

environmental management



Annual Compliance Report
5 February 2018 to 4 February 2019
EPBC 2016/7723

Rawlings Road Development, Deebing Heights, Ipswich, Queensland
Defence Housing Australia
8122 E
16 August 2019



Document control

Title	Annual Compliance Report, 25 June 2016 to 24 June 2017, EPBC 2013/6866
Address	Rawlings Road Development, Deebing Heights, Ipswich Queensland
Client	Defence Housing Australia (DHA)
Job Number	8122 E

Document Issue

Issue	Date	Prepared By	Checked By
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Reports and/or plans by others may be included within this Environmental Management report to support the document.



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I. Introduction

The Environmental Management Division of Saunders Havill Group was engaged by Defence Housing Australia to prepare an Annual Compliance Report for the Rawlings Road Development (Torhaven) granted under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) (ref EPBC 2016/7723), and is specifically required by condition 5 of the approval granted on 9 January 2018. The project is referred to in this report as *Torhaven* which is the residential estate name.

The project area covers approximately 25.37 hectares (ha) of which 15 hectares deemed Critical Koala Habitat was allowed to be cleared onsite with a further 14.7 hectares deemed to be indirectly impacted. At current 8.6ha has been cleared to date. The development is located approximately 6.5 kilometres by road south of Ipswich (refer to **Figure 1**).

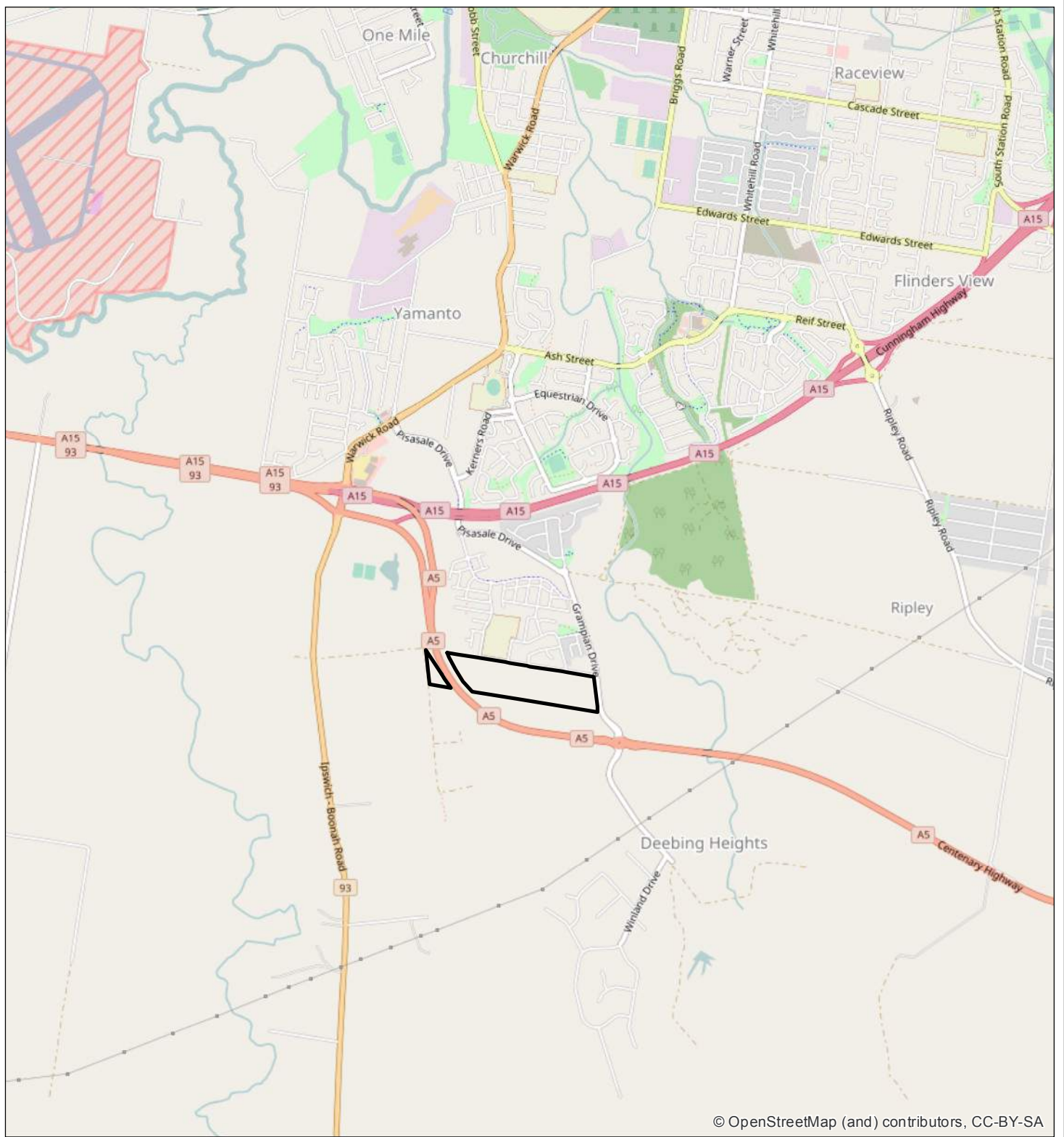
This report delivers an annual overview of the project’s progression towards achieving the primary objective:

Compensating for the loss of 29.7 hectares of Koala habitat through the offset of 53.6 hectares of land including rehabilitation works to improve the offset land for Koala habitat.

The project’s progress and notable events during the reporting period are detailed in Section 3. The assessment of compliance with the approval conditions is presented in Section 4. This report is the First Annual Compliance Report for the approved action.

I.I. Approval details

Commonwealth reference	EPBC 2016/7723
Approval holder	Defence Housing Australia
ABN	72 968 504 934
Approval date	9 January 2018
Expiry date of approval	17 January 2031
Approved action	To develop the Rawlings Road Development in Deebing Heights, Ipswich, Queensland
Controlling provision	Approved - listed threatened species and communities (sections 18 & 18A)
Reporting period	5 February 2018 to 4 February 2019
Address	Rawlings Road, Deebing Heights
Local government area	Ipswich City Council



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Legend

 Project referral area

Figure 1
Site Context

File ref. 8122 E Figure 1 Site Context A
Date 09/08/2019
Project Rawlings Road, Deebing Heights

0 500 1,000 m
Scale (A4): 1:40,000 [GDA 1994 MGA Z56]



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2. Declaration of accuracy

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this Annual Compliance Report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name	Adam Hutchinson
Position	Senior Environmental Scientist
Organisation	Saunders Havill Group ABN 24 144 972 949
Date	9 August 2019



3. Development actions

Torhaven is a residential community located in the suburb of Deebing Heights. The development of residential land parcels and open space areas is under establishment, with approximately 50 houses under construction with approximately 10 houses completed since the commencement of the action in 2018. Prior to the commencement of the development under EPBC Approval (2016/7723) condition 2a. 53.6 hectares of koala habitat was legally secured for the life of the approval for the purposes to offset both the direct and indirect impacts on Koala Habitat.

Clearing works associated with the residential development was undertaken during 2018 with the assistance of Queensland Fauna Consultancy (QFC). As part of this work, a fauna spotter was in attendance at all times during clearing activities. QFC reported on the clearing activities.

Since the commencement of the action the following milestones on the impact site have included:

- road and infrastructure construction;
- house construction;
- landscape and drainage works; and
- rehabilitation improvement works.

The following table best summarises the current status of the project in conjunction with Images 1 to 4. Figure 2 illustrates the impacts to habitat critical to the survival of the Koala as defined in the approval and listed in the table.

3.1. Development details

Total dwellings (approved)	332
Dwellings under construction	50 with 10 complete
Approved total clearing of defined critical habitat only	15 ha
Total current clearing of defined critical habitat only	8.6 ha



Image 1: Established local park facilities



Image 2: Established local park facilities



Image 3: Onsite Water rehabilitation



Image 4: Newly established waterway rehabilitation

Figure 2 - Impact on Critical Habitat





NOTES
 This plan was prepared as a desktop assessment tool. The information on this plan is not suitable for any other purpose. Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions. No reliance should be placed on the information on this plan for detailed design or for any financial dealings involving the land. Saunders Havill Group therefore disclaims any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2019), Aerial (Nearmap 2019)

* This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

LEGEND

-  Project referral area
-  Critical habitat currently cleared to 4th Feb 2019 (8.6 ha)

PLAN ISSUE:

Issue	Date	Description	Drawn	Checked
A	9/08/2019	Preliminary Draft	TC	MS

0 50 100 200 m

Universal Transverse Mercator GDA 1994 MGA Zone 56 1:4,000 @ A3





4. Offset actions

As per the detailed preliminary documentation, the offset land is made up of one area being a portion of the land located at 569 Mt. Flinders Road Peak Crossing.

As part of the EPBC approval process, it was determined that the offset area would be legally secured under a voluntary declaration (2017/006736) and within nine years the proponent would need to demonstrate a statistically significant increase, maintained for two consecutive years in Koala density over the entire offset site. Also required in year one is the completion of the baseline assessment which is required to report on Koala density, Koala food trees and Koala predators located in the offset area. At this current stage of the process only baseline data has been collected as per the conditions. Statistical improvements in both habitat quality, predation and Koala density will be reported upon in the second Annual Compliance Report (ACR).

No Offset Management Plans were conditioned for approval prior to the commencement of the action.

4.1 Offset status

Since the commencement of the action the following milestones have been completed on the offset site:

- Legally secure offset site;
- Initial first year baseline survey

The following documents are provided as supporting documentation to the current offset area status:

Appendix A: BASELINE KOALA ASSESSMENT FOR OFFSET EPBC 2016/7723 569 MT FLINDERS ROAD
PEAK CROSSING: Year 1 (Baseline): October 2018

In summary, 53.6 hectares of offset area has been legally secured under the voluntary declaration (2017/006736) on the 12 January 2018. Offset management is run by the offset provider QTFN.



5. Field survey offset area

As part of preparation for this Annual Compliance Report, two field ecologists from the QTFN attended the site in October 2018 and inspected the offset area. As part of this inspection, the following tasks were completed and/or reviewed:

- Application of Koala SAT rapid assessment methodology technique (scat meander) (Condition 2c)
- Motion camera pest species (condition 2g)
- Assessment of Koala food tree density (Condition 2e)

The field ecologists identified evidence of Koala usage throughout the offset site. As this was the initial baseline survey for the registered offset increased density of Koala is not able to be assessed in year one of the offset process. Koala scat coverage and tree species preference as recorded as: – 86% of searched sites showed evidence of koala activity. Most scats were found beneath Spotted Gums (*E. citriodora sub sp. variegata*), aligning with koala tracking from past surveys that suggested most individuals on the Koala Crossing occupy this species of Eucalypt.

Dogs, foxes and cats were recorded in the camera trapping survey of January 2018 and July 2018 (additional surveys for the whole of the site). Foxes are the most active on site (average RAI across seasons of 5.5, average number of stations 3), followed by dogs (RAI 1, number of stations 1.5) and cats (RAI of 0.5, only seen in one station in winter interval). No predator scats have been found within the EPBC 2016/7724 offset area, though they have been found in the surrounding areas

Individual Koalas within this area appear to prefer sites co-dominated by midsize Spotted Gum and Narrow-leaf Ironbark, spend more time in Spotted Gum, and deposit scats below Spotted Gum more often. This preference needs to be confirmed by more detailed study in the March 2019 research round, but there appears to be evidence that vegetation management within the EPBC2016/7724 should focus on maintaining recruitment (early, mid and mature) of these two species as well as the Queensland Blue-gum.

All Measurement are considered to be baseline (Year 0-1). Inferences and comparisons on data can and will be made in the year 2 and reported on in the ACR.

The full offset site assessment can be viewed in Appendix A of the ACR.



6. EPBC approval conditions compliance table

The EPBC approval conditions for the project are replicated in Table 1 with a designation of compliance or non-compliance if the condition was applicable during the reporting period, and evidence and comments as required. A copy of the EPBC approval and conditions is provided in Appendix B

Table 1: EPBC approval conditions compliance table

Condition number/reference	Condition	Is the project compliant with this condition?	Evidence/comments
Part A – Conditions specific to the action			
1	The approval holder must not clear more than 15 hectares of koala habitat within the project site.	Compliant	At this stage 8.6 ha of critical Koala habitat has been cleared on the referral site. As such the impact is deemed to be compliant with condition one (1) of the approval. Refer to Figure 2 Compliant
d2	To compensate for the loss of 29.7 hectares of koala habitat within, and adjacent to the project site, the approval holder must: A. Prior to commencement of the action, legally secure for the life of the approval a minimum of 53.6 hectares of koala habitat at the offset site. B. Within 10 business days of legally securing the offset site, provide the Department with evidence of when and how it was legally secured, what mechanism was used, and appropriate coordinates to enable the Department to map the offset site.	Compliant	A – A voluntary declaration permit number (2017/006736) was registered on the 12 January 2018 for 53.6 ha. This information was sent to Officer Ben Phillips on Tue 1/16/2018 1:55 PM. It is noted that this is well before the commencement date of on 5 February 2018. Please refer to Appendix C B- – A voluntary declaration permit number (2017/006736) was registered on the 12 January 2018 for



Condition number/ reference	Condition	Is the project compliant with this condition?	Evidence/comments
	<p>C. Within one year of commencement of the action complete a baseline koala density survey over the entire offset site.</p> <p>D. Within nine years, commencing from the date condition 2.c is completed, demonstrate achievement of a statistically significant increase, maintained for two consecutive years, in koala density over the entire offset site compared to the results of the baseline koala density survey required by condition 2.c.</p> <p>E. Within one year of commencement of the action complete a baseline koala food trees survey over the entire offset site.</p> <p>F. Within seven years, commencing from the date condition 2.e is completed, demonstrate achievement of ongoing recruitment of koala food trees over the entire offset site, compared to the results of the baseline koala food trees survey required by condition 2.e.</p> <p>G. Within one year of commencement of the action complete a baseline survey of non-native koala predators over the entire offset site.</p> <p>H. Demonstrate achievement of a reduction, maintained for 10 consecutive years, in the number of non-native koala predators over the entire offset site, compared to the results of the baseline survey of non-native koala predators established by condition 2.g.</p> <p>I. For the life of the approval, ensure there is no net loss in the extent of koala habitat over the entire offset site that is legally secured under condition 2.a</p>		<p>53.6 ha. This information was sent to Officer Ben Phillips on Tue 1/16/2018 1:55 PM. Please refer to Appendix C</p> <p>C- Baseline Koala density surveys were conducted by QTFN in October 2018. As per appendix A</p> <p>D- Condition 2D is not applicable at this stage of the offset progress. Comparisons of survey results from year to year will be made starting in year two.</p> <p>E - Baseline Koala tree surveys were conducted by QTFN in October 2018. As per appendix A.</p> <p>F- Condition 2E is not applicable at this stage of the offset progress. Comparisons of survey results from year to year will be made starting in year two.</p> <p>G - Baseline native Koala predator surveys were conducted by QTFN in October 2018. As per appendix A.</p> <p>H- Condition 2H is not applicable at this stage of the offset progress. Comparisons of survey results from year to year will be made starting in year two.</p> <p>I – As the offset site has been secured under a voluntary declaration. No Koala habitat is lawfully able to be removed once captured by the offset under the voluntary declaration. Recent near map aerial photography confirms this statement. Refer to Appendix D</p>



Condition number/ reference	Condition	Is the project compliant with this condition?	Evidence/comments
Part B Standard Administrative Conditions			
3	Within 20 business days after the commencement of the action, the approval holder must advise the Department of the actual date of commencement of the action.	Compliant	The Department were informed of the commencement of the action as 5 February 2019 with the department confirming the written record on the 19 February 2019. The letter of confirmation falls inside the 20-business days of commencement requirement. As the written consent occurs before the acknowledgement letter for the DOE it is clear that the commencement of action notification occurred prior to the 20-business day limit and is therefore compliant. Refer to appendix E
4	The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement any management plans or monitoring programs required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be publicised through the general media	Compliant	All Records for the impact and offset sites are held by DHA or a DHA appointed consultant. If required DHA are able to produce records of all undertakings that have occurred on both the impact and offset sites since the commencement of the action.



Condition number/ reference	Condition	Is the project compliant with this condition?	Evidence/comments
5	Within 60 business days of every 12 month anniversary of the commencement of the action, the approval holder must publish a report on its website addressing compliance with each of the conditions of this approval, including implementation of any management plans or monitoring programs as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published. The Minister may provide written consent to the approval holder to cease reporting under this condition if satisfied additional reports are not warranted.	Compliant	Condition 5 is not applicable in year one of the project as the 60 business days for reporting fall under year two of the assessment of the project. Therefore, the project is considered compliant.
6	The approval holder must report any potential or actual contravention of the conditions of this approval to the Department in writing within 5 business days of the approval holder becoming aware of the potential or actual contravention.	Compliant	No known contravention has occurred during the dates of 5 February 2018 to 4 February 2019. Therefore, the project is considered compliant.
7	Upon the direction of the Minister, the approval holder must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor and criteria must be approved by the Minister prior to the commencement of the audit. The audit report must address the criteria to the satisfaction of the Minister.	Compliant	No Request has been made at current – Not Applicable
8	If, at any time after 5 years from the date of this approval, the approval holder has not commenced the action, then the approval holder must not commence the action without the written agreement of the Minister.	Compliant	Not Applicable



Appendices

Appendix A

BASELINE KOALA ASSESSMENT FOR OFFSET EPBC 2016/7723 569 MT FLINDERS ROAD PEAK CROSSING: Year 1(Baseline): October 2018

Appendix B

Conditions of Approval

Appendix C

Voluntary Declaration Information

Appendix D

Offset Site assessment – No Removal of Vegetation considered Critical Koala Habitat

Appendix E

Written Consent Confirmation Documentation



Appendix A

BASELINE KOALA ASSESSMENT FOR OFFSET EPBC 2016/7723 569
MT FLINDERS ROAD PEAK CROSSING: Year I(Baseline):
October 2018



KOALA CROSSING

**BASELINE KOALA ASSESSMENT
FOR OFFSET EPBC 2016/7723**

569 MT FLINDERS ROAD PEAK CROSSING

Year 1 (Baseline): October 2018



Abundance of Koala (*Phascolarctos cinereus*), their food trees and their predators on the EPBC2016/7724 portion of QTFN “Koala Crossing”

January 2018

Report prepared by:

Dr Renee Rossini, Queensland Trust for Nature & The University of Queensland

Felicity Shapland, Queensland Trust for Nature

Acknowledgements:

This report supplements new data collected as baseline surveys of the EPBC 2016/7723 offset area of the Koala Crossing reserve with the findings of past survey efforts by UQ Koala Ecology Group, QTFN staff and volunteers. The authors would like to acknowledge Dr Sean Fitzgibbon and Dr William Ellis in particular, for their assistance in developing methodologies for Koala surveys on this site.

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CHAPTER 1: Background

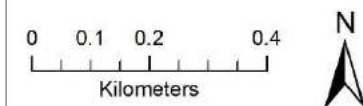
This report provides a summary of past assessments, and an updated abundance and food tree assessment for populations of the threatened Koala (*Phascolarctos cinereus*) occupying the EPBC2016/7723 portion of Queensland Trust for Nature’s Koala Crossing Reserve. Koala crossing represents a 652ha site near Peak Crossing in south-east Queensland, which comprises multiple lots. The property is managed for the conservation of koalas at a whole-of-property scale but monitoring and reporting is conducted independently in each offset. The results presented here are centred around areas managed under EPBC2016/7723 (contextualised within the broader patterns at a whole-of-property scale).

The Koala Crossing site spans a variety of landforms, with three Regional Ecosystems occurring on-site (Table 1). Many dominant trees within these Regional Ecosystem types are preferred food trees for koala (Table 1). Any part of the site not mapped as remnant is in a state of regrowth and was formally used for grazing purposes.

Table 1. The Regional Ecosystems (RE), their conservation status, dominant trees in each RE, and whether these trees are important food trees (I) or secondary food trees (S) recognised in populations of Koala from the Ipswich region (ICC,2004).



RE ID	VMA class	Biodiversity status	Dominant trees	Koala food tree
12.9-10.2	Least concern	No concern at present	<i>Corymbia citriodora</i> sub. sp. <i>variegata</i>	S
			<i>Eucalyptus crebra</i>	S
12.9-10.7	Of concern	Of concern	<i>Eucalyptus crebra</i>	S
			<i>Eucalyptus tereticornis</i>	I
			<i>Corymbia tessellaris</i>	S
			<i>Angophora</i> spp.	-
			<i>Eucalyptus melanophloia</i>	-
12.8.24	Endangered	Endangered	<i>Corymbia citriodora</i> sub. sp. <i>variegata</i>	S

MAP 1
EPBC 2016/7724
General context

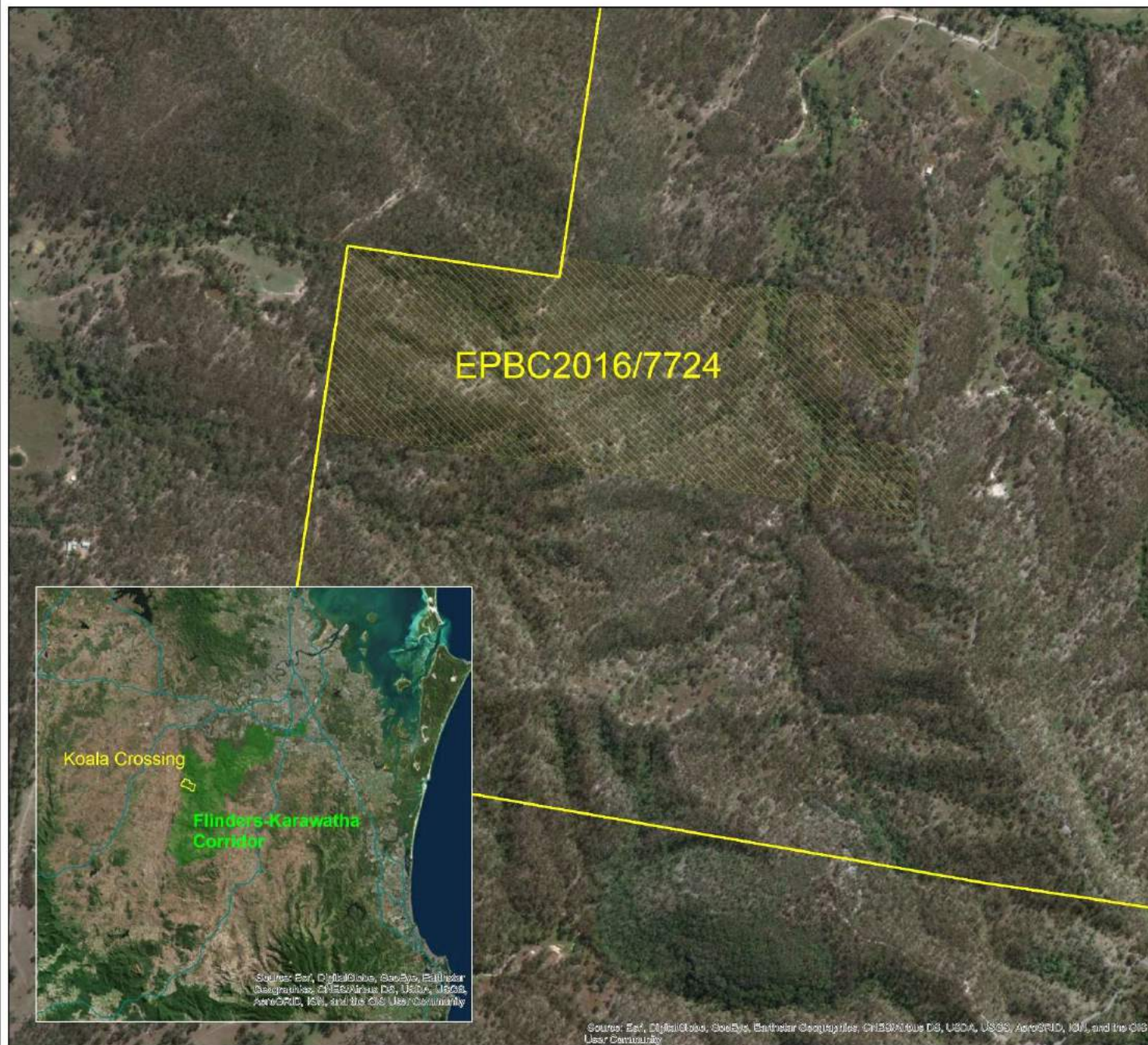


1 cm = 80 meters
when printed at A3

Legend

-  OFFSETS_DHA EPBC 2016_7724
-  Koala Crossing boundary

Author: QTFN
Date: 13/8/2018
Source: Cadastral Boundaries,
Data supplied by QSpatial
<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>
ACCURACY STATEMENT
Due to varying sources of data,
spatial locations may not coincide
when overlaid.



CHAPTER 2: Methods

KOALA ABUNDANCE AND KOALA FOOD TREES

This assessment followed the methods presented in Fitzgibbon & Ellis (2015). Surveys were conducted over a one-day period in August 2018 by the authors. In total, eight plots were searched for koala scat (Map 1). A minor modification was made to Fitzgibbon & Ellis (2015) method, following their recommendation. In previous study of the area thirty trees were assessed at each site, however sites that contained koala scat at Koala Crossing were confirmed within the eleventh tree (and always by the thirteenth tree). To expediate the survey process and maximise the number of sites, we therefore changed our search effort to fifteen trees per site but doubled the number of sites searched within EPBC 2016/7724 from four to eight.

Fifteen trees were selected randomly from a central node determined *a priori* using GIS, and therefore represent the relative densities of each tree species at randomly selected search sites. This data can therefore be used as an assessment of relative frequency of different tree species at each site. When searching trees, the authors measured circumference at breast height of each tree assessed to document the age structure of searched sites, as well as tree diversity.

INTRODUCED PREDATORS AND THEIR DIETS

Feral predator abundance is monitored on Koala Crossing using two methods. Camera trapping is performed biannually (December to January, June to July). Throughout the year, predator scat is collected opportunistically across the property. Collected scats are processed by an external contractor, and the diet of predators determined.

Camera trapping data is used to create two metrics of predator abundance. The home-ranges of dogs, foxes and cats in both peri-urban and agricultural are presented in Table 2. Operating under this assumption, we placed a network of six camera trapping stations that ensured coverage of the entire property (Map 3, these same locations have been used since 2015). Cameras were deployed for a 40-day trapping interval in each season, and all photos were databased, categorised and analysed using Camelot (©WildLabs, 2018), with an independence threshold of 10min.

Table 2. Average foraging range for three target predators ascertained from the literature (Harden 1985; Meek 1999; Meek & Saunders 2000; Molsher et al. 2005; McNeill et al. 2016), and the camera trap stations that therefore assess the RAI of each species within the EPBC2016/7724 offset area.

<i>Animal</i>	<i>Radius</i>	<i>Camera stations with territories that overlap EPBC2016/7724</i>
Dog (<i>Canis lupus</i>)	2 to 3km	A, B, C, D, E, F & G
Cat (<i>Felis catus</i>)	600 to 1km	B, C, D, E & G
Fox (<i>Vulpes vulpes</i>)	~900m	B, C, D, E & G

As ascertaining the exact number of individuals from camera trapping is impossible, relative indexes of abundance are a preferred way to ascertain whether the activity level of any given animal has increased or decreased (under the assumption that lower activity implies potentially lower numbers of animals, or at least lower threat of predation upon koala). The first metric used to assess the activity of introduced predators for this baseline report is the Relative Abundance Index – a metric calculated by Camelot and exported from the program for each 40-day trapping interval. The second is the number of camera traps across the property where each predator has been captured, a metric focussed more on the spatial concentration of predators rather than their number, and whether the hypothetical home range of any captured animal overlaps with the EPBC2016/7724 offset area.

The second metric used to assess predator abundance is scat searches. During bi-monthly traverses of the Koala Crossing property, roadsides and creeks are searched for predator scat. These scats are GPS located and collected for dietary analysis. The number of scats collected in this fashion since the commencement of this offset (January 2018) will stand as the Baseline, with evidence of increased or decreased activity of any predator suggested by an increased number of scats per area.

CHAPTER 3: Results & Discussion

This section will be presented in three parts reflecting the desired elements of the baseline survey: updated estimates of koala abundance, updated estimates of koala food trees, and updated estimates of introduced predator abundance. In each section, results collected through this supplementary survey are presented considering the three years' worth of intensive surveying within the EPBC 2016/7723 site, and in the Koala Crossing reserve generally.

3.1 Koala abundance

SUMMARY OF PAST DATA

Koala surveys conducted within the EPBC 2016/7723 area in 2015 by Fitzgibbon and Ellis (2015) found koala scat at all four sites searched. Across the Koala Crossing property, scats were found at 76% of searched sites, with the majority of koala scat found beneath spotted gum (*E. citriodora* sub sp. *variegata*), narrow-leaf Ironbark (*E. crebra*) and blue gum (*E. tereticornis*). Koala scats were found at survey sites within EPBC 2016/7724 after searching between 9 (site 29) and 13 trees (site 30), a value comparable with other areas within the Koala Crossing site.

Koala tree preference can be highly site and individual specific, so studies of local populations are essential for clarifying preferred trees. In 2017, a home range and habitat use assessment was conducted by tracking tagged koala. This data confirmed previous records of tree preference (Fitzgibbon, Ellis & Barth, 2017); radio-tracked koalas were found in Spotted Gum (*E. citriodora* sub sp. *variegata*) on 41% of occasions, followed by Blue Gum (*E. tereticornis*) and Narrow-leaved Ironbark (*E. crebra*). Koala tracked during this study (n=3) ranged between 28.2ha and 100.2ha, which is comparable with estimates from similar areas in the region (Ellis *et al.* 2002) but is larger than other published studies from coastal south-east Queensland (generally ~10ha). Home range size generally reflects the area each koala needs to search to find adequate nutrition and reflects the relative quality and abundance of food trees in this region.

Opportunistic sightings of koala and koala scats have been collected by QTFN staff since 2015. Scats have been found throughout the EPBC 2016/7724 offset area in locations outside of those that were part of the Fitzgibbon & Ellis (2015) survey. In 2017 and 2018 an untagged koala was photographed in one of the long-term photo-monitoring plots (Figure 1). If an average home range of ~50ha is assumed from the previous studies at this site, this individual is likely to utilise the western third of the EPBC 2016/7724 offset area. Intensive GPS tracking and health assessments planned for early 2019 will attempt to tag and track this individual and assess its health, tree preferences and home range in more detail.



Figure 1. A photo from a long-term camera monitoring plot positioned on the south-western boundary of EPBC2016/7724 showing a large and healthy (probably male) koala roaming through the area. This individual has been captured on camera on numerous occasions since.

Previous surveys suggest that the Koala Crossing area, including the area within EPBC 2016/7724, are utilised by koalas consistently, that these areas contain high abundances of preferred food trees for koalas on this site, and that populations in this area appear to prefer Spotted Gum (*E. citriodora* sub sp. *variegata*) and Narrow-leaf Ironbark (*E. crebra*).

RESULTS OF THE AUGUST 2018 SURVEY

Of the eight plots that were searched, koala scat was found at seven (88%) (Table 2). This figure is less than previous searches of this area which likely reflects the fact that twice as many sites over a larger area were searched, instead of indicating a decline in koala numbers. This estimate is higher than the average for the Koala Crossing wide assessments (76%) made by Fitzgibbon & Ellis (2015). Scats were found, on average, after searching 7 ± 1.2 trees ($\pm 95\%$ confidence interval), an estimate lower than the site-wide average of 11, suggesting koalas are more active in this area. Scats were found beneath spotted gum (*E. citriodora* sub sp. *variegata*) at most sites, with some scats beneath narrow-leaf ironbark (*E. crebra*), silverleaf ironbark (*E. melanophloia*) and Moreton Bay ash (*C. tessellaris*).

Table 3. Results of the August 2018 koala scat survey within EPBC2016/7724 showing how many trees were searched before scat were found, the total percentage of trees that had scat, the species and the percentage that scat were found beneath.

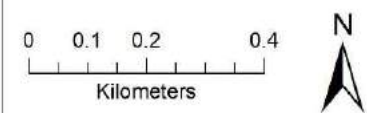
Site	Number of trees searched before first scat found	Percentage of trees with scat	Percentage of tree species with scat
S1	12	6%	<i>E. citriodora</i> 100%
S2	13	6%	<i>E. citriodora</i> 100%
S3	6	26%	<i>E. citriodora</i> 100%
S4	2	20%	<i>E. citriodora</i> 50% <i>E. crebra</i> 50%
S5	13	13%	<i>E. citriodora</i> 50% <i>E. melanophloia</i> 50%
S6	-	0%	-
S7	2	26%	<i>E. citriodora</i> 25% <i>C. tessellaris</i> 25% <i>E. crebra</i> 50%
S8	2	13%	<i>E. citriodora</i> 100%

There is evidence to suggest at least two koalas are utilising the EPBC 2016/7724 site (Map 2). The first is the individual captured in opportunistic camera trapping (Figure 1). If we hypothesise that the home-range of this individual extends across 50ha (the average from past data for this site, a radius of approximately 400m), sites 1, 2 and 4 are potentially being used by this koala.

This leaves sites 3, 5, 7 and 8. Given that scats were found across the full length of the east-west axis of the EPBC 2016/7724 area, and the known territory of no other tracked individual overlaps with the searched sites (Map 2), it may be safe to assume at least one other koala is utilising trees in this area.

This data will be used to guide intensive searches and koala collaring efforts planned for early 2019. We recommend that efforts focus intensively on the areas surrounding the three camera trapping stations where koalas have been photographed in this baseline study

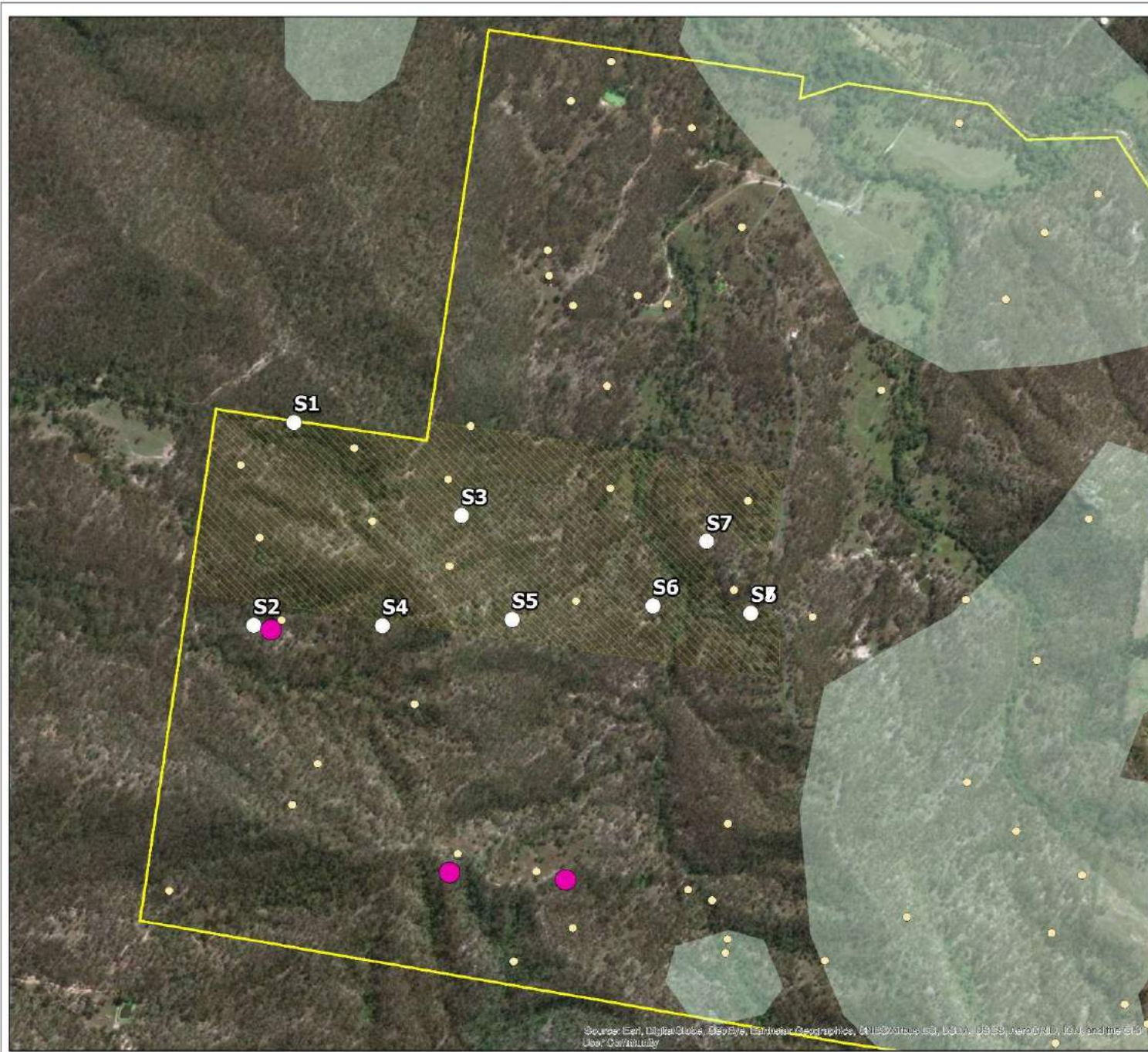
MAP 2
EPBC 2016/7724
Koala occurrence



1 cm = 80 meters
 when printed at A3

Legend

-  Koala records on camera trapping station
-  Koala scat search sites
-  Koala scat records 2015-2017
-  Known koala territories
-  OFFSETS_DHA EPBC 2016_7724
-  Koala Crossing boundary



Author: QTFN
 Date: 13/8/2018
 Source: Cadastral Boundaries,
 Data supplied by QSpatial
<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>
ACCURACY STATEMENT
 Due to varying sources of data,
 spatial locations may not coincide
 when overlaid.

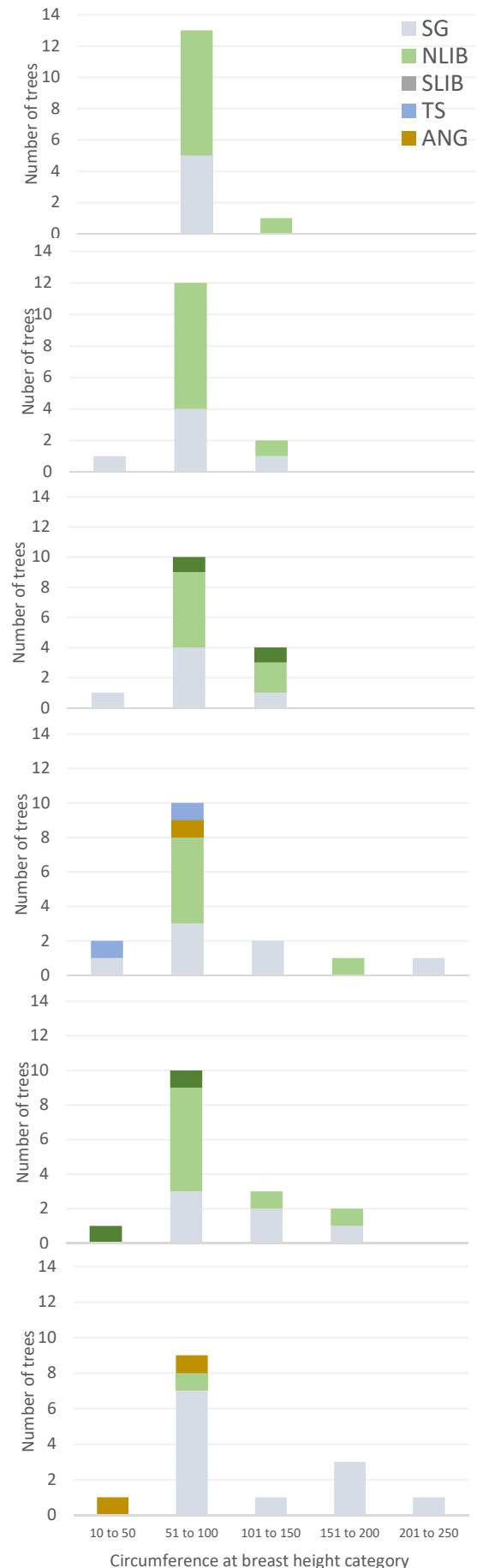
3.2 Koala food trees

Five species of *Eucalypt* were recorded in the forests of the EPBC 2016/7724 plot. Most (70±2%) trees are midsize (circ. at breast height 51-100cm), with sites in the east (S4, 5 and 6) having higher numbers of larger mature trees and higher species richness. At present, recruitment appears to be occurring at all but one site (trees in the 10-50cm category) with 8±0.1% of trees being small recruits of adequate size for koala to use. At sites 4, 5 & 6, 50% or more of recruits are Silver-leaf Ironbark, Moreton Bay Ash or *Angophora* (tree species used by koala (Table 1) but with little evidence of koala use in this survey).

There appears to be a relationship between the number, age and species richness of a site and the number of koala scat as well as the proportion of trees with scats below them (Figure 3). Whilst most trees with scat beneath them were Spotted Gums (*E. citriodora* sub sp. *variegata*), sites with the highest number of scats and highest number of trees with scat are those dominated by Spotted Gum and Narrow-leaf Ironbark (*E. crebra*), and, those with highest proportions of midsized Narrow-leaf Ironbark (Figure 3).

Even though Spotted Gum and Narrow-leaf Ironbark are considered secondary food plants for koala (Table 1), few Blue Gums (a primary food tree, *E. tereticornis*) are found within the EPBC2016/7724 area. These koalas appear to be utilising Spotted Gums and Narrow-leaved Ironbark and defecating more, and in higher numbers of trees, in sites dominated by midsized individuals of these two species. Presence of scat does not necessarily dictate a dietary preference (e.g. they could be sheltering preferences instead, see Ellis *et al.* 2002) and future detailed study of koala within the EPBC 2016/7724 will confirm the preference of these individuals.

Figure 2. The proportion of the five dominant tree species (SG – Spotted Gum, NLIB – Narrow-leaf Ironbark, SLIB – Silver-leaf Ironbark, TS – Moreton Bay Ash, ANG – *Angophora* spp.) at six of the searched sites sorted by the number of scats found at the site (highest number of scats at top, from top to bottom – S1, S2, S3, S5, S6, S4).



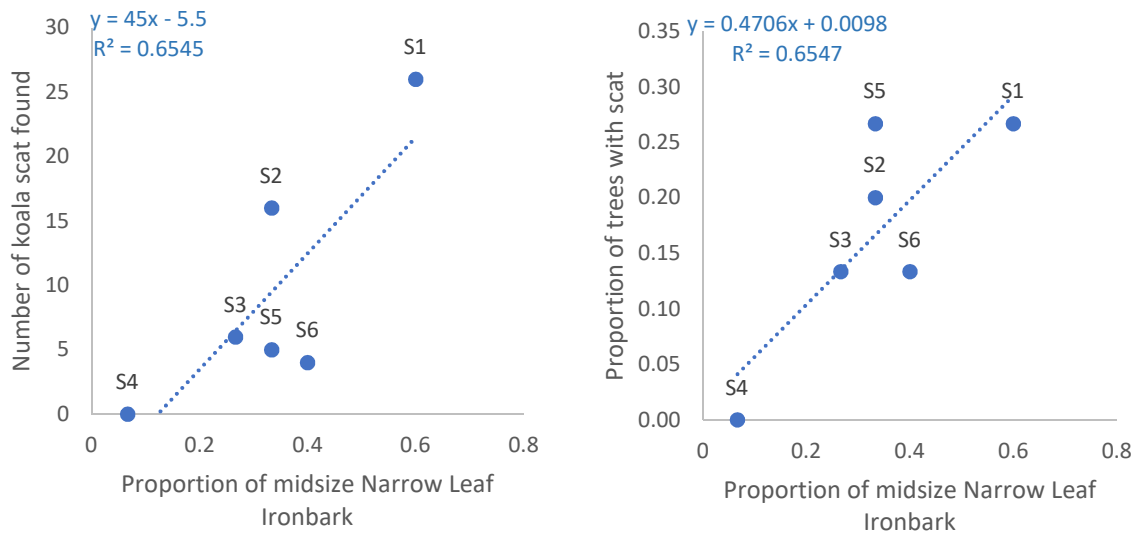


Figure 3. The relationship between the number of koala scat found in total across the site (left) and the proportion of trees at the site with koala scat (right) at six sites searched within the EPBC2016/7724 offset area.

3.3 Introduced predators and their diets

SUMMARY OF PAST DATA

Introduced predator monitoring has been occurring since 2015, including within the EPBC 2016/7724 site. Prior to the commencement of this offset (January 2018), dogs (*Canis lupus*) and foxes (*Vulpes vulpes*) were found on site. There have been no recorded attacks on koala within the site by either of these species. Dog and fox numbers have fluctuated considerably over this three-year period (dogs – RAI of 0 to 3, foxes RAI of 0.3 to 3), with the site-wide baseline for both predators set at RAI of 3 in 2015. A contractor is engaged regularly to dispose of any animals discovered on site.

RESULTS OF THE AUGUST 2018 SURVEY

Dogs, foxes and cats were recorded in the camera trapping survey of January 2018 and July 2018. Foxes are the most active on site (average RAI across seasons of 5.5, average number of stations 3), followed by dogs (RAI 1, number of stations 1.5) and cats (RAI of 0.5, only seen in one station in winter interval). Of these, one fox, two dog sightings and one cat sighting overlap with the EPBC2016/7724 area (Map 3).

No predator scats have been found within the EPBC 2016/7724 offset area, though they have been found in the surrounding areas (Map 3).

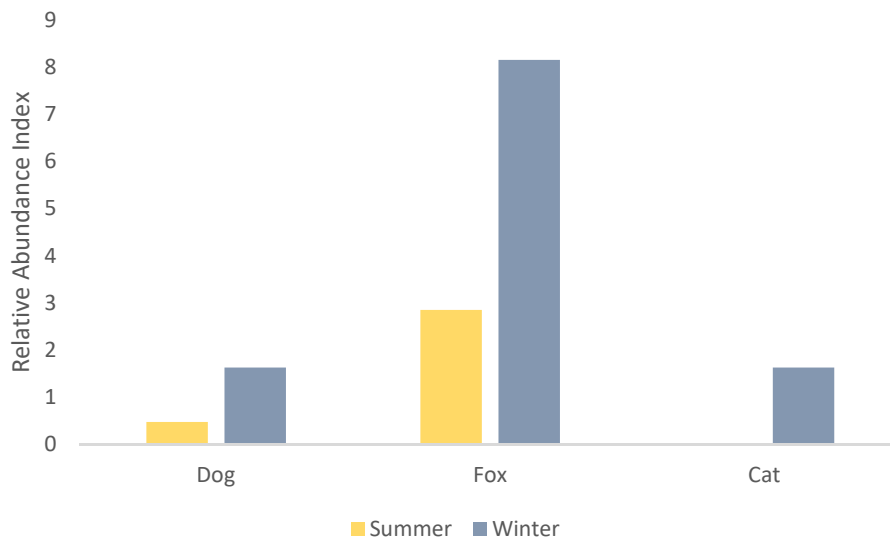
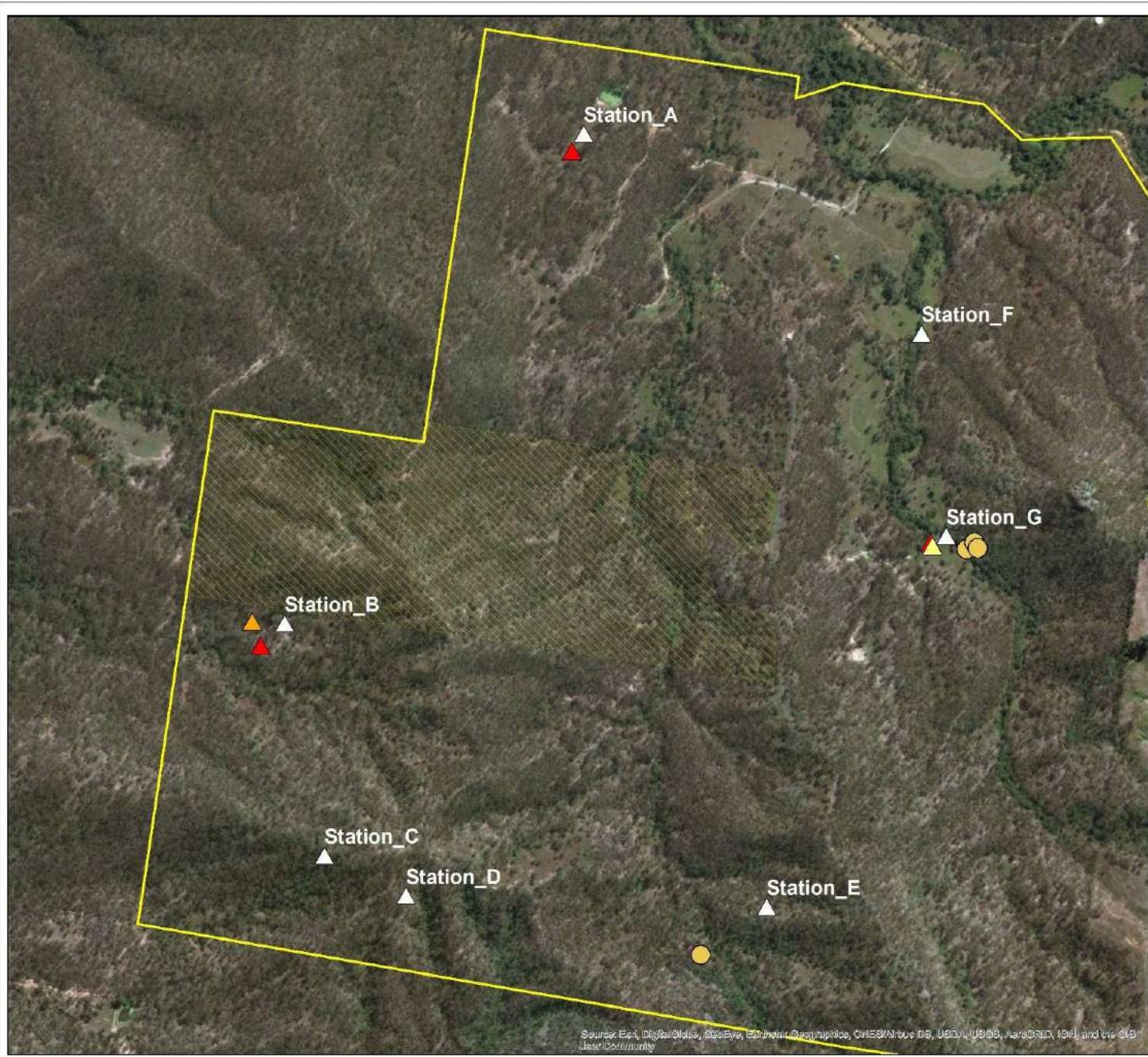


Figure 4. Relative Abundance Index estimates for the whole of Koala Crossing reserve for dogs (*C. lupis*), foxes (*V. vulpes*) and cats (*F. catus*) in the summer sampling interval (January 2018) and winter sampling interval (June-July 2018).

Although both foxes and dogs are found on the site, an analysis of all predatory scats collected to date suggest that neither predator is consuming koala, and the diets of most individuals is composed of other marsupials (primarily macropods) and vegetation (Table 3).

Table 3. The types of prey item identified from fox and dog scat collected within the site by June 2017, sorted by the frequency of individual predators whose scat contained each prey type (e.g. Grey Kangaroo were found in 36% of the 11 scats collected).

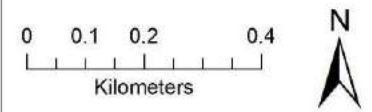
Species name	Common name	FREQ
<i>Macropus giganteus</i>	Grey Kangaroo	0.36
Unidentifiable berry	-	0.27
<i>Wallabia bicolor</i>	Swamp Wallaby	0.18
<i>Canis lupus</i>	Dog	0.18
<i>Isoodon macrourus</i>	Common Brown Bandicoot	0.09
Unidentifiable mammal bone	-	0.09
Unidentifiable bird	-	0.09
Unidentifiable beetle	-	0.09



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



MAP 3
EPBC2016/7724
Non-native predator
records



1 cm = 80 meters
 when printed at A3

Legend

- Camera trap locations
- FERALS_Predator_scat_2017_2018
- Cat photo
- Dog photo
- Fox photo
- OFFSETS_DHA EPBC 2016_7724
- Koala Crossing boundary

Author: QTFN
 Date: 13/8/2018
 Source: Cadastral Boundaries,
 Data supplied by QSpatial
<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>
ACCURACY STATEMENT
 Due to varying sources of data,
 spatial locations may not coincide
 when overlaid.

CHAPTER 4: Conclusion

4.1 General conclusions

Koala scat coverage and tree species preference remains stable within EPBC 2016/7724 – 86% of searched sites showed evidence of koala activity. Most scats were found beneath Spotted Gums (*E. citriodora* sub sp. *variegata*), aligning with koala tracking from past surveys that suggested most individuals on the Koala Crossing occupy this species of *Eucalypt*.

Koala/s utilising the EPBC 2016/7724 area are yet to be tracked and their home-range sizes and dietary preferences are needed before the true importance of each tree species can be determined within the offset area. Searched sites with koala scat within the EPBC 2016/7724 area extend beyond the known territories of previously tracked koala, and an untagged individual has been captured on camera traps on the sites south-western margin. Intensive surveys planned for early 2019 will focus on confirming these individual's presence within the area, tracking them, determining their tree preferences, and assessing their health.

Such data will aid in establishing the dietary breadth of koalas at this site, data which is essential for the vegetation management and recruitment of koala food trees. There appears to be a relationship between the assemblage of trees, their age structure, and the number of koala scats and proportion of trees showing evidence of being used by koala. This data suggests that trees generally considered of secondary importance in the Ipswich and Scenic Rim region (spotted gum and narrow-leaf ironbark, Table 1) are being utilised by koalas at this site, and that sites with higher species richness and higher portions of older trees are less utilised by koala. Naturally occurring Queensland blue gum (*E. tereticornis*) are rare within this offset area because the conditions required for their dominance are not present (i.e. the Regional Ecosystem on this site does not include grey gum as dominant). Highly utilised koala food trees at this site include narrow-leaf ironbark (*E. crebra*) and spotted gum (*E. citriodora* sub sp. *variegata*).

Though no direct predator sightings or scats have been found within the EPBC 2016/7724 area, there is evidence that all three target predators are active within the site. Dietary analyses suggest that whilst these animals are actively hunting onsite (hunted wallabies have been found by QTFN staff), they are not consuming or attacking koala. To date, no koala deaths have been recorded and attributed to feral animals since QTFN began managing the property.

4.2 Recommendations for assessing performance indicators

In summary, below are the baseline estimates that we recommend be used for EPBC 2016/7724 offset area, and recommendations for the critical limits for assessments of whether koala abundance and koala food trees have experienced statistically significant changes, and whether a reduction in the non-native predators of koalas is maintained.

KOALA ABUNDANCE

The percentage of sites used by a koala is **highly variable and contingent** on the specifics of the site searched (search sites are random), the individual koala that utilises the site at the time, acquired and learned preferences and the time-specific health of all trees available within its home range. As the assessment period is in 9-11 years from this baseline estimate, any changes could be ascribed to changes in individual koalas occupying the offset area (i.e. it could be more koalas, but they have different preferences) or the effect of climatic conditions at the time of assessment on food trees (i.e. there could be more trees, but drought is making them less desirable to koalas). Therefore, changes in proportion of trees with scat or sites with scat with statistically significant changes may not represent true changes in koala population density, but rather be a product of the naturally variable nature of koalas and their habitat preferences. We are therefore recommending that performance be assessed against the **conservative estimates** requiring statistical significance, but that strong evidence of change only be considered outside of the **acceptable limits**.

We recommend that the abundance of koala be assessed using three metrics – 1) the percentage of searched sites with koala scats, 2) the average number of trees searched before koala scat is found, 3) whether koalas are recorded on any long-term Camera Trap station that implies a home-range area that overlaps with the boundary of the offset area.

- **Metric 1 – Percentage of sites searched**
 - Koalas are utilizing **86% of sites searched** within the EPBC2016/7724 offset area, a value higher than the 2015 average for the Koala Crossing reserve (76%) and well above the site-based average for the Koala Crossing reserve of $58 \pm 1.4\%$ (see Appendix 2 for how this was calculated).
 - To comply with the offset conditions, a statistically significant increase, maintained over two years, must be demonstrated across the EPBC2016/7724 offset area within nine years of the baseline report.
 - Conservative estimates:
 - A **statistically significant decline in koala abundance** should be considered to have occurred if eight sites are assessed and estimates of the percentage of sites utilised by koala falls below **84.6%** (see Appendix 2 for more details).
 - A **statistically significant increase in koala abundance** should be considered to have occurred if eight sites are assessed and estimates of the percentage of sites utilised by koala fall above **87.4%** (see Appendix 2 for more details).

- Acceptable limits:
 - The lower limit of the site-based average percent of sites utilised is 56.6%, therefore we recommend that **strong evidence of decline in koala occupancy** should be considered as anything below this number.
 - The upper limit of the site-based average percent of sites utilised of 59.4% should be considered as **strong evidence for an increase in koala occupancy**.

- **Metric 2 – Average number of trees searched before scat found**
 - Scats were found within the EPBC2016/7724 site after **searching 7±1.2 trees**, a value lower than the Koala Crossing average of 11±2. Such estimates can be used as an indicator of koala activity, with low search effort meaning koalas are more active because fewer trees need be searched before scat is found (see justification in Fitzgibbon & Ellis, 2015).
 - Conservative estimates:
 - A **statistically significant decline in koala utilisation of the offset area** should be considered to have occurred if the average number of trees searched is above 8.2.
 - A **statistically significant increase in koala utilisation of the offset area** should be considered to have occurred if the average number of trees searched is below 5.8.
 - Acceptable limits:
 - The higher limit of the site-based average number of trees searched is 13, therefore we recommend that **strong evidence of a decline in koala occupancy** be considered to have occurred if the average number of trees searched increases above this.
 - The lower limit of the site-based average number of trees searched is 9, therefore we recommend that **strong evidence of an increase in koala occupancy** be considered to have occurred if the average number of trees searched increases above this.

- **Metric 3 – Photographic evidence of koala activity**
 - Photo monitoring stations are positioned throughout the Koala Crossing property. By assuming a home range of 50ha (a circle with a radius of ~400m, based on Fitzgibbon, Ellis & Barth 2017), we can use koala camera trap observations to infer if a koala is frequenting the offset area.
 - Conservative estimates:
 - A **statistically significant decline in koala activity** in the offset area should be considered if koala are no longer photographed on camera B, C or D.
 - A **statistically significant increase in koala activity** in the offset area should be considered if evidence suggest more than one koala are being photographed, or if more than one of stations B, C or D have koala photos.
 - Acceptable limits:

- If koala continue to be captured on one or more camera stations A-G it should be considered **strong evidence of increase in koala activity**.
- If koala fail to be captured on any camera stations A-G it should be considered **strong evidence of decline in koala activity**.

KOALA FOOD TREES

Individual koalas within this area appear to prefer sites co-dominated by midsize Spotted Gum and Narrow-leaf Ironbark, spend more time in Spotted Gum, and deposit scats below Spotted Gum more often. This preference needs to be confirmed by more detailed study in the March 2019 research round, but there appears to be evidence that vegetation management within the EPBC2016/7724 should focus on maintaining recruitment (early, mid and mature) of these two species as well as the Queensland Blue-gum. We recommend three metrics for demonstrating the recruitment of koala food trees – 1) the percentage of search sites with young recruits of any of the three target koala food trees, 2) the percentage of sites where >40% of trees are any of the three target food species in the 51-100cm category, 3) the percentage of sites with trees persisting to full maturity.

- **Metric 1 – Percentage of search sites with recruitment of young food trees**
 - The ongoing ability of a site to provide food for koala is contingent on preferred food trees germinating and surviving to a size where koalas utilise them (~10cm circumference). On average, 8% of trees in the sampled sites are young recruits, and 86% of sites have evidence of recruitment occurring.
 - Conservative estimates:
 - If all sites surveyed have >7.99% of trees as Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 10-50cm circumference category, this will be considered a **significant recruitment of young koala food trees over the entire offset area**.
 - If more than 75% of sites have < 8% of trees as Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 10-50cm circumference category, this will be considered a **failure to recruit young koala food trees over the entire offset area**.
 - Acceptable limits:
 - If no sites have any Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 10-50cm circumference category this will be considered **strong evidence of no recruitment of young food trees**.
 - If at least 50% of sites have any Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 10-50cm circumference category this will be considered **strong evidence of some recruitment of young food trees**.
- **Metric 2 – Percentage of search sites sustaining midsize food trees**
 - Koalas appear to defecate more in (and thus possible spend more time resting or feeding in) sites with higher proportions of midsize Spotted Gum and Narrow-

leaf Ironbark. On average $61 \pm 0.03\%$ of trees at sites where koala scat was found are of these two species in the 51-100cm circumference category. Therefore, it must be ensured that these food tree species are persisting into adulthood.

- Conservative estimates:
 - If all sites surveyed have $>50\%$ of trees as Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category, this will be considered a **significant recruitment of midsize koala food trees over the entire offset area**.
 - If more than 75% of sites have $<50\%$ of trees as Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category, this will be considered **failure to recruit midsize koala food trees over the entire offset area**.
- Acceptable limits:
 - If no sites have any Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category this will be considered **strong evidence of no recruitment of midsize food trees**.
 - If at least 50% of sites have any Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category this will be considered **strong evidence of some recruitment of midsize food trees**.
- **Metric 3 – Percentage of search sites sustaining food trees to full maturity**
 - The ability of a plant community to be self-sustaining post management is contingent on food trees growing to full maturity. Whilst these large trees may not be preferred food of koala, they will provide the seed bank that will maintain recruitment in perpetuity. Naturally, few trees survive to very large sizes – at present $<8\%$ of trees at 30% of sites are in the $>200\text{cm}$ circumference category.
 - Conservative estimates:
 - If all sites surveyed have $>5\%$ of trees as Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the $>200\text{cm}$ circumference category, this will be considered a **significant recruitment of mature koala food trees over the entire offset area**.
 - If more than 75% of sites have $<5\%$ of trees as Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category, this will be considered **failure to recruit mature koala food trees over the entire offset area**.
 - Acceptable limits:
 - If no sites have any Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category this will be considered **strong evidence of no recruitment of mature food trees**.
 - If at least 50% of sites have any Spotted Gum, Narrow-leaf Ironbark or Queensland Blue-gum in the 51-100cm circumference category this will be considered **strong evidence of some recruitment of mature food trees**.

NON-NATIVE KOALA PREDATORS

Predators occur and are likely to range and hunt throughout the Koala Crossing site. As no predator has been recorded on the EPBC 2016/7724 offset area, but there is evidence they are active in the surrounding area and that the EPBC 2016/7724 offset is within standard foraging ranges, we argue that all baselines should be considered at a whole of Koala Crossing scale. To achieve a reduction and maintain it for 10 years therefore, we propose the use of three metrics: 1) Relative Abundance Indices, 2) number of camera trap stations with records of target species, and 3) number of scats per hectare found within the EPBC 2016/7724 offset area.

- **Metric 1 – Relative Abundance Indices (RAI)**

- Using the current site-wide RAI and estimates of variance from all past surveys since 2015 we can gain an insight into the average estimates of predator activity across the Koala Crossing site (see Appendix 2 for more details).
- Conservative estimates:
 - If RAI remains equal to or below 1 for dogs, 5.5 for foxes and 0.5 for cats this should be considered a **statistically significant reduction**.
 - If RAI goes beyond any of these values for any target taxa, it should be considered a **failure to reduce the number of introduced predators in a statistically significant fashion**.
- Acceptable limits:
 - If RAI remains below the maximum values plus variance (dogs – 3.05, foxes – 8.02, and cats 1.9), this can be considered **strong evidence of a reduction**.
 - If RAI exceeds any of these maximum values plus variance it can be considered **strong evidence that there has been a failure to reduce**.

- **Metric 2 – Number of camera stations with target species**

- A relative measure of spatial abundance can be gleaned from the number of camera traps where a target predator is captured. For example, if foxes are captured at 1 station they are localised, if they are captured on 5 stations (all stations) they are present across the property. Using past data, we can calculate average and variance around the spatial abundance of target predators.
- Conservative estimates:
 - If number of traps remains equal to or below 1.6 for dogs, 1.3 for foxes and 1 for cats this should be considered a **statistically significant reduction**.
 - If number of traps exceeds these values for any taxa, this should be considered a **failure to maintain a statistically significant reduction**.
- Acceptable limits:
 - If the number of traps remains below the maximum value ever recorded on Koala crossing, which is 4 for dogs and foxes and 1 for cats, this should be considered **strong evidence for a reduction**.

- If the number of traps exceeds the maximum value ever recorded on Koala crossing, which is 4 for dogs and foxes and 1 for cats, this should be considered **strong evidence for a failure to reduce**.
- **Metric 3 – Number of predator scats per hectare**
 - Using past data, and considering each lot as a replicate, we can estimate the average number of scats found in a single year per lot per year and set this as a baseline measure of scat (as an indirect measure of predator abundance and activity across the site) (see Appendix 2 for more details).
 - Conservative estimates:
 - If the number of scats found within a year within the EPBC 2016/7724 area remains below the property-wide average of 1, this should be considered a **statistically significant reduction**.
 - If the number of scats found within a year within the EPBC 2016/7724 area exceeds the property-wide average of 1, this should be considered a **failure to maintain a statistically significant reduction**.
 - Acceptable limits:
 - If the number of scats found within a year within the EPBC 2016/7724 area remains below the property-wide maximum of 3, this can be considered **strong evidence of a reduction**.
 - If the number of scats found within a year within the EPBC 2016/7724 area exceeds the property-wide maximum of 3, this can be considered **strong evidence of a failure to reduce**.

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Harden RH (1985) The Ecology of the Dingo in North-Eastern New South Wales I. Movements and Home Range. *Wildlife Research* 12, 25-37.

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Appendix 1. Statistical inferences

KOALA ABUNDANCE

As the response variable for estimates of the percentage of sites searched occupied by koala is unable to be replicated within a single offset area, statistical inferences available to test for significant increases in koala occupancy are limited. Therefore, we recommend the following logic be used to create an estimate of variance in site occupancy based on averages across equivalent areas within the Koala Crossing site overall.

The western half of the Koala Crossing reserve is composed of four plots of varying area. Within each, similar Regional Ecosystems persist. Previous surveys of Fitzgibbon & Ellis (2015) searched seventeen sites across all of these plots. To construct an estimate of variance around the percentage of sites searched that contain koala scat on average, we have broken the site up into the four plots recognised by Fitzgibbon & Ellis (2015), ascertained the percentage of occupied sites for each plot, and estimated the 95% confidence interval for percentage occupied at Koala Crossing.

Using this method, the average percentage of searched sites occupied by koala is 58%, with a 95% confidence interval around that estimate of 1.4%. It is recommended that a statistically significant decline therefore, will be anything outside the lower range of the site-based 95% confidence interval (1.4%) applied to the current estimate for the EPBC2016/7724 offset area of 86%. This would be any estimate of percentage sites occupied below 84.6%. A statistically significant increase in koala should be considered using the same logic but applied to the higher threshold of the 95% confidence interval. This would be any estimate of percentage sites occupied above 87.4%.

PREDATOR ABUNDANCE

As the response variable of neither RAI nor number of camera trap stations with records of a nominated predator can be replicated within a single offset area, statistical inferences are limited. We recommend the following logic be used to create an estimate of variance around each variable.

For RAI we suggest using the RAI from each sampling bout since 2015 as an estimate of variance in predator numbers around the estimates made for this baseline report. For dogs, this gives an average RAI of 1.2 ± 0.05 , for foxes this gives an average RAI of 1.3 ± 0.04 , and for cats any number above 0. For the number of camera trap stations that capture each predator, for dogs the average is 1.2 ± 0.05 , for foxes 1.3 ± 0.02 , and for cats anything above 0 ± 0.4 . Given the highly variable nature of predator abundance, we recommend strong evidence for increases above baseline be considered any number of camera observations in excess of the site-wide maximum \pm the relevant variance for each species.

Likewise, we suggest considering scats as a measure of abundance at a property-wide level. Foxes and dogs leave scats in strategic locations, often along road-lines and creeks, and often in the same spot, therefore areas that have high numbers of scats in the past are likely to remain high. In some cases, it is possible to determine the species that left the scat (either dog or fox), but this can be done with confidence in only 50% of cases. Therefore, we recommend scats are used as a total count (i.e. inclusive of dogs and foxes), and that averages calculated from the winter 2017 to winter 2018 across four lots within the western portion of Koala Crossing, and its 95% confidence interval, be considered the critical limit. These estimates are an average number of scats of 1.4 ± 0.04 .



Appendix B

Conditions of Approval



APPROVAL

Rawlings Road Development, Deebing Heights, Ipswich, Queensland, (EPBC 2016/7723)

This decision is made under sections 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*.

Details

Person to whom the approval is granted (approval holder)	Defence Housing Australia
ACN or ABN of approval holder	ABN 72 968 504 934
Action	Construct a residential development consisting of 295 new lots with 332 dwellings, with a development footprint of 25.37 ha, located in Ripley Valley, Ipswich Queensland. [See EPBC Act referral 2016/7723]

Approval decision

My decision on whether or not to approve the taking of the action for the purposes of each controlling provision for the action are as follows.

Controlling Provisions

Listed Threatened Species and Communities	
Section 18	Approve
Section 18A	Approve

Commonwealth actions	
Section 28	Approve

Period for which the approval has effect

This approval has effect until Friday, 17 January 2031

Decision-maker

Name and position

James Barker
Assistant Secretary, Assessments and Governance Branch

Signature

Date of decision

9 January 2018

Conditions of approval

This approval is subject to the conditions under the EPBC Act as set out in ANNEXURE A.



ANNEXURE A – CONDITIONS OF APPROVAL

Part A – Conditions specific to the action

Project site

1. The **approval holder** must not clear more than 15 hectares of **koala habitat** within the **project site**.

Compensation for residual significant impact

2. To compensate for the loss of 29.7 hectares of **koala habitat** within, and adjacent to the **project site**, the **approval holder** must:
 - a. Prior to **commencement of the action**, **legally secure** for the **life of the approval** a minimum of 53.6 hectares of **koala habitat** at the **offset site**.
 - b. Within 10 **business days** of **legally securing** the **offset site**, provide the **Department** with evidence of when and how it was **legally secured**, what mechanism was used, and appropriate coordinates to enable the **Department** to map the **offset site**.
 - c. Within one year of **commencement of the action** complete a **baseline koala density survey** over the entire **offset site**.
 - d. Within nine years, commencing from the date condition 2.c is completed, demonstrate achievement of a **statistically significant** increase, maintained for two consecutive years, in **koala density** over the entire **offset site** compared to the results of the **baseline koala density survey** required by condition 2.c.
 - e. Within one year of **commencement of the action** complete a **baseline koala food trees survey** over the entire **offset site**.
 - f. Within seven years, commencing from the date condition 2.e is completed, demonstrate achievement of ongoing **recruitment** of **koala food trees** over the entire **offset site**, compared to the results of the **baseline koala food trees survey** required by condition 2.e.
 - g. Within one year of **commencement of the action** complete a **baseline survey of non-native koala predators** over the entire **offset site**.
 - h. Demonstrate achievement of a reduction, maintained for 10 consecutive years, in the number of **non-native koala predators** over the entire **offset site**, compared to the results of the **baseline survey of non-native koala predators** established by condition 2.g.
 - i. For the **life of the approval**, ensure there is no net loss in the extent of **koala habitat** over the entire **offset site** that is **legally secured** under condition 2.a

Part B – Standard administrative conditions

3. Within 20 **business days** after the **commencement of the action**, the **approval holder** must advise the **Department** of the actual date of **commencement of the action**.
4. The **approval holder** must maintain accurate **records** substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement any management plans or monitoring programs required by this approval, and make them available upon request to the **Department**. Such **records** may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.



5. Within 60 **business days** of every 12 month anniversary of the **commencement of the action**, the **approval holder** must publish a report on its website addressing compliance with each of the conditions of this approval, including implementation of any management plans or monitoring programs as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the **Department** at the same time as the compliance report is published. The **Minister** may provide written consent to the **approval holder** to cease reporting under this condition if satisfied additional reports are not warranted.
6. The **approval holder** must report any potential or actual contravention of the conditions of this approval to the **Department** in writing within 5 **business days** of the **approval holder** becoming aware of the potential or actual contravention.
7. Upon the direction of the **Minister**, the **approval holder** must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor and criteria must be approved by the **Minister** prior to the commencement of the audit. The audit report must address the criteria to the satisfaction of the **Minister**.
8. If, at any time after 5 years from the date of this approval, the **approval holder** has not **commenced the action**, then the **approval holder** must not **commence the action** without the written agreement of the **Minister**.

Part C - Definitions

9. In these conditions, except where contrary intention is expressed, the following definitions are used:
 - a. **Approval holder** means the name of the person to whom the approval is granted, or any person acting on their behalf, or to whom the approval is transferred under section 145B of the **EPBC Act**.
 - b. **Baseline koala density survey** means a field survey measuring the number of **koalas** per unit area, undertaken by a **suitably qualified person** using a scientifically robust and repeatable methodology and completed prior to the **commencement of the action**.
 - c. **Baseline koala food trees survey** means a field survey measuring the number of **koala food trees**, undertaken by a **suitably qualified person** using a scientifically robust and repeatable methodology and completed prior to the **commencement of the action**.
 - d. **Baseline survey of non-native koala predators** means a field survey measuring the number of **non-native koala predators**, undertaken by a **suitably qualified person** using a scientifically robust and repeatable methodology and completed prior to the **commencement of the action**.
 - e. **Business days** means a day that is not a Saturday, a Sunday or a public holiday in the location of the **action**.
 - f. **Clear/ clearing** means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of native vegetation (but not including weeds – see the *Australian weeds strategy 2017 to 2027* available from <http://www.agriculture.gov.au/pests-diseases-weeds/pest-animals-and-weeds/review-aus-pest-animal-weed-strategy/aus-weeds-strategy> for further guidance).
 - g. **Commencement of the action** means the point at which any **clearing** for the purposes of the action occurs.



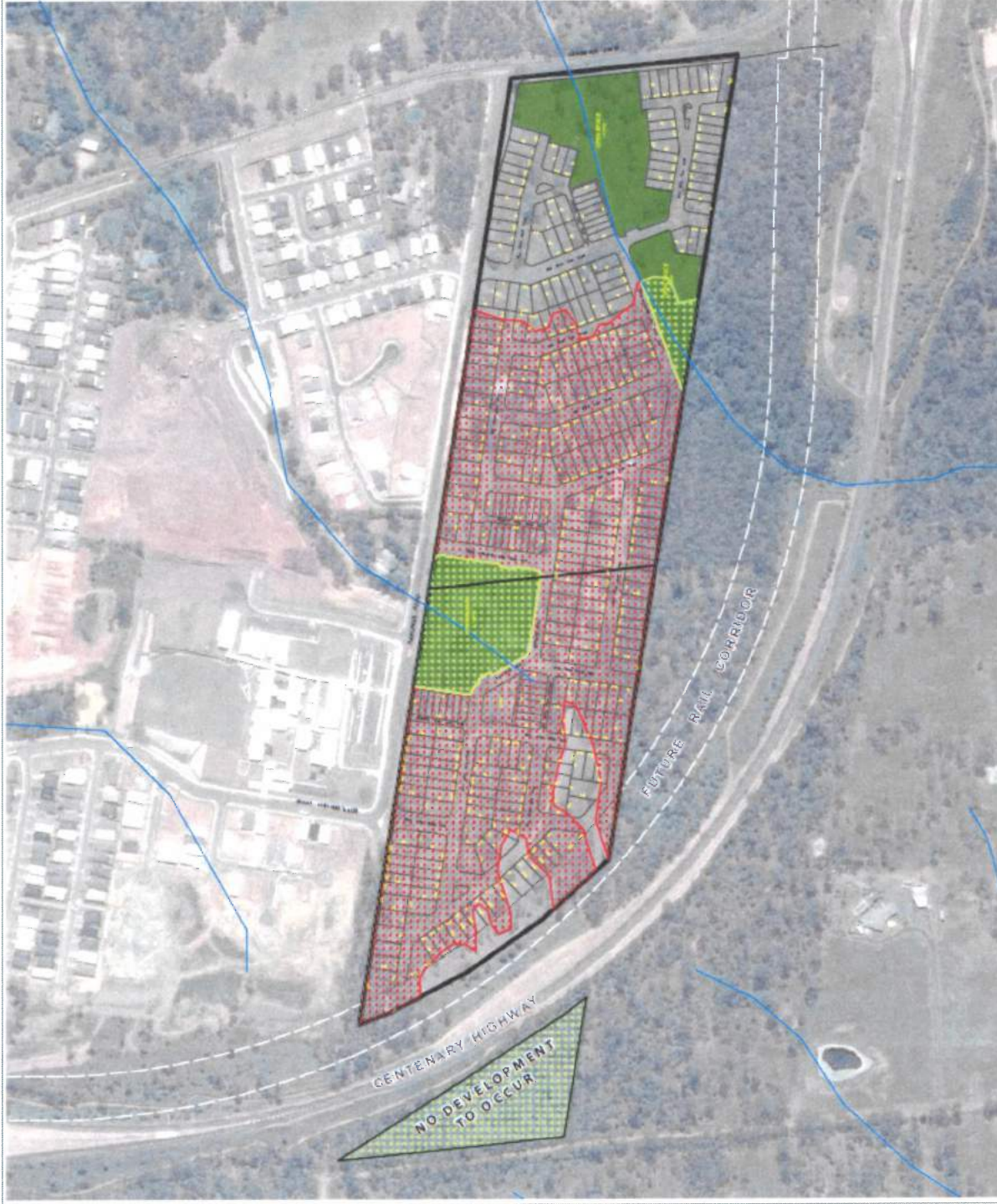
- h. **Department** means the Commonwealth Department of Environment and Energy or any other agency that administers the **EPBC Act** from time to time and includes, where the context permits, the officers, delegates, employees and successors of the **Department**.
- i. **EPBC Act** means the Environment Protection and Biodiversity Conservation Act 1999 (Cth).
- j. **Koala** means *Phascolarctos cinereus*.
- k. **Koala density** means the number of koalas per unit area.
- l. **Koala food tree** means any tree known to be part of the normal diet for **koalas**.
- m. **Koala habitat** means any vegetation that scores five or more using the Koala habitat assessment tool from the EPBC Act referral guidelines for the vulnerable koala.
- n. **Legally secure / secured / securing**: means long-term protection under a voluntary declaration as provided for in the *Vegetation Management Act 1999* (Qld), or establishing a Nature Refuge under the *Nature Conservation Act 1992* (Qld).
- o. **Life of the approval** means the period for which the approval has effect.
- p. **Minister** means the Minister administering the **EPBC Act** including any delegate of the Minister.
- q. **Non-native koala predators** means any animal not native to Australia that is known to predate on **koalas** of any age.
- r. **Offset site** means the area designated as *EPBC 2016_7723 DHA offset* on the map at **Attachment B**.
- s. **Project site** means the areas defined as *Project Site DCDB* on the map, and by the coordinates, at **Attachment A**.
- t. **Records** means all documentation or other material in whatever form, including without limitation any correspondence, reports, assessments, methodologies, operations manuals, specifications, training materials and instructions or data.
- u. **Recruitment** means new individuals added to an existing population.
- v. **Suitably qualified person** means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.
- w. **Statistically significant** means a result that's not attributed to chance, as determined using methodologies and statistical analysis appropriate to the data being analysed.

ATTACHMENTS

Attachment A — Project site

Attachment B — Offset site

Project site map



Legend

- Project site DC/DB
- VMA Watercourse
- Development Layout
- Potential Koala Habitat to remove (15 ha)
- Potential Koala to retain (41 ha)



SH saunders havill group

PROJECT NO: 11881314
 DATE: 15/03/2018
 PROJECT: Grampian Drive, Deebing Heights
 DRAWING NO: 11881314-010
 DRAWING TITLE: Potential Koala Habitat Plan
 SCALE: 1:1000
 SHEET NO: 10 OF 10

DHA

DEPARTMENT OF HERITAGE AND ARCHITECTURE
 11881314-010
 15/03/2018

Grampian Drive, Deebing Heights
 Potential Koala Habitat Plan

PROJECT NO: 11881314
 DATE: 15/03/2018
 PROJECT: Grampian Drive, Deebing Heights
 DRAWING NO: 11881314-010
 DRAWING TITLE: Potential Koala Habitat Plan
 SCALE: 1:1000
 SHEET NO: 10 OF 10

Plan 4

SH/CF/18
 #272504 Grampian Drive A

Project site coordinates

Area 1

-27.67426, 152.74607

-27.67584, 152.75693

-27.67817, 152.75719

-27.67681, 152.74794

-27.67612, 152.74724

-27.67538, 152.74666

-27.67458, 152.74619

Area 2

-27.67403, 152.74448

-27.67564, 152.74565

-27.67594, 152.74586

-27.67637, 152.74617

-27.67659, 152.74636

-27.67635, 152.74475

Offset site



Legend

- EPBC 2016_7723
- EPBC 2014/7190
- EPBC20137047



Defence Housing Offset Area



Scale 1:10000
Date 2011-10
Source: Cadastre Database
Data supplied by: Cadastre
Accuracy statement: All points are within 10m of true location
Due to varying sources of data, slight variations may exist between
when created



Appendix C

Voluntary Declaration Information



Author : Genevieve Humble-Crofts
Ref number : 2017/006736
Unit : Vegetation Management Unit
Phone : 5352 4230

12 January 2018

Ms Keira Grundy
9 Thompson Street
Bowen Hills
QLD
4006

Dear Ms Grundy

Re: Certification of a voluntary declaration on 89 RP892014 - Scenic Rim Regional Council

This is to advise you that a voluntary declaration on 89 RP892014 - Scenic Rim Regional Council has been certified and the declaration of an area of high nature conservation value has been made - consistent with your agreement - by the Department of Natural Resources, Mines and Energy (DNRME) on 12 January 2018. A copy of each of the following certified documents is attached for your records:

- Declaration notice
- Declared area plan
- Declared area PMAV
- Declared area management plan

Additional copies of the certified documents are attached for each registered owner listed on your original application form. These have been sent to you for distribution, as you are the nominated contact on the application form.

If a registered owner requires additional copies of the certified documents, these can be purchased at Department of Natural Resources, Mines and Energy Customer Service Centre.

Please note, that in accordance with the declaration, management of the declared area, monitoring the condition of the declared area, and reporting on the condition of the declared

DNRME Gympie
27 O'Connell Street, Gympie
Locked Bag 383, Gympie 4570
Telephone 07 5352 4229
Facsimile 5352 4201
Website www.dnrme.qld.gov.au
ABN 59 020 847 551

area will be required. Please refer to the declaration documents for the specifics regarding such requirements.

This declaration will be noted on the title of the declared area—binding management, monitoring and reporting responsibilities upon current and future owners.

If you wish to discuss this matter further, please contact Genevieve Humble-Crofts on telephone number 5352 4230 quoting the reference number 2017/006736.

Yours sincerely

A handwritten signature in blue ink that reads "Genevieve Humble-Crofts".

Genevieve Humble-Crofts
Natural Resource Management Officer
Natural Resource Assessment - South Region

Voluntary Declaration notice (2017/006736)

s19E – 19K of the *Vegetation Management Act 1999*

1. Details of request

- 1.1. **Proponent's name:** Queensland Trust for Nature
- 1.2. **Date request received:** 1 December 2017
- 1.3. **Request:** declaration request as another area that contributes to the conservation of the environment.
- 1.4. **Property description:** 89 RP892014 – Scenic Rim Regional Council
- 1.5. **Land tenure:** Freehold
- 1.6. **Decision reference:** 2017/006736

2. Declaration information

2.1. Declaration made:

The Chief Executive of the Department of Natural Resources, Mines and Energy declares the area identified on Declared Area Map DAM (2017/006736) as an area of high nature conservation value in accordance with s19F(1) of the *Vegetation Management Act 1999*.

The chief executive considers the declared area to meet the following criteria under s19G of the *Vegetation Management Act 1999*—

The declared area is an area of high nature conservation value under s19G(1)(b), as the area is one or more of the following:

- a wildlife refugium;
- a centre of endemism;
- an area containing a vegetation clump or corridor that contributes to the maintenance of biodiversity;
- an area that makes a significant contribution to the conservation of biodiversity;
- an area that contributes to the conservation value of a wetland, lake or spring stated in the notice mentioned in section 19F(1) of the declaration;
- another area that contributes to the conservation of the environment.

The documents outlined in 2.2 form part of this declaration.

2.2. Voluntary declaration documents:

The following documents are part of this voluntary declaration, and must be read in conjunction with this notice:

- ✓ Declared area map (DAM 2017/006736)
- ✓ Rawlings Road Development EPBC Act Offset Area Management Plan, 27 November 2017, version 3, prepared by Queensland Trust for Nature.

2.3. **Property Map of Assessable Vegetation**

In accordance with s20B of the *Vegetation Management Act 1999*, the following Property Map of Assessable Vegetation has been prepared for the declared area.

✓ Declared area PMAV (PMAV 2017/006737).

2.4. **Date of declaration:** 12 January 2018

3. **Delegated officer's signature**

A handwritten signature in cursive script, appearing to read 'mPierce'.

Monique Pierce
Natural Resource Management Officer

476400 476600 476800 477000 477200 477400 477600 477800 478000 478200 478400

6926600
6926400
6926200
6926000
6925800
6925600
6925400
6925200
6925000
6924800

476400 476600 476800 477000 477200 477400 477600 477800 478000 478200 478400

Derived Reference Points

These reference points are provided by the Department of Natural Resources, Mines and Energy and may be used to assist in locating areas delineated on this plan.
All reference points continue sequentially when labels not shown.
Horizontal Datum is GDA 1994
Coordinates are in Map Grid of Australia (MGA) - Zone 56

Point	Easting	Northing	Parcel
1	477289	6925532	A1
2	478067	6925422	A1
3	478031	6925227	A1
4	477900	6925310	A1
5	477894	6925237	A1
6	477932	6925141	A1
7	478041	6925112	A1

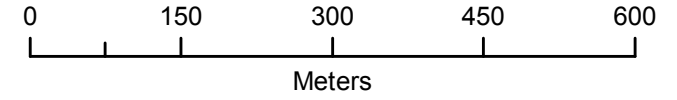
Declared Area Map

Sheet 1 of 1



DAM 2017/006736

LOT on PLAN
89RP892014



LEGEND

- Reference Points
- Subject Lot(s)
- Declared Area (A1)



Scale: 1:7500
(original size A3)

Notes:

Property boundary provided by Department of Natural Resources, Mines and Energy.
The property boundaries shown on this plan are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
Horizontal Datum: GDA 1994
Projection: Universal Transverse Mercator - Zone 56

Imagery supplied by the Department of Natural Resources, Mines and Energy.
Ipswich_2016_10cm_Mosaic_a.ecw
(acquisition date 25/06/2016)

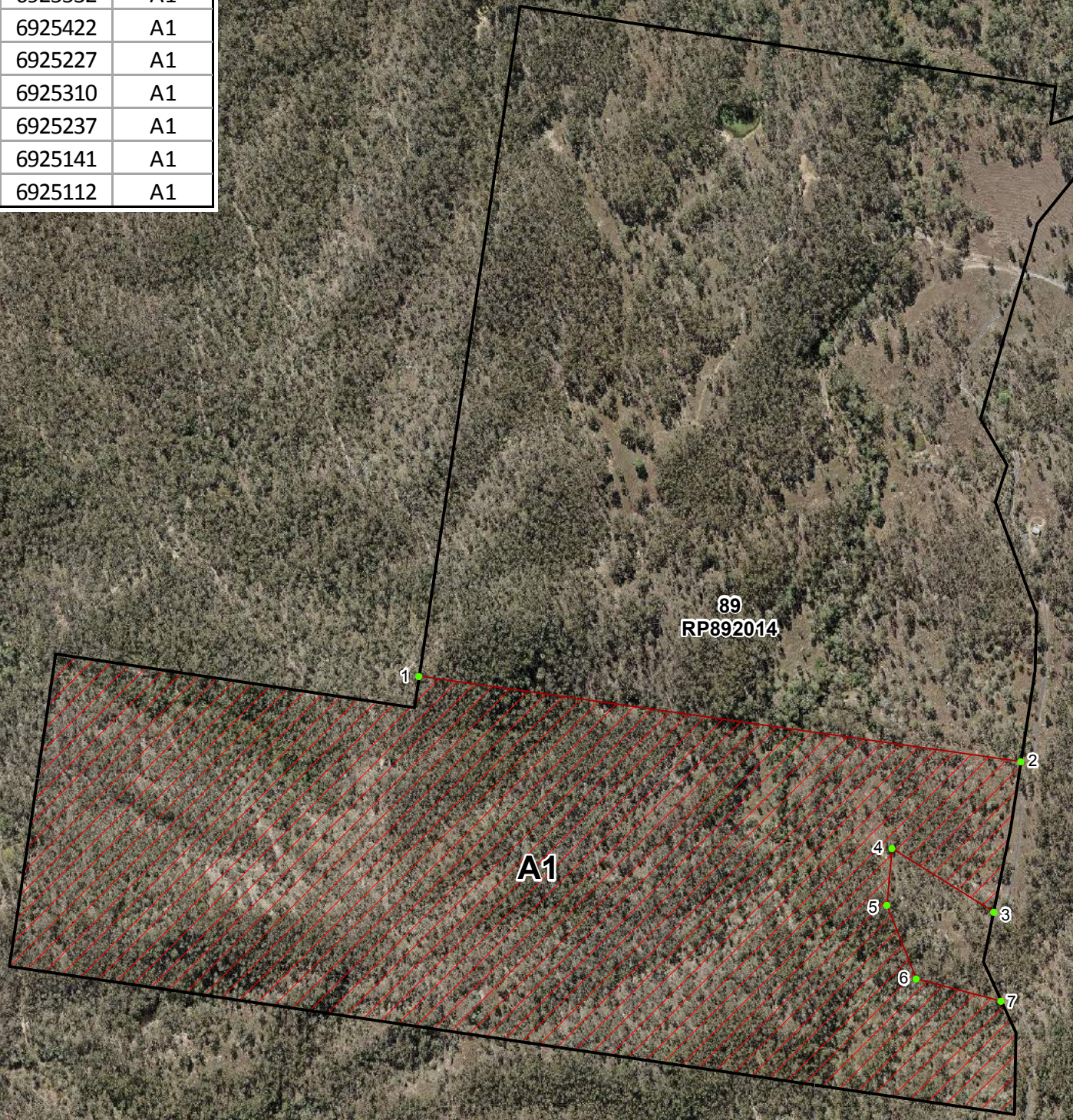
Based on or contains data provided by the State of Queensland (Department of Natural Resources, Mines and Energy) 2018. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.

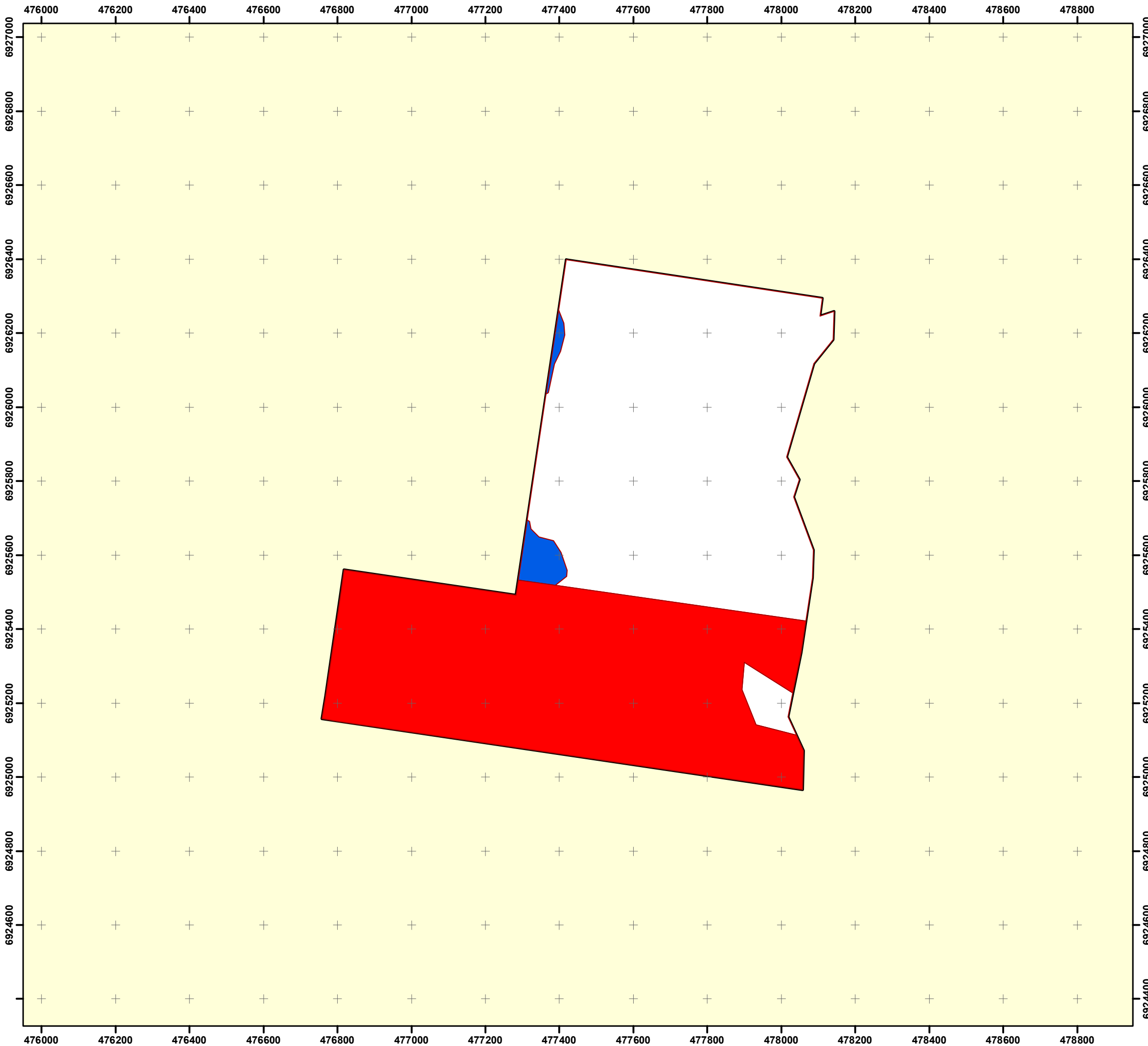
© The State of Queensland (Department of Natural Resources, Mines and Energy) 2018

Map Prepared by: LMO
Department of Natural Resources, Mines and Energy
LMB 383, Gympie, Qld, 4570
© The State of Queensland (Natural Resources, Mines and Energy) 2018


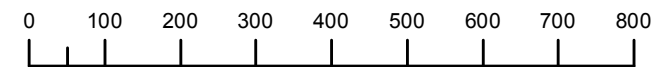
Map Preparation Date: 12/01/2018

This plan must be reproduced in colour.





Sheet 1 of 1
Property Map of Assessable Vegetation
PMAV 2017/006737
 LOT on PLAN
 89RP892014

Meters
Scale: 1:10000
 (original size A3)




- LEGEND**
- Subject Lot(s)
 - Area to which the PMAV does not apply
- Vegetation Category Area**
- Category A area
 - Category B area
 - Category X area

Notes:
 Property boundary provided by Department of Natural Resources, Mines and Energy.
 The property boundaries shown on this plan are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
 Horizontal Datum: GDA 1994
 Projection: Universal Transverse Mercator - Zone 56

This PMAV is made under Section 20B(1)(b) of the Vegetation Management Act 1999.

Signed for the Chief Executive of the Department of Natural Resources, Mines and Energy by:
 Name: Monique Pierce
 Title: Natural Resource Management Office
 Signature: 
 Date: 12 January 2018

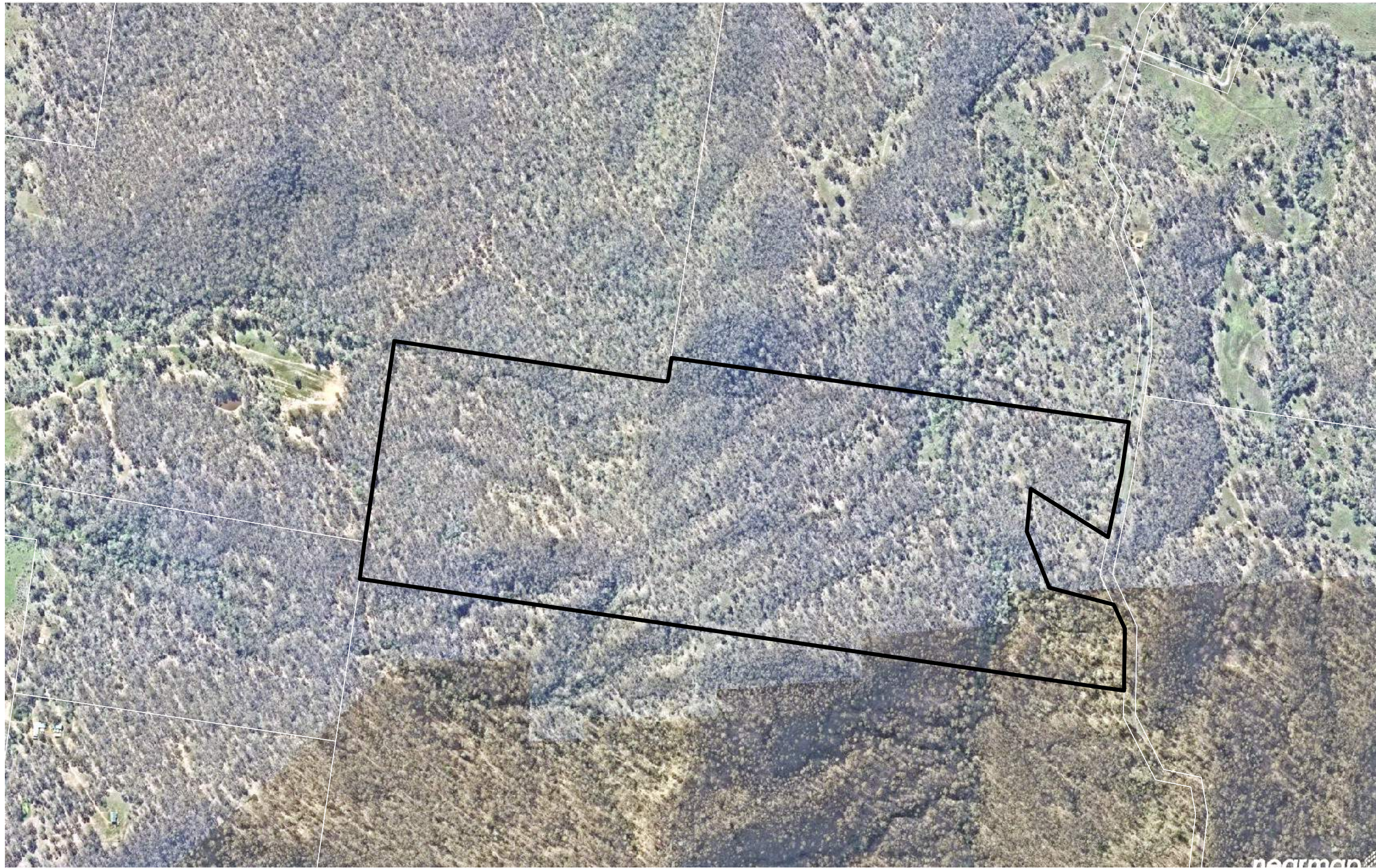
Map Prepared by: LMO
 Department of Natural Resources, Mines and Energy
 LMB 383, Gympie, Qld, 4570
 © The State of Queensland (Natural Resources, Mines and Energy) 2018
 Map Preparation Date: 07/12/2017
 This plan must be reproduced in colour.



Appendix D

Offset Site assessment – No Removal of Vegetation considered Critical
Koala Habitat

Appendix D Plan - Offset Area



NOTES
 This plan was prepared as a desktop assessment tool. The information on this plan is not suitable for any other purpose. Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions. No reliance should be placed on the information on this plan for detailed design or for any financial dealings involving the land. Saunders Havill Group therefore disclaims any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

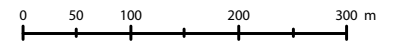
Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2018), Aerial (Nearmap 2016)

*This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

LEGEND
 Project Offset site

PLAN ISSUE:

Issue	Date	Description	Drawn	Checked
A	9/08/2019	Preliminary Draft	TC	MS



Universal Transverse Mercator GDA 1994 MGA Zone 56 1:6,992 @ A3

Aerial Date: 31.05.2019



Rawlings Road, Deebing Heights





Appendix E

Written Consent Confirmation Documentation



Contact Officer: Christopher Kerin
Telephone: (02) 6274 2389
Email: EPBCmonitoring@environment.gov.au

Meaghan O'Shea
Development Manager
Defence Housing Australia
Level 4, 76 Skyring Terrace
Newstead, QLD 4006

Dear Ms O'Shea

**Commencement of the Rawlings Road Development, Deebing Heights, Ipswich, Queensland
EPBC 2016/7723**

Thank you for notifying the Department that the action commenced on 5 February 2018 in accordance with condition 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2016/7723. Because the action commenced on this date, please complete the following tasks in accordance with the approval conditions by the mentioned due dates.

Condition 5 - Annual Compliance Report

The Annual Compliance Report for the period 5 February 2018 to 4 February 2019 must be published and submitted to the Department before 30 April 2019. The Annual Compliance Report must continue to be published and submitted to the Department until the expiry of the project 17 January 2031.

Please email the Annual Compliance Report, and the details of its publication, to EPBCmonitoring@environment.gov.au

Please maintain accurate records of all activities associated with, or relevant to, the approval conditions so that they can be made available to the Department on request. These documents may be subject to audit and be used to verify compliance. Summaries of audits may be published by the Department.

For information about the Monitoring and Audit program, see the Department's website at <http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-conservation-act-1999/complian-2>

If you would like to discuss this matter further, please contact Christopher Kerin on (02) 6274 2389.

Yours sincerely

Mick Welsh
A/g Assistant Director
Environmental Audit Section
Office of Compliance

19 February 2018