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4 December 2018

Rob Ball
Senior Development Manager, Communities
Lendlease
(by email to rob.ball@lendlease.com)

Dear Rob,

RE: Summary of 2018 Koala Monitoring and Site-wide Survey Events_Yarrabilba

As you are aware, we have now concluded Year 1 activities according to the Koala Monitoring Program. Reporting for the five *Koala Capture / Monitoring Events*¹ have been previously submitted to you.

The following information provides a set of summary notes on the other two field components of the Koala Monitoring Program, i.e. the *Koala Monitoring Events* and the *Koala Population Survey Events*.

Please be aware that data summarised herein, will be subject to a more detailed analysis of data which is scheduled for a later stage of the Koala Monitoring Program.

Koala Monitoring Events

The aim of each event was to track collared koalas in order to assess health condition and collect information on tree species usage. Each event was implemented by two biologists, using a Yagi 151MHz antenna and Australis 26K receiver scanner to track Koalas, and binoculars to assess animal condition and ancillary information such as the presence of joeys with their mothers. Notes were made of each observation.

An event was scheduled, and implemented during each month from late October 2017 through until late November 2018. Non-scheduled events were also implemented to investigate low/nil movement data for an individual Koala detected as part of the daily assessment of 12-hourly updates via the web-based LX System². As part of these non-scheduled events, other Koalas were tracked. This work provided a total of 17 tracking events.

¹ Events undertaken October 2017, March 2018, June 2018, August 2018, and October 2018.

² Koala movement data is collected by sensors within the K-tracker (LX Solutions) radio collar and transmitted to a base station in the field via wireless technology. Results are uploaded on a 12-hourly cycle to the web via the 3G network and relayed to a mobile phone / PC where the last position of the collar and movement data can be plotted and reviewed. Results which show low or nil activity could indicate a Koala in poor health, a death, or that the collar has been separated from a Koala.

Attachment A provides summary data for each of the 54 Koala tracking observations.

The results highlight that Koalas were commonly observed within two species of tree, i.e. *Eucalyptus molucanna* (46% of data) or *E. tereticornis* (30% of the data). Koalas were also recorded within *E. crebra* and *Corymbia intermedia*, and from the introduced *Pinus radiata* (13% of the data; pine trees being a legacy of former silviculture operations on the site).

The data also indicates that Koalas were more commonly encountered in trees with a trunk characteristic of >40cm DBH (43% of the data). In contrast, one Koala, Sue-Bob, appeared to be found in smaller trees (<30cm DBH) which is characteristic of the tree size class within the area she frequented the most throughout the year, i.e. eucalypt regrowth.

Koala Population Survey Events

The aim of these field events was to provide a systematic survey across the site in order to collect data on Koala presence and distribution.

Consistent with the Koala Monitoring Plan, particular attention was directed to the full extent of the *Fauna Corridor*, and the seven *EPBCA Offset Areas*. Furthermore, that surveys were to be implemented twice per year, commencing in February/March and six months later in August. The survey timing in August is considered to be important because at that time of the year koala joeys are still dependent, and with their mothers as either back young or pouch young, and are large enough to be detected by observers from the ground using binoculars if necessary³.

To date, two events have been implemented, in March and then in August 2018. The following, provides a summary of the work undertaken as part of each event.

A site inspection was undertaken 18 March 2018, with the survey work implemented throughout the period 19 to 23 March 2018 inclusive. In August 2018, inspection of key survey areas was undertaken on 5 March, with survey work being implemented throughout the period 6 to 9 August 2018 inclusive.

The study team for both events comprised six personnel, being a combination of experienced biologists from Austecology (Lindsay Agnew, Bree Wilson, Heath Agnew and Brian Coulter) and the Koala Ecology Group (Ben Bath, Bill Ellis, and Sean Fitzgibbon).

For each event, a systematic ground survey approach was implemented throughout the designated open space system within the so-called “balance land”, i.e. a combination of *EPBCA Offset Areas*, the *Fauna Corridor*, and *Greenspace Corridors*. North of the power easement, the remaining parts of the *Fauna Corridor* and *EPBCA Offset Areas* were also surveyed.

The on-ground survey protocol provided a systematic and comprehensive search using teams of observers working in unison, to move through habitat, methodically searching all trees within the area for koala presence. Surveyors were spaced approximately 50m apart in order to minimize the potential for double counting from adjacent transects. Observers cross-checked any Koala observation with the relevant team member to confirm that the observation did not represent a double count.

³ The presence of observable young may also assist in estimating the proportion of adult females breeding and to monitor trends in breeding rates over time.

For any Koala observation, the following was undertaken as a minimum: an assessment of the Koala's condition, age and gender; GPS location recorded; and identification of the tree in which the Koala was observed.

There were no site access constraints or weather conditions which were considered to have any material impact to the success of either survey. The survey program provided a total of 14 survey person days in March 2018, and 17 survey person days for the August 2018 event.

The following provides a summary of the results for the March 2018 survey event. Seven adult Koalas were observed during the event, and the following provides a snapshot of each observation:

- 19 March – A female Koala was recorded within riparian habitat designated as *Fauna Corridor* in the south-eastern part of the survey area. The roost tree was a blue gum *Eucalyptus tereticornis*. This Koala appeared in good health.
- 20 March – A male Koala was detected within forested habitat designated as *Greenspace Corridor* within the south-west part of the survey area. The roost tree was a brown bloodwood *Corymbia intermedia*. This Koala appeared in good health.
- 20 March – A female Koala was observed within open forest habitat designated as *EPBCA Offset Area 1* within the north-west part of the survey area. The roost tree was a narrow-leaved ironbark *Eucalyptus crebra*. This Koala (now named Kobe) was captured and fitted with a radio-tracking collar.
- 21 March – A Koala (possibly a male) was located within forested habitat designated as *EPBCA Offset Area 4* within the eastern part of the survey area. The roost tree was a narrow-leaved ironbark *Eucalyptus crebra*. This Koala appeared in good health.
- 21 March – A male Koala was detected within open forest habitat designated as *EPBCA Offset Area 1* within the north-west part of the survey area. The roost tree was a blue gum *Eucalyptus tereticornis*. This male koala (Bomber) was first captured and tagged in May 2017, during a preliminary survey of the site.
- 23 March - A male Koala was recorded within open forest habitat designated as *EPBCA Offset Area 3* within the north-eastern part of the survey area. The roost tree was a spotted gum *Corymbia citriodora*. This Koala appeared in good health.
- 23 March - A Koala (possibly a female) was observed within riparian habitat designated as *EPBCA Offset Area 2* within the northern part of the survey area. The roost tree was a spotted gum *Corymbia citriodora*. This Koala appeared in good health.

At a variety of locations, fresh Koala faecal pellets (<48 hours old) were located, indicating recent Koala presence. Targeted searches within the local environs did not result in the detection of a Koala. These sites were:

- Open forest habitat designated as *Fauna Corridor* within the western part of the site;
- Open forest habitat within the central part of *EPBCA Offset Area 3* - north-eastern part of site;
- Riparian habitat designated as *Fauna Corridor* within the western part of the site;
- Open forest habitat designated as *Greenspace Corridor* within the central part of the site – south of the power easement; and
- Open forest habitat designated as *EPBCA Offset Area 4* within the eastern part of the site - south of the power easement.

During the August 2018 survey event, a total of 11 Koalas were detected. The following provides a summary of those observations:

- 6 August - An adult female Koala was recorded within a small treed patch to the near south of the power easement – eastern part of the site and outside of designated habitat retention areas. The roost tree was a blue gum *Eucalyptus tereticornis*. This Koala appeared in good health.
- 6 August – An adult female Koala was recorded in open forest habitat within the western part of *EPBCA Offset Area 1*. This Koala was the previously tagged Scarlet, and observed with her young on the same branch. She was detected in a gum-topped box *Eucalyptus mollucana*. Scarlet and her back young appeared in good condition.
- 6 August – An adult female Koala was observed within open forest habitat which is part of the *Fauna Corridor* (south of power easement) in the central part of the site. This Koala was the previously collared Kobe. She was detected in a very large blue gum *Eucalyptus tereticornis*. Kobe exhibited a stained rump and was known to have a chlamydial infection and was subsequently captured and taken to the Australia Zoo Wildlife Hospital for treatment.
- 6 August – An adult female Koala was recorded in open forest habitat within the eastern part of *EPBCA Offset Area 1*. This Koala was the previously collared Jean. She was observed in a rusty gum *Angophora leiocarpa* and appeared in good condition.
- 7 August - An adult female Koala was observed within open forest habitat on the western edge of *EPBCA Offset Area 3* within the north-eastern part of the survey area. The roost tree was a white mahogany *Eucalyptus acmenoides*. This Koala appeared in good health.
- 7 August – An adult male Koala was recorded in open forest habitat within the eastern part of *EPBCA Offset Area 1*. This Koala was the previously tagged Bomber. Bomber was observed in a narrow-leaved ironbark *Eucalyptus crebra*. This Koala appeared in good health.
- 8 August – An adult female Koala was observed within riparian open forest habitat which is part of the *Fauna Corridor* (south of power easement) in the central-western part of the site. The Koala was detected in a blue gum *Eucalyptus tereticornis*. This Koala appeared in good health.
- 8 August – An adult female Koala was recorded in riparian habitat designated as *Greenspace Corridor* within the north-west part of the survey area. The Koala was observed in a brown bloodwood *Corymbia intermedia*. This Koala appeared in good health.
- 8 August – A young male Koala was observed in open forest habitat designated as *EPBCA Offset Area 7*, within the far south-eastern part of the site. This Koala was detected in a narrow-leaved ironbark *Eucalyptus crebra*, and appeared in good condition.
- 9 August – An adult female Koala was recorded within the north-eastern part of Wal's block. This Koala was observed in a large blue gum *Eucalyptus tereticornis*. This Koala appeared in good health.
- 9 August – An adult male Koala was recorded within the north-eastern part of Wal's block. This Koala was recorded about 150m west of the above-mentioned female Koala record. This Koala was also observed in a very large blue gum *Eucalyptus tereticornis*, and appeared in good health.

Other notable findings derived from the August 2018 event included the following:

- 7 August - a skull of a sub-adult Koala was recorded within open forest habitat of *EPBCA Offset Area 3* within the north-eastern part of the survey area. No other body parts could be found and it was not possible to determine cause of death.
- 8 August – a skull of an adult Koala was found within the open forest habitat within *EPBCA Offset Area 2*, to the near north of the power easement. No other body parts could be located and it was not possible to posit cause of death.

- At a number of locations, fresh Koala faecal pellets (<48 hours old) were located, indicating recent Koala presence. Targeted searches within the local environs did not result in the detection of a Koala. These sites were:
 - Riparian habitat designated as *Fauna Corridor* within the north-western part of the site - south of the power easement;
 - Open forest habitat designated as *Fauna Corridor* within the central part of the survey area - south of the power easement;
 - Open forest habitat within the southern part of *EPBCA Offset Area 3* - north-eastern part of the survey area;
 - Open forest habitat designated as *EPBCA Offset Area 4* within the central-eastern part of the survey area;
 - Riparian habitat designated as *Fauna Corridor* within the central part of the site - south of the power easement; and
 - Riparian habitat designated as *Fauna Corridor* within the south-eastern part of the site.

Attachment B describes the location of all of the observations described above.

I trust that this information is sufficient for your current purposes.

Yours faithfully,



Lindsay Agnew
Director



Attachment A Summary of Koala Monitoring Event Data –2017 to 2018

Date	Koala	Gender	Tree species	Tree character	Health Appearance	Comments	Identifiers
13-15/10/2017						Capture / Monitoring Event	
23/10/2017	Jean	F	<i>Pinus radiata</i>	> 20cm DBH	No clear view.	Within very top of very tall pine tree, but no clear view.	Orange #F15, right ear. Emily has no ear tags
23/10/2017	Scarlet	F	<i>E. tereticornis</i>	> 40cm DBH	Eyes & rump appear clean.		Royal blue #G14, right ear; metal tag, left ear.
23/10/2017	Sue-Bob	F	<i>E. molucanna</i>	< 20 cm DBH	Eyes & rump appear clean.	Un-named young present.	Orange #F20, right ear.
5/11/2017	Cain	M	<i>E. molucanna</i>	> 40cm DBH		Re-release following return from AZWH.	Royal Blue #58, left ear.
5/11/2017	Sue-Bob	F	<i>E. molucanna</i>	< 20 cm DBH	Eyes & rump appear clean.	Un-named offspring still present.	Orange #F20, right ear.
5/11/2017	Jean	F	<i>E. tereticornis</i>	> 30cm DBH	Eyes & rump appear clean.	Emily, her offspring was present close by in same tree.	Orange #F15, right ear.
5/11/2017	Scarlet	F	<i>E. tereticornis</i>	> 40cm DBH	Eyes & rump appear clean.		Royal blue #G14, right ear; metal tag, left ear.
14/12/2017	Cain	M	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Royal Blue #58, left ear.
14/12/2017	Jean	F	<i>E. tereticornis</i>	> 30cm DBH	Eyes & rump appear clean.	Emily, her offspring was present close by in same tree.	Orange #F15, right ear.
14/12/2017	Scarlet	F	<i>E. molucanna</i>	> 30cm DBH	Eyes & rump appear clean.		Royal blue #G14, right ear; metal tag, left ear.
14/12/2017	Sue-Bob	F	<i>E. molucanna</i>	> 30cm DBH	Eyes & rump appear clean.	Un-named offspring still present.	Orange #F20, right ear.
26/01/2018	Jean	F	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.	Extensive search could not find Emily.	Orange #F15, right ear.
26/01/2018	Scarlet	F	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Royal blue #G14, right ear; metal tag, left ear.
26/01/2018	Cain	M	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Royal Blue #58, left ear.
26/01/2018	Sue-Bob	F	<i>E. molucanna</i>	> 30cm DBH	Eyes & rump appear clean.	Extensive search could not find offspring.	Orange #F20, right ear.
16/02/2018	Scarlet	F	<i>E. crebra</i>	> 30cm DBH	Eyes & rump appear clean.	Possible enlarged pouch, maybe carrying young.	Royal blue #G14, right ear; metal tag, left ear.
16/02/2018	Cain	M	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Royal Blue #58, left ear.
16/02/2018	Sue-Bob	F	<i>E. molucanna</i>	< 30cm DBH	Eyes & rump appear clean.		Orange #F20, right ear.
16/02/2018	Jean	F	<i>Pinus radiata</i>	> 30cm DBH	Rump clear, could not see eyes.		Orange #F15, right ear.
19-21/03/2018						Capture / Monitoring Event	
22/03/2018	Scarlet	F	<i>E. tereticornis</i>	> 40cm DBH	Eyes & rump appear clean.	Possible enlarged pouch, maybe carrying young.	Royal blue #G14, right ear; metal tag, left ear.
22/03/2018	Bomber	M	<i>E. molucanna</i>	> 50cm DBH	Eyes & rump appear clean.		Pink #886, right ear. Light blue #621, left ear
22/03/2018	Cain	M	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Royal Blue #58, left ear.
22/03/2018	Sue-Bob	F	<i>E. molucanna</i>	< 30cm DBH	Eyes & rump appear clean.		Orange #F20, right ear.
22/03/2018	Jean	F	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Orange #F15, right ear.
26/04/2018	Scarlet	F	<i>E. molucanna</i>	> 30cm DBH	Rump appears clear, could not see eyes.	Possibly with joey, but could not confidently record.	Royal blue #G14, right ear; metal tag, left ear.
26/04/2018	Jean	F	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Orange #F15, right ear.
26/04/2018	Sue-Bob	F	<i>E. tereticornis</i>	< 30cm DBH	Eyes & rump appear clean.		Orange #F20, right ear.
26/04/2018	Kobe	F	<i>E. tereticornis</i>	> 40cm DBH	Rump stained, some redness around eyes.		Yellow ear tag #C20, right ear.

Date	Koala	Gender	Tree species	Tree character	Health Appearance	Comments	Identifiers
26/04/2018	Bomber	M	n/a	n/a	n/a	Collar drop, Koala not sighted. Collar found on ground, 12/05.	
26/04/2018	Cain	M	n/a	n/a	n/a	Collar drop, Koala not sighted. Collar found in tree, 12/05.	
6/05/2018	Scarlet	F	n/a	n/a	n/a	Collar drop, Koala not sighted. Collar found on ground, 12/05.	
30/05/2018	Jean	F	<i>C. intermedia</i>	> 30cm DBH	Eyes & rump appear clean.		Orange #F15, right ear.
30/05/2018	Sue-Bob	F	<i>E. molucanna</i>	< 30cm DBH	Eyes & rump appear clean.		Orange #F20, right ear.
30/05/2018	Kobe	F	<i>Pinus radiata</i>	> 30cm DBH	Rump appears stained, could not see eyes.		Yellow #C20, right ear.
30/05/2018	Bomber	M	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.	Sighted without collar.	Pink #886, right ear. Light blue #621, left ear
4-6/06/2018						Capture / Monitoring Event	
7/06/2018	Kobe	F	<i>E. tereticornis</i>	> 40cm DBH	Rump stained, could not see eyes.		Yellow #C20, right ear.
18/06/2018	Kobe	F	<i>E. tereticornis</i>	< 30cm DBH	Rump stained, some redness around eyes.		Yellow #C20, right ear.
18/06/2018	Jean	F	<i>Pinus radiata</i>	> 30cm DBH	Rump appears clear, could not see eyes		Orange #F15, right ear.
18/06/2018	Scarlet	F	<i>E. crebra</i>	> 30cm DBH	Eyes & rump appear clean.	Sighted without collar.	Royal blue #G14, right ear; metal tag, left ear.
29/07/2018	Zara	F	<i>Pinus radiata</i>	> 30cm DBH	Rump appears clear, could not see eyes.	Possible enlarged pouch, maybe carrying young.	Yellow #C4 right ear, Maroon # A16, left ear
29/07/2018	Sue-Bob	F	<i>E. tereticornis</i>	< 30cm DBH	Eyes & rump appear clean.	Possibly with joey, but could not confidently record.	Orange #F20, right ear.
29/07/2018	Jean	F	<i>Pinus radiata</i>	> 30cm DBH	Rump appears clear, could not see eyes	Possible enlarged pouch, maybe carrying young.	Orange #F15, right ear.
29/07/2018	Kobe	F	<i>Pinus radiata</i>	< 30cm DBH	Rump stained, some redness around eyes.		Yellow #C20, right ear.
6-8/09/2018						Capture / Monitoring Event	
11/08/2018	Bomber	M	<i>E. crebra</i>	> 30cm DBH	Eyes & rump appear clean.	Recollared 5/08.	Pink #886, right ear. Light blue #621, left ear
11/08/2018	Jean	F	<i>E. tereticornis</i>	> 40cm DBH	Eyes & rump appear clean.	Possible enlarged pouch, maybe carrying young.	Orange #F15, right ear.
2/09/2018	Jean	F	<i>E. tereticornis</i>	> 40cm DBH	Eyes & rump appear clean.	With obvious back young.	Orange #F15, right ear.
2/09/2018	Bomber	M	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.		Pink #886, right ear. Light blue #621, left ear
2/09/2018	Zara	F	<i>C. intermedia</i>	> 40cm DBH	Eyes & rump appear clean.	Very large pouch - with joey.	Yellow #C4 right ear, Maroon # A16, left ear
2/09/2018	Sue-Bob	F	<i>E. tereticornis</i>	< 30cm DBH	Eyes & rump appear clean.	With obvious back young.	Orange #F20, right ear.
24/09/2018	Zara	F	<i>E. molucanna</i>	< 30cm DBH	Eyes & rump appear clean.	Sighted without collar. Accompanied by back young.	Yellow #C4 right ear, Maroon # A16, left ear
24/09/2018	Bomber	M	<i>E. crebra</i>	> 30cm DBH	Eyes & rump appear clean.		Pink #886, right ear. Light blue #621, left ear
24/09/2018	Sue-Bob	F	<i>E. tereticornis</i>	< 30cm DBH	Rump clear, could not see eyes.	Presence of joey unresolved.	Orange #F20, right ear.
24/09/2018	Jean	F	<i>E. molucanna</i>	> 40cm DBH	Eyes & Rump appear clean	With obvious joey.	Orange #F15, right ear.
8-10/10/18						Capture / Monitoring Event	
23/11/2018	Bomber	M	n/a	n/a	n/a	Collar drop, Koala not sighted. Collar found on ground, 23/11.	
23/11/2018	Sue-Bob	F	<i>E. tereticornis</i>	< 20cm DBH	Rump clear, could not see eyes.	Joey not apparent.	Orange #F20, right ear.
23/11/2018	Lindsay	M	<i>E. tereticornis</i>	> 40cm DBH	Eyes & rump appear clean.		Yellow #C10, left ear.

Date	Koala	Gender	Tree species	Tree character	Health Appearance	Comments	Identifiers
23/11/2018	Jean	F	<i>E. molucanna</i>	> 40cm DBH	Eyes & rump appear clean.	With joey.	Orange #F15, right ear.
23/11/2018	Cain	M	<i>E. molucanna</i>	> 30cm DBH	Eyes & rump appear clean.	Battery on collar transmitter flat (<10%), irregular/unreliable transmission uploads.	
28/11/2018	Zara	F	n/a	n/a	n/a	Collar drop. Collar on ground. Collar retrieved 27/11.	Royal Blue #58, left ear.

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