

## **Appendix I Koala Technical Memorandum**

# Memorandum

Date: 24 November 2021

Subject: Kumbarilla Renewable Energy Park – Koala Habitat Assessment Tool

## 1 Introduction

CDM Smith Australia Pty Ltd (CDM Smith) has partnered with Fox & Co. Environmental Pty Ltd (Fox & Co), the specialist Koala Detection Team (KDT) from the University of the Sunshine Coast (USC), and Arcadian Ecology Pty Ltd (Arcadian Ecology) to undertake Koala surveys on the site of the proposed Kumbarilla Renewably Energy Park (K-REP) (herein referred to as the Project). The Project is situated on Lot 4DY457, which is located at the end of Forest Road, Kumbarilla, Queensland. Each specialist partner has provided information on Koala (*Phascolarctos cinereus*) presence and habitat quality on the Project site.

### 1.1 Purpose

The purpose of this memorandum is to synthesise the results of these and prepare a standalone habitat assessment using the Koala Habitat Assessment Tool (KHAT) in accordance with the 'EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)' (Commonwealth of Australia, 2014) (herein referred to as the Koala Referral Guidelines).

In summary:

- The KDT provided a stand-alone report (Koala survey using detection dogs, Dalby Solar Farm, University of the Sunshine Coast, 2021 (KDT, 2021)) outlining the results of a field assessment which included mapping of presence/absence and the survey coverage area (Refer to **Appendix A**).
- Fox & Co. prepared an assessment of Koala habitat using the KHAT in accordance with the Koala Referral Guidelines.
- Arcadian Ecology later prepared an assessment of the Koala habitat using the KHAT following a more detailed BioCondition Assessment and associated Habitat Quality Assessment of the Project site in 24-27 May 2021.

## 2 Survey Findings

### 2.1 Preliminary Survey

Fox and Co. undertook a preliminary ecology survey of the Project over a 3-day / 2-night period between 6-8 May 2020. This survey identified potential Koala habitat and a Koala skull.

## 2.2 Koala Detection Team Survey

A subsequent survey was undertaken between 18-22 January 2021. This included a targeted Koala habitat survey. Fox & Co. partnered with the specialist KDT to assist with Koala surveys for the Project site. The detection dog covered an 18.9 km section during the survey (refer to Figure 4 in attached KDT report, **Appendix A**). Evidence of Koala presence was found only twice during the surveys:

- Scats age 4 (months old), of similar size and shape (likely from the same Koala) (refer Figure 5 in attached KDT report, **Appendix A**),
- Koala skull (refer Figure 6 in attached KDT report, **Appendix A**) (same skull identified in May 2020 by Fox and Co)

The results imply Koalas have been present on Lot 4 on DY457 several months prior to the survey. The same vegetation community (Regional Ecosystem (RE) 11.5.1) where the skull and scats were located is the predominant vegetation type on the property, including within the project footprint. The low density of Koala scats suggests low density of Koalas which could be attributed to several factors including:

- Natural low-density populations (however near Dalby (40 km away) they are not expected to be at the lowest densities on the Koala densities scale (KDT, 2021));
- Climate, especially heatwave / drought – the trees in some of the surveyed area did show sign of heat stress or were dead (KDT, 2021);
- Koala disease – there could have been an outbreak of chlamydia or Koala retrovirus, but without seeing Koalas and assessing their health it is impossible to confirm this as a potential cause (KDT, 2021); and
- Predation – during the survey a dingo was observed. Numerous wallaby bones are also scattered throughout the site, suggesting wild dogs are a significant threat to terrestrial fauna populations in the area.

## 2.3 BioCondition and Habitat Assessment Survey

A BioCondition and Habitat Assessment Survey ecological survey was undertaken between 24-27 May 2021 within the Project Area. The survey was conducted by Bruce McLennan (Principal Botanical Ecologist) and Ben Nottidge (Principal Fauna Ecologist). This was undertaken to ground-truth desktop information and identify any additional flora and fauna values.

A total of 10 BioCondition sites were recorded along with corresponding fauna habitat species including the Koala. Koala habitat was confirmed at all surveyed sites. Within the Project area the presence of the Koala was recorded on a number of occasions within BioCondition survey sites and within the wider area. Recordings included scats, scratches, and a Koala skull (additional to the Koala skull previously found), as per Figure 1.

The potential Koala habitat contributes to remnant linkages through existing remnant blocks including areas of state forest. Lot 4 DY457 is partially in a State-wide biodiversity corridor buffer area for terrestrial corridors; however, the Project disturbance footprint is outside this corridor buffer area. The corridor buffer area in vicinity to the Project area generally moves in a north-south direction. The lots surrounding the Project are generally undeveloped with the exception of some gas development infrastructure and roads. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project, and the impact at a regional and local scale is expected to be minor.

The eastern section of the access road corridor, although largely running through cleared pasture country, does provide a usable fauna corridor from Daandine State Forrest (on the eastern side of Kumbarilla Road) to the west.



**Legend**

- PV Power Station
- Access Corridor
- Waterway
- Property boundary
- Fauna habitat assessment site
- Known koala habitat

**Evidence of koala**

- Scats
- Scats and scratches
- Skull

R	Details	Date	©COPYRIGHT CDM SMITH This drawing is confidential and shall only be used for the purpose of this project.			
2	Final	18/11/21	DESIGNED	DB	CHECKED	SM
-	-	-	DRAWN	DB	CHECKED	SM
-	-	-	APPROVED	SM	DATE	18/11/21
Notes:						

Scale @ A3 - 1:20,000 GCS GDA 2020 MGA Zone 56						

**DISCLAIMER**  
 CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

**DATA SOURCE**  
 QLD Government Open Source Data  
 CDM Smith Modelling Data

**DESIGNER**

**CLIENT**

**FIGURE 1**

**Known Habitat for the Koala**  
*(Phascolarctos cinereus)*

DRG Ref: FIG 7-6 Koala Habitat

### 3 Koala Habitat Assessment Tool

The KHAT (Table 3-1) is used to determine the sensitivity, value, and quality of the lands potentially impacted under development proposals. The assessment tool is used to determine whether the lands may be considered ‘critical to the survival of the Koala’ and from a national recovery perspective, habitat that is considered to be important for the long-term survival and recovery of the species (Koala Referral Guidelines).

Table 3-1 provides the KHAT results in accordance with the Koala referral guidelines.

**Table 3-1 Koala Habitat Assessment Tool**

Attribute	Score	Inland	Assessment
Koala occurrence	+2 (high)	Evidence of one or more Koalas within the last 5 years.	<b>2</b> Two Koala skulls were found in the impact area. Koala scats also found within the impact site.
	+1 (medium)	Evidence of one or more Koalas within 2 km of the edge of the impact area within the last 10 years.	-
	0 (low)	None of the above.	-
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known Koala food tree species, <b>OR</b> 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	<b>2</b> Vegetation contains <i>Eucalyptus crebra</i> , <i>Eucalyptus exserta</i> , <i>Eucalyptus populnea</i>
	+1 (medium)	Has forest, woodland or shrubland with only 1 species of known Koala food tree present.	-
	0 (low)	None of the above.	-
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape $\geq 1000$ ha.	<b>2</b> Adjacent State Forests (FTY475 and 201FTY1243 (>1.000ha). All sites part of a larger contiguous block of remnant vegetation >1000 h
	+1 (medium)	Area is part of a contiguous landscape < 1000 ha, but $\geq 500$ ha.	-
	0 (low)	None of the above.	-
Key existing threats	+2 (high)	Little or no evidence of Koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for Koala occurrence. Areas which score 0 for Koala occurrence and have no dog or vehicle threat present.	<b>2</b> A juvenile Koala skull found; however, there is little to no evidence of dog/vehicle threat. A dingo was observed during the KDT survey; however, this is not directly linked to the Koala skull found.

	+1 (medium)	Evidence of infrequent or irregular Koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for Koala occurrence, <b>OR</b> Areas which score 0 for Koala occurrence and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular Koala mortality from vehicle strike or dog attack in the study area at present, <b>OR</b> Areas which score 0 for Koala occurrence and have a significant dog or vehicle threat present.	-
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 (Koala Referral Guidelines, 2014).	<b>2</b> The area is used by Koala periodically, conservatively the habitat is considered to be important for achieving interim recovery objectives.
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 (Koala Referral Guidelines, 2014)	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 (Koala Referral Guidelines, 2014)	

## TOTAL SCORE = 10

Assessment of the Project site proposed to be cleared scored ten (10) on the KHAT. Impact areas that score five or more using the habitat assessment tool for the Koala contain habitat critical to the survival of the Koala. Impact areas that score four or less using the KHAT do not contain habitat critical to the survival of the Koala.

Please refer to the Appendix B, which contains a flow chart (Figure 2) from the Koala Referral Guidelines (2014). This flow-chart helps to determine whether the habitat loss associated with the action is likely to adversely affect habitat critical to the survival of the Koala and so require referral to the Department of Agriculture, Water and Environment (DAWE). As per the flow chart, as the Project will clear  $\geq 20$  ha of habitat containing known Koala food trees in an area with a habitat score of  $\geq 8$ , a referral is recommended. The flow chart refers the proponent to Section 8 of the Koala Referral Guidelines (2014) to consider other impacts.

## 4 Impact Mitigation

As per Section 8 of the Koala Referral Guidelines (2014), as the activity scored  $\geq 5$  using the KHAT, the habitat is considered critical to the survival of the Koala, and therefore mitigation of impacts have been considered.

On review of Table 5-9 of the Koala Referral Guidelines (2014) the following mitigation measures are proposed:

- Dog attack mitigation measures (Table 5 of the Koala Referral Guidelines (2014)):
  - The action is not likely to lead to an increase in dog attacks
  - No domestic pets will be allowed on site
- Vehicle strike mitigation measures (Table 6 of the Koala Referral Guidelines (2014)):
  - Koala proof fencing will be established along the solar farm area and will:
    - Be a minimum 1.8m high,
    - Be 3m from any retained trees or plantings and be clear of all overhanging branches,
    - Have a minimum 50cm wide scratch panelling installed along the length of the fence,
  - A fully-funded agreement will be put in place with a relevant organisation or authority for the maintenance and monitoring of the fencing in perpetuity,
  - Inclusion of escape mechanisms i.e. climbing poles along road corridor will be implemented
  - A 60 km/h speed limit on the access corridor at dawn and dusk with appropriate signage (see Plate 1) recommendation will be put forward to Council. As part of site inductions, staff will be reminded to adhere to this recommendation to not exceed 60 km/h.
  - Road signage to be used to alert drivers of potential Koala movement across the road (refer to Plate 1 as an example).
  - Guidelines will be added to the Project Operation and Maintenance Plan outlining procedures on recording sick, injured or dead Koalas located in the Project area, and reporting to DES on 1300 ANIMAL (1300 264 625).
- Introduction and spread of pathogens (Table 7 of the Koala Referral Guidelines (2014)):
  - Fauna spotter/catchers aware of appropriate quarantine and biosecurity procedures for koalas found to be affected by disease
  - Biosecurity procedures will be added to the Construction Environmental Management Plan and Operation and Maintenance Plan for all persons and vehicles entering the site that may carry vegetation pathogens known to affect koala food trees. These procedures will be enforced
  - Visual monitoring of adjacent habitat by site personnel to record and notify DES of any koalas and potential disease occurrence
- Barriers to dispersal and fragmentation (Table 8 of the Koala Referral Guidelines (2014)):
  - Koala food trees will be retained where possible along clearing boundaries
  - Vegetation clearing limits clearly marked to ensure no unnecessary clearing outside disturbance footprint (whereby minimising impacts to fauna habitat and movement around the site)
  - Fauna egress infrastructure installed along fencing to prevent entrapment. Fauna ramps and climbing poles shall be provided at regular intervals around the internal Project area boundary to allow fauna to exit the facility should they become trapped.

- Degradation of habitat critical to the survival of the Koala through hydrological change (Table 9 of the Koala Referral Guidelines (2014)):
  - A hydrology assessment has been undertaken which found there was no adverse impact as a result of the Project. The action is not likely to lead to a hydrological change (refer to the report which is appended to the referral documentation).



**Plate 1 Wildlife Zone Signage Examples**

## 5 Conclusion

The Project footprint is approximately 213 ha. Assessment of the Project site proposed to be cleared scored ten (10) on the KHAT. Under the referral guidelines for Koala (DotE 2014) it is recommended that a project be referred where it is proposed to clear to 'clear  $\geq 20$  ha of habitat containing known Koala food trees in an area with a habitat score  $\geq 8$ . The Project area will impact up to 207.6 ha of habitat containing known Koala food trees. It is considered that a referral to DAWE is required, and that a controlled action decision that confirms the Project is a controlled action, will likely include requirements (amongst other controlling provisions) to reduce or offset the impacts to koalas and their habitat by the clearing required for the Project.

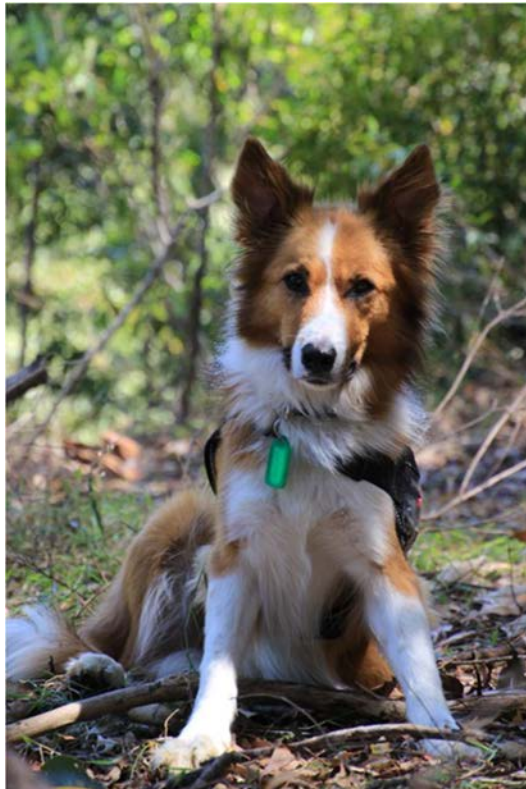


# Appendix A Koala Detection Team – Survey Findings



## **Koala survey using detection dogs**

### **Dalby Solar Farm**



**Prepared for Fox and Co Environmental**

**By Detection Dogs for Conservation, University of the Sunshine Coast**

**Dr Romane Cristescu, Russell Miller**

**February 2021**

---

## Disclaimer

*This report was prepared in accordance with the scope of work agreed with Fox and Co Environmental and is subject to the specific time, cost and other constraints as defined by the scope of work.*

*To prepare this report, USC relied on information supplied by the Client, and does not accept responsibility for the accuracy or completeness of this information. USC also relied on information gathered at particular times and under particular conditions, and does not accept responsibility for any changes or variances to this information which may have subsequently occurred. Accordingly, the authors of the report provide no guarantee, warranty or representation in respect to the accuracy, adequacy or completeness of the information, whether generally or for use or reliance in specific circumstances. To the extent permitted by law, the authors exclude any liability, including any liability for negligence, for any loss, damage, injury, illness howsoever caused, including (with limitation) by the use of, or reliance upon, the information, and whether arising from errors or omissions or otherwise.*

*This report is subject to copyright protection and the copyright owner reserves its rights.*

## 1- Introduction

### 1.1 Scope of works

The University of Sunshine Coast, Detection Dogs for Conservation (DDC) team was contracted by Fox and Co Environmental Pty Ltd to conduct koala surveys using detection dogs on a proposed solar farm development site at Lot 4 DY457 (the Project). The aim was to conduct casual surveys within the Project area to determine and map whether there are signs of koala presence, i.e. koala scats.

### 1.2 Project Area

The Project Area comprised privately owned land located south of Dalby

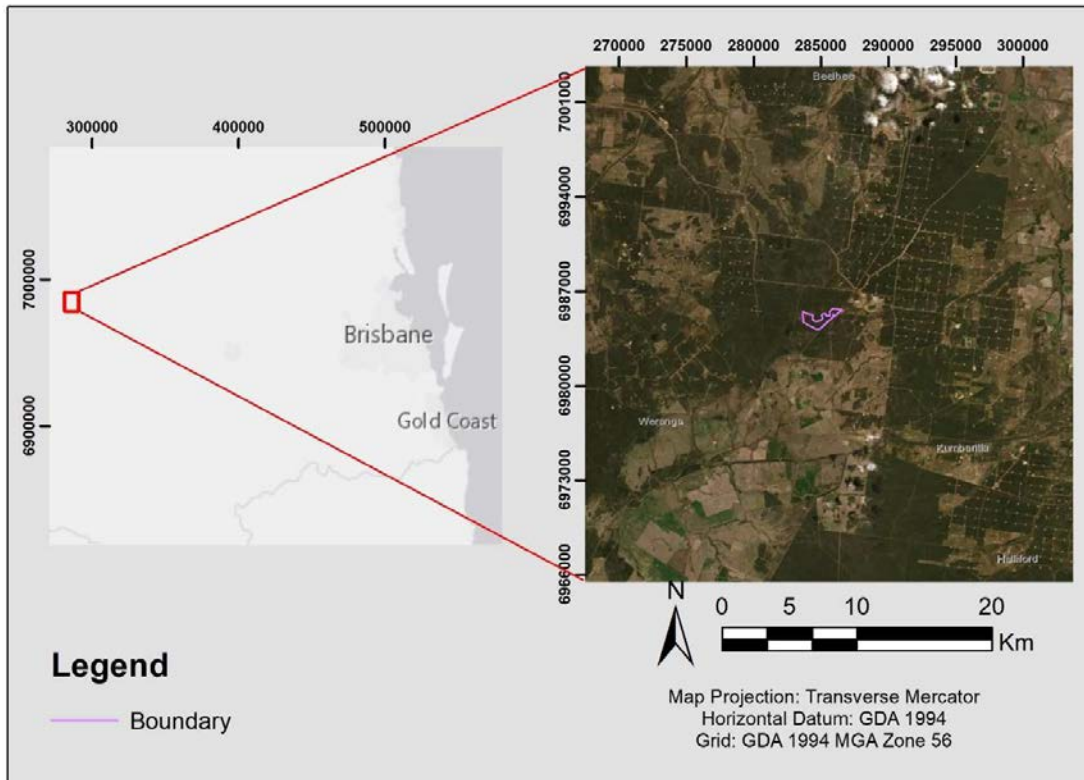


Figure 1 Location plan of the Project Area

## 2- Methodology

### 2.1 Detection dogs and casual surveys

Detection dogs are a powerful method to study koala presence / absence, having been showed to be more accurate and efficient than human surveys to locate koala scats (Cristescu et al. 2015). This

methodology can lead to more robust data, and therefore more supported management decisions, for koala (Cristescu et al. 2019). Detection dog surveys were conducted within the Project area on 19 and 20 January 2021 using the koala scat detection dog Baxter. Baxter has been tested for accuracy and has conducted more than 1,322 koala scat surveys in his deployment thus far.

Upon arrival at the survey sites, ecological characteristics that might influence the detectability and decay of scats were recorded (e.g. wet areas and fire will increase decay rates; therefore, scats will be detectable for a shorter amount of time (Cristescu et al. 2012)).

The casual survey technique was used for this Project. Casual surveys are the fastest way to determine whether koalas are present at a specific site. In a casual survey, the dog is not constrained by the handler, and can freely follow its nose. Handlers focused their searches in areas with tree cover to maximise targeting potential koala habitat.

The detection dog was fitted with a GPS collar to record the survey tracks and therefore record the search area. If a scat was found, age and size were recorded, and a GPS position taken. Age of koala scats is defined as per Table 1.

Table 1 Guide used to age koala scats in the field

Scat age categories	Age	Characteristics
1	One day old or less	Very fresh (covered in mucus, wet)
2	Couple of days old	Fresh (shine and smell)
3	Couple of weeks	Medium fresh (shine or smelly when broken)
4	Months old	Old (no shine, no smell)
5	More than a few months	Very old and discoloured

## 2.2 Scat Identification

Typical koala scats (Figure 2, Figure 3) have the following characteristics (Triggs 1996):

- symmetrical and bullet-shaped (not jelly-bean shaped);
- generally about 1.5 cm long by 0.5 cm wide (adult koala scat size);
- even-sized and especially fine particles;
- absence of insect parts (koalas do not eat insects); and
- very compact.



Figure 2 Typical koala scat shape found in the field



Figure 3 Example of different koala scat sizes (width)

### 2.3 Incidental records

The researcher conducting the surveys was on the lookout for opportunistic / incidental spotting of koalas, scats and other signs (skull).

### 2.4 Health and safety

The detection dogs work under strict Animal Ethics approvals (USC: ANA16113, ANA18123, ANS1752) and Queensland Government wildlife permits allowing the DDC to perform surveys using detection dogs and collect scats for genetic analysis (SPP WIF418590017, WISP18590117 and WITK18570117).

### 2.5 Limitations

The survey was limited to the Project area only, except for one survey, adjoining land parcels were not surveyed as part of this Project.

The rate at which scats decay may vary significantly between sites due to varying ground layer structure, composition, moisture, sunlight, local weather events and invertebrate activity. Decomposed scats may lose their unique scent mark and the dog may no longer detect it – however this has not been proven yet.

Failure to detect scats in an area does not necessarily indicate koalas are not using the area. Failure to detect koala scats may suggest either of the following:

- Koalas are not present in the area (i.e. true absence);
- Koalas occur in the area, however, scats were not detected (false negative) because:
  - scats were present at some stage but decayed and disappeared from the environment before the survey was conducted,
  - the dog did not detect the scat; and/or, the dog indicated the presence of a scat, but it was too decayed (fragments only, no scat) to be confirmed.
- Koalas may be present in adjoining land parcels.

### 3 - Results

The detection dog covered an 18.9 km section during the survey (refer to Figure 4). Evidence of koala presence was found only twice during the surveys:

- scats age 4 (months old), of similar size and shape (likely from the same koala) at 285539 / 6985459 (Figure 5),
- koala skull at 285340 / 6984586 (Figure 6).

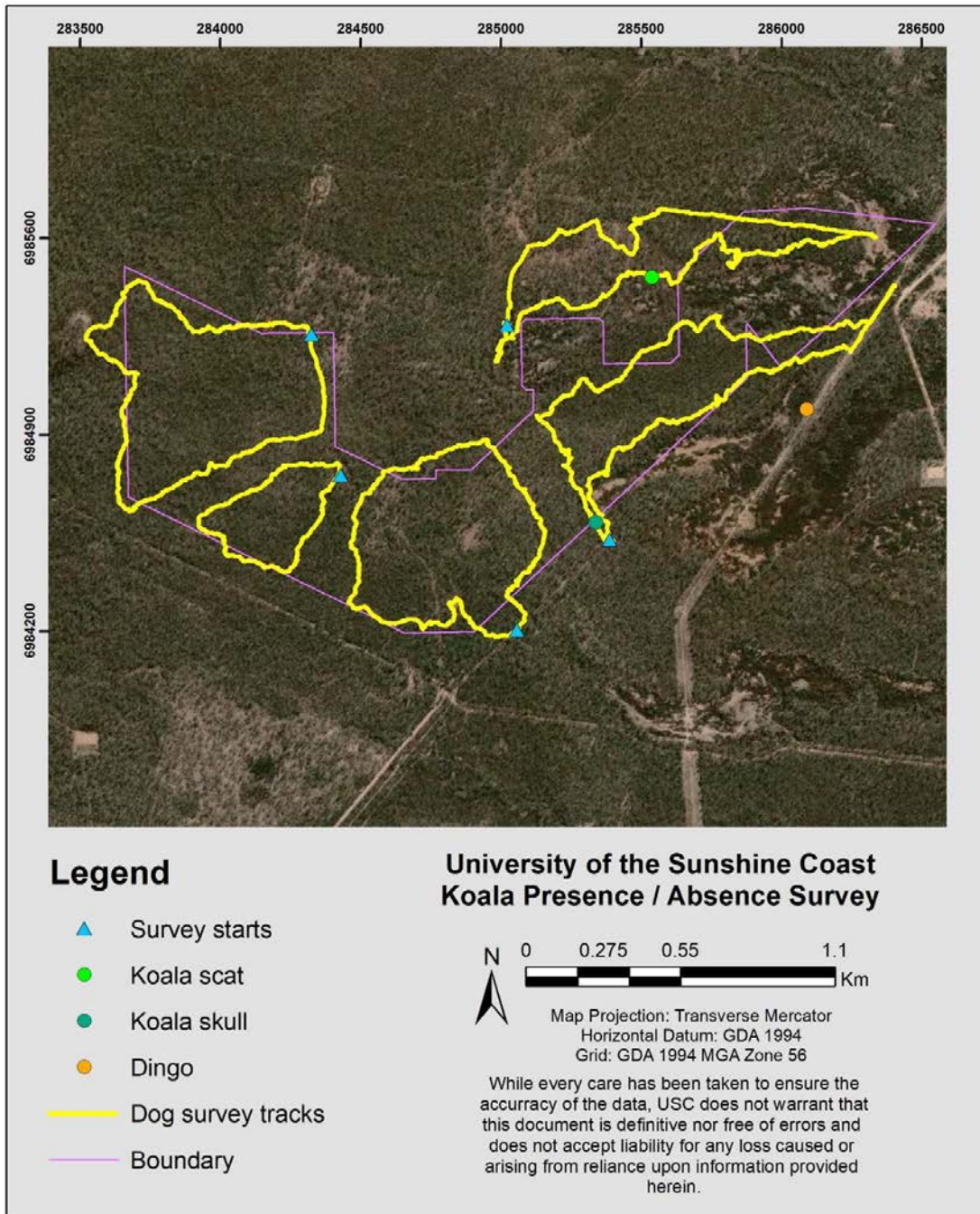


Figure 4 Koala scat survey using detection dogs





Figure 5 Koala scats collected on site



Figure 6 Koala skull found on site

#### 4 - Discussion and Comments

Much of the habitat searched was open at ground level allowing good air flow for the detection dogs to search through (refer, Figure 7). These conditions are suitable for the detection of scats where they are present. However, part of the area surveyed had signs of fires which could increase scat decay and disappearance.

From the low density of koala scats, it is likely that koalas have been in the area surveyed several months prior to the survey. Note that the area was only surveyed on one occasion; therefore, the presence / absence results presented here provide a snapshot of the population during this period and in the recent months only.



Figure 7 Example of the vegetation at the survey area

The exact cause of the low density of koalas in the surveyed area is unknown and cannot be ascertained based on this survey, however one can explore the likelihood of some well documented causes of decline for koala populations elsewhere. Possible causes could include:

- Normal low-density populations – koalas are naturally found at low density in the western parts of their distribution (Sullivan et al. 2004), however near Dalby we would not expect to be at the lowest densities on the koala densities scale [population densities in QLD range from low e.g., 0.01/ha in central Queensland (Melzer and Lamb 1994) to moderate e.g., 1/ha in southeast Queensland (Dique et al. 2004)].
- Climate, especially heatwave / drought – the trees in some of the surveyed area did show sign of heat stress or were dead.
- Koala disease – there could have been an outbreak of chlamydia or koala retrovirus, but without seeing koalas and assessing their health it is impossible to confirm this as a potential cause.
- Predation – during the survey a dingo was observed. This could represent a threat in the area - dog predation can cause koala populations to decline (Beyer et al. 2018).

Further investigation would be needed to confirm the potential cause for the lack of koalas in the Project area. For example, camera traps could be deployed to assess dog activity. It has to be noted though that one dog can be responsible for high mortality and therefore dog predation is not always correlated to dog activity or density (Beyer et al. 2018, Gentle et al. 2019).

## 5 - References

- Beyer, H., L., D. deVilliers, J. Loader, A. Robbins, M. Stigner, N. Forbes, J. Hanger, and M. González-Suárez. 2018. Management of multiple threats achieves meaningful koala conservation outcomes. *Journal of Applied Ecology*.
- Cristescu, R., K. Goethals, P. B. Banks, F. Carrick, and C. Frère. 2012. Persistence and detectability of fecal pellets in different environment and the implication for pellet based census of fauna. *International Journal of Zoology* **2012**, Article ID 631856:doi:10.1155/2012/631856.
- Cristescu, R. H., E. Foley, A. Markula, G. Jackson, D. Jones, and C. Frère. 2015. Accuracy and efficiency of detection dogs: a powerful new tool for koala conservation and management. *Scientific Reports* **5**.
- Cristescu, R. H., R. L. Miller, and C. H. J. A. Z. Frère. 2019. Sniffing out solutions to enhance conservation: How detection dogs can maximise research and management outcomes, through the example of koalas.
- Dique, D. S., H. J. Preece, J. Thompson, and D. de Villiers. 2004. Determining the distribution and abundance of a regional koala population in south-east Queensland for conservation management. *Wildlife Research* **31**:109-117.
- Gentle, M., B. L. Allen, J. Oakey, J. Speed, L. Harriott, J. Loader, A. Robbins, D. de Villiers, and J. Hanger. 2019. Genetic sampling identifies canid predators of koalas (*Phascolarctos cinereus*) in peri-urban areas. *Landscape and Urban Planning* **190**:103591.
- Melzer, A., and D. Lamb. 1994. Low density populations of the koala (*Phascolarctos cinereus*) in Central Queensland. Pages 89-93 *in* Proceedings of the Royal Society of Queensland.
- Sullivan, B. J., G. S. Baxter, A. T. Lisle, L. Pahl, and W. M. Norris. 2004. Low-density Koala (*Phascolarctos cinereus*) populations in the mulgalands of southwest Queensland. IV. Abundance and conservation status. *Wildlife Research* **31**:19 - 29.
- Triggs, B. 1996. Tracks, scats and other traces: A field guide to Australian mammals. Oxford University Press, South Melbourne.

# **Appendix B Assessing Adverse Effects on Habitat Critical to the Survival of the Koala (Koala Referral Guidelines, 2014)**



Figure 2: Assessing adverse effects on habitat critical to the survival of the koala

