverts. This resulted in an increase in fauna records on the Sand Plots and Camera Traps along the fence lines. The addition of infill rock (**Appendix B** Site photos example) leading up to the fauna Culvert 1 (Plot 2) on the outer eastbound carriageway has shown improved fauna interaction and promoted fauna entry and crossing for that culvert. This was particularly evident with macropod species. Allowing fauna to easily traverse the rock scour systems will overtime increase confidence in funnelling and entering the culverts. Revegetation and management of weeds on the westbound route on the outside aprons to provide overhead ground cover and protection for terrestrial species will also support and encouraging funnelling.

It was evident that mammal movements captured on camera were higher during the night in comparison to daytime records, this is typical nocturnal behaviour. Fauna did not appear to be impacted by the operations of the cameras and feral cat activity was only recorded during the night. Periods of rain appeared to reduce the capture records on both cameras and sand plots.

Overall, the fauna crossings have shown to be beneficial to a variety of animals and localised fatalities on the ERRP are likely to decrease as learned behaviours and other factors (such as increased scent) draw animals through. The purpose-built square design fauna crossings were more successful than the drainage round pipe culverts with a greater number of fauna interactions and complete pass throughs. Koalas have shown promising signs (such as funnelling) that they will use the culverts, and this is likely to increase. The Mackay Whitsunday District Koala Protection Plan (DTMR 2015), section 5.7.1 notes that evidence of Koala use of 1800mm pipe culverts have been record at locations on the Peak Downs Highway. This shows that Koalas are willing to travel though these culverts where available, however they have a tendency to go over land as opposed to under and appear to attempt crossing the fence at weak points or take advantage of low hanging vegetation. Improvements to the fence integrity will see further improvements of fauna crossing.

4.2 RECOMMENDATIONS

A summary of recommendation is detailed below:

- Continue to use multi trapping methods such as Sand Plots and Camera Traps in conjunction for future monitoring.
- Continued vegetation management on the outer fence boundaries to provide encouraged funnelling and access.
- Implement a Feral Cat removal program, this could involve trapping, baiting, and or shooting.
- Installation of permanent improved gate fixtures, constructed with a concrete base to prevent fauna crawling underneath.
- Extension and / or addition of winged aprons on the extremities of the fence to redirect fauna away from the highway.
- Revegetation and management of weeds on the westbound route on the outside aprons to provide overhead ground cover and protection for terrestrial species, encouraging funnelling.
- Further monitoring is recommended to better understand the nature of the fauna movement and where to improve measures to encourage Koala passage for the ERRP and other projects.
- Any future monitoring is suggested to be conducted between September and October to reduce likelihood of weather impacts and capture Koala breeding season movements.

5 REFERENCES

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6 LIMITATION

6.1 STATEMENT OF LIMITATIONS

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The findings and conclusions contained within this report are made following a review of certain information, reports, correspondence and data noted by methods described in this report including information supplied by TMR and third parties. Kleinfelder does not provide guarantees or assurances regarding the accuracy, completeness and validity of information and data obtained from these sources and accepts no responsibility for errors or omissions arising from relying on data or conclusions obtained from these sources. The conclusions and opinions presented in this report are relevant to the conditions of the site and the state of legislation currently enacted as at the date of this report.

Kleinfelder has used a professional standard of skill and care ordinarily exercised by reputable members of the same profession practicing in the same or similar locality.

Any representation, statement, opinion or advice expressed or implied in this report is made in good faith on the basis that Kleinfelder, its agents and employees are not liable to any other person or party taking or not taking (as the case may be) action in respect of any representation, statement, opinion or advice referred to above or warrants that the conclusions in this report will be applicable in the future as there may be changes in the condition of the site, applicable legislation or other factors that would affect the conclusions contained in this report.

6.2 PROJECT LIMITATIONS

- Inclement weather and significant early season rainfall in 2021 had impacted the Sand Plots and reduced the quality of the survey results.
- Sand plot 1 was impacted by recreational motorcyclists on one occasion in 2021.
- The theft of Camera 1 on week 2 of 4 also reduced the potential data collected. Camera 10 was relocated to replace Camera 1 as it was not capturing many fauna movements in its original position.
- Fauna travelling along the fence line towards the culverts were not considered as successful funnels as it could not be determined if they were funnelled or directed into bushland.
- A single Sand Plot positioned on only one end of the culvert restricted capacity to understand true fauna movements as some fauna habitually avoid unfamiliar surface and / or hop over plots. This may have reduced the capacity to know if fauna had actually passed through or turned around within the culverts.

APPENDIX A FAUNA RECORDS 2020 2021

Sand Plot Trap Culvert Interactions Summary 2020

Plot #	Date	Species	Species	Count	Direction
2	25.11.20	*Mammalia spp*	Mammal species	1	Successful funnel into culvert
2	25.11.20	*Wallabia bicolor*	Swamp Wallaby	1	Successful pass-through culvert and return
2	2.12.20	*Mammalia spp*	Mammal species	2	Successful funnel into culvert
2	7.12.20	*Chordata spp*	Vertebrate species	1	Successful funnel into culvert
2	7.12.20	*Mammalia spp*	Mammal species	1	Successful funnel into culvert
2	7.12.20	*Mammalia spp*	Mammal species	1	Successful funnel into culvert
3	7.12.20	*Macropus spp*	Macropod species	1	Successful funnel into culvert
3	7.12.20	*Varanidae spp*	Monitor Lizard species	1	Successful funnel into culvert
3	9.12.20	*Mammalia spp*	Mammal species	1	Successful funnel into culvert
6	2.12.20	*Macropus spp*	Macropod species	2	Successful funnel into culvert
6	9.12.20	*Macropus giganteus*	Eastern Grey Kangaroo	1	Successful funnel into culvert
6	9.12.20	*Muridae spp*	Rodent species	2	Successful pass-through culvert and return
6	9.12.20	*Muridae spp*	Rodent species	1	Successful pass-through culvert and return

Sand Plot Culvert Interactions Summary 2021

Plot #	Date	Species	Common Name	Count	Comment
6	4.10.21	*Macropus giganteus*	Eastern Grey Kangaroo	1	Successful funnel into culvert
2	8.10.21	*Felis catus*	Feral Cat	1	Successful crossing, complete pass-through
6	8.10.21	*Aepyprymnus rufescens*	Rufous Bettong	2	Successful pass-through culvert and return
7	8.10.21	*Macropus agilis*	Agile Wallaby	1	Successful crossing, complete pass-through
2	11.10.21	*Hydromys chrysogaster*	Water Rat	1	Successful pass-through culvert and return
6	11.10.21	*Aepyprymnus rufescens*	Rufous Bettong	1	Successful pass-through culvert and return
6	11.10.21	*Rattus sp.*	Rat	1	Successful pass-through culvert and return

Plot #	Date	Species	Common Name	Count	Comment
7	11.10.21	*Intellagama lesueurii*	Eastern Water Dragon	1	Living inside Koala Garden
6	13.10.21	*Felis catus*	Feral Cat	1	Successful crossing, complete pass-through
2	13.10.21	*Intellagama lesueurii*	Eastern Water Dragon	2	Living inside koala garden
2	18.10.21	*Felis catus*	Feral Cat	1	Successful crossing, complete pass-through
6,3	18.10.21	*Wallabia bicolour*	Swamp Wallaby	1	Successful crossing, complete pass-through
3	18.10.21	*Macropus giganteus*	Eastern Grey Kangaroo	1	Successful funnel into culvert
6	18.10.21	*Intellagama lesueurii*	Eastern Water Dragon	1	Living inside koala garden
6	20.10.21	*Wallabia bicolour*	Swamp Wallaby	1	Successful funnel into culvert
7	20.10.21	*Macropus agilis*	Agile Wallaby	1	Successful funnel into culvert
6	22.10.21	*Wallabia bicolour*	Swamp Wallaby	1	Successful funnel into culvert
2	25.10.21	*Hydromys chrysogaster*	Water Rat	1	Successful pass-through culvert and return
6	25.10.21	*Macropus agilis*	Agile Wallaby	1	Successful funnel into culvert
7	25.10.21	*Diporiphora australis*	Tommy Roundhead	1	Successful funnel into culvert
2	27.10.21	*Wallabia bicolour*	Swamp Wallaby	1	Successful funnel into culvert
7	27.10.21	*Felis catus*	Feral Cat	1	Successful crossing, complete pass-through
			Total	**20**	

Camera Trap Culvert Interactions 2020

Camera	Date	Species	Common Name		Direction
2	20.11.20	*Rattus fuscipes*	Bush Rat	07:47pm	Successful funnel into culvert
2	23.11.20	*Wallabia bicolor*	Swamp Wallaby	08:27pm	Successful funnel into culvert
2	23.11.20	*Wallabia bicolor*	Swamp Wallaby	08:27pm	Successful funnel into culvert
2	23.11.20	*Wallabia bicolor*	Swamp Wallaby	08:47pm	Successful funnel into culvert
2	23.11.20	*Wallabia bicolor*	Swamp Wallaby	09:03pm	Successful funnel into culvert

Camera	Date	Species	Common Name		Direction
2	23.11.20	*Wallabia bicolor*	Swamp Wallaby	09:35pm	Successful funnel into culvert
2	23.11.20	*Wallabia bicolor*	Swamp Wallaby	10:09pm	Successful funnel into culvert
2	24.11.20	*Wallabia bicolor*	Swamp Wallaby	12:01am	Successful funnel into culvert
3	19.11.20	*Chlamydosaurus kingii*	Frill-necked Lizard	07:17am	Successful funnel into culvert
3	28.11.20	*Chlamydosaurus kingii*	Frill-necked Lizard	07:18am	Successful funnel into culvert
3	29.11.20	*Chlamydosaurus kingii*	Frill-necked Lizard	07:19am	Successful funnel into culvert
3	29.11.20	*Chlamydosaurus kingii*	Frill-necked Lizard	07:20am	Successful funnel into culvert
6	22.11.20	*Macropus agilis*	Agile Wallaby	01:26am	Successful funnel into culvert
6	22.11.20	*Macropus agilis*	Agile Wallaby	02:19am	Successful funnel into culvert

Camera Culvert Interactions Summary 2021

Camera	Date	*Species*	Common Name	Time	Comment
2	01.10.21	*Macropus agilis*	Agile Wallaby	12:31am	Successful funnel into culvert
2	09.10.21	*Macropus giganteus*	Eastern Grey Kangaroo	7:15am	Successful funnel into culvert
2	17.10.21	*Macropus agilis*	Agile Wallaby	6:30pm	Successful funnel into culvert
2	18.10.21	*Macropus agilis*	Agile Wallaby	8:37pm	Successful funnel into culvert
2	19.10.21	*Macropus agilis*	Agile Wallaby	2:02am	Successful funnel into culvert (return)
3	29.09.21	*Intellagama lesueurii*	Eastern Water Dragon	2:38pm	Living inside Koala Garden
6	04.10.21	*Isoodon macrourus*	Northern Brown Bandicoot	7:12pm	Successful pass-through culvert and return
7	02.10.21	*Intellagama lesueurii*	Eastern Water Dragon	9:52am	Living inside Koala garden

Photos:

Photo 1: Plot 6

Photo 2: Plot 3

Photo 3: Plot 1

Photo 4: Plot 8

Photo 5: Modified Gate

Photo 6: Modified Gate

Photo 7: Brush Cut Access

Photo 8: Cleared Fence Line Vegetation

Photo 9: Cat Tracks

Photo 10: Cat Tracks

Photo 11: Eastern Grey Kangaroo

Photo 12: Swamp Wallaby

Photo 13: Water Rat

Photo 14: Eastern Water Dragon

Photo 15: Agile Wallaby

Photo 16: Koala

Photo 17: Camera 5 – Agile Wallaby

Photo 18: Camera 1 – Swamp Wallaby

Photo 19: Camera 5 - Koala

Photo 20: Camera 5 – Agile Wallaby

Photo 21: Camera 6 – Pheasant Coucal

Photo 22: Camera 5 – Cat

Photo 23: Camera 5 – Bush Stone-curlew

Photo 24: Cat – Using Culvert 3

Photo 25: Camera 5 – Frill Necked Lizard

Photo 26: Camera 5 – Lace Monitor

Photo 27: Camera 8 – Cat

Photo 28: Agile Wallaby Successful Funnel

Photo 29: Camera 5 – Koala 23.10.2021

Photo 30: Camera 6 – Bandicoot Successful Funnel

Photo 31: Camera 9 – Blue-winged Kookaburra

Photo 32: Camera 9 – Crow

Photo 33: Rain Effected Plot

Photo 34: Koala Scat – Plot 5

Photo 35: Macropod Scat

Photo 36: Fauna Furniture in Box Culvert

APPENDIX C STATISTICAL DATA

Statistical data

Camera Trap /Sand Plot	20-1	20-4	20-5	20-8	20-2	20-3	20-6	20-7	Total 2020	21-1	21-4	21-5	21-8	21-2	21-3	21-6	21-7	Total 2021
Location	**F**	**F**	**F**	**F**	**CO**	**CI**	**CI**	**CI**		**F**	**F**	**F**	**F**	**CO**	**CI**	**CI**	**CI**	
Koala	4	-	2	-	1	-	-	-	**7**	-	-	2	-	-	-	-	-	**2**
Common Brushtail Possum	-	-	-	-	1	-	-	-	**1**	-	-	-	-	-	-	-	-	**0**
Northern Brown Bandicoot	2	1	10	6	-	-	-	-	**19**	1	-	-	-	-	-	3	-	**4**
Agile Wallaby	3	1	14	11	-	-	4	-	**33**	2	4	4	4	5	-	1	-	**20**
Swamp Wallaby	-	2	-	-	6	1	-	-	**9**	2	2	1	-	1	1	4	-	**11**
Eastern Grey Kangaroo	-	1	15	3	-	-	-	-	**19**	-	1	1	-	1	1	1	-	**5**
Rufous Bettong	-	-	-	-	-	-	-	-	**0**	-	-	-	-	-	-	4	-	**4**
Bush Rat	-	-	-	-	1	-	-	-	**1**	-	-	1	-	-	-	1	1	**3**
Water Rat	-	-	-	-	-	-	-	-	**0**	-	-	-	-	2	-	-	-	**2**
Muridae sp.	1	1	3	-	2	3	-	7	**17**	-	-	-	-	-	-	-	-	**0**
Common Dunnart	-	-	-	-	-	-	-	-	**0**	-	-	1	-	-	-	-	-	**1**
Feral Cat	-	-	-	-	-	-	-	-	**0**	1	-	1	1	2	-	2	1	**8**
Frilled-neck Lizard	-	1	1	-	1	3	-	-	**6**	-	-	1	-	-	-	-	-	**1**
Agamidae sp.	-	-	-	-	-	1	-	-	**1**	-	-	-	-	-	-	-	-	**0**
Elapidae sp.	-	-	1	-	-	-	-	-	**1**	-	-	-	-	-	-	-	-	**0**
Lace monitor	-	-	1	-	-	1	-	1	**3**	1	-	1	-	-	-	-	-	**2**
Eastern Water Dragon	-	-	-	-	-	-	-	-	**0**	-	-	-	-	2	5	2	1	**10**

Camera Trap /Sand Plot	20-1	20-4	20-5	20-8	20-2	20-3	20-6	20-7	Total 2020	21-1	21-4	21-5	21-8	21-2	21-3	21-6	21-7	Total 2021
Squamata sp.	-	-	1	-	-	-	1	-	**2**	-	-	-	-	-	-	-	-	**0**
Species Richness	**4**	**6**	**9**	**3**	**6**	**5**	**2**	**2**	**13**	**5**	**3**	**9**	**2**	**6**	**3**	**8**	**3**	**13**
Abundance	**10**	**7**	**48**	**20**	**12**	**9**	**5**	**8**	**119**	**7**	**7**	**13**	**5**	**13**	**7**	**18**	**3**	**73**

Note: 20 = 2020, 21 = 2021, F = Fence, CO = Culvert Outer and CI = Culvert Inner, Yellow Highlight = Fence but not Culvert Inner, Green Highlight = Culvert Inner but not Fence

APPENDIX D STAFF CONTRIBUTIONS

The following staff were involved in the compilation of this report.

Name	Qualification	Title	Contribution
Nick Malmstedt	B.AppSc	Senior Ecologist	Desktop Assessment, Field Surveys, Report Author
Charlie Taylor	BSc	Ecologist	Field Surveys, Data Compilation
Kevin Wormington	PhD B.AppSc	Senior Ecologist	Statistical Analysis
Gayle Joyce	BSc Forestry (Hons 1)	GIS Specialist	GIS Mapping
Dallas Milburn	B.AppSc	Principal Ecologist	Technical Review

APPENDIX E LICENSING

Kleinfelder employees involved in the current study are licensed or approved under the Department of Environment and Science Scientific Purposes Permit WA0024582, Rehabilitation Permit WA0031685, and Department of Agriculture and Fisheries Animal Ethics Committee Reference CA2019/06/1290 to undertake fauna surveys.