

environmental management



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

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Rawlings Road Residential Development (2016/7723) Preliminary Documentation Submission Response Memo

RE: Rawlings Road Residential Development (EPBC: Act Ref 2016/7723) Covering memo response to submissions made during Public Notification of Preliminary Documentation under the EPBC Act

Pursuant to Section 95A(3) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and direction to publish from the **Department of Environment and Energy (DEE), Defence Housing Australia** commenced the public notification process for the Rawlings Road Residential Development (EPBC Act Ref: 2016/7723). Public comments were invited on the Rawlings Road Residential Development EPBC Act Preliminary Documentation Submission Report (PD) from the 13th of September to the 26th of September 2017. Two (2) submissions were received during this period.

The two (2) submissions were received in the form of electronic mail rather than the requested hardcopy format stipulated in the advertisement, however both have been considered properly made for the purposes of obtaining community feedback on the project. Both submissions have been reviewed and a combined response to the listed matters of concern are highlighted below.

The submission(s) identified concerns regarding the following:

- The single seasonality of the survey effort;
- Retention of critical Koala habitat,
- The loss of essential habitat and incursion of roads (in a general context);
- The location of the development; and
- Animal refuge on the subject site due to regional clearing (including Koala).

Single seasonality of the survey effort

Concern was stated over the seasonality of the survey effort as only one summer season of survey was conducted in the assessment of the site. In relation to the Vulnerable Koala, in which this project has been determined a controlled action, the site surveys did locate evidence of Koala as stated in PD Part A (**Section 2.2.4**). Koala usage for the site was assessed via a combination of interrogating desktop database sources of available locality records and the results of a number of Spot Assessment Technique surveys (SAT) PD Part A (**Section 2.2.1 and 2.2.4**). All survey methods deployed on-site are listed in section 5 of the **DEE's –EPBC Act referral guidelines for the vulnerable koala** (the guideline).

The Koala habitat assessment tool outlines when site vegetation is considered “Critical” Habitat for the Koala under five main categories, being:

- Koala occurrence;
- Vegetation composition;
- Habitat connectivity;
- Key existing threats; and
- Recovery value.

Species presence for the vulnerable Koala is assessed under the Koala occurrence category. The way in which this assessment category is structured any direct or indirect evidence of Koala will result in a maximum score of 2 (out of 2). As stated in PD Part A (**Section 2.2.4 and Attachment A6**) the assessment for the Rawlings Road Residential Development yielded indirect evidence of Koala usage in the form of scats and therefore received a maximum score for Koala occurrence (2/2). Increased survey effort or seasonal variances would not in this instance result in a different altered score or level applied to the project area under the Koala Habitat Assessment Tool.

Retention of critical Koala habitat

Highlighted in the submission(s) was the need for the retention of critical Koala habitat in large enough pockets to support Koala. The Rawlings Road Residential Development (2016/7723) has been assessed by the **DEE** and has been determined to be a controlled action (**Attachment A1 of PD Part A**). As such, the impacts of the project on Critical Habitat areas are to be compensated through an environmental offset in accordance with the EPBC Act’s Environmental Offset Policy. A direct offset will be legally secured and improved to compensate for 100 percent of the quantum of impact as stated in PD Part A (**Sections 5.2 & 5.3**). A direct offset must include actions that provide a measurable conservation gain for an impacted protected matter, in this case for the vulnerable Koala. The Rawlings Road Residential Development (2016/7723) is currently in the process of securing direct offsets as per the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. These offsets must be assessed and approved by the **DEE** and legally secured prior to the commencement of the action, including any vegetation clearing on the project land. For more information on direct offsets please refer to the **DEE’s Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy**, which can be found on the **DEE** website at www.environment.gov.au.

The loss of essential habitat and incursion of roads (in a general context);

Concern was highlighted in one submission of the loss of essential habitat and the incursion of roads in the general region. Allocation of roads within the proposed development falls under the jurisdiction of the regional council

(Ipswich City Council (**ICC**)). The **DEE** is concerned with matters listed to be of National Ecological Significance (MNES), which may include impacts of new or upgraded roads, however does not extend to the allocation of roads.

Assessment of the Rawlings Road Residential Development was assessed and approved by the ICC on the 8th of June 2017 under the application reference CA-2930 / 2016. Access to this application documentation can be found by searching for the application reference at <http://pdonline.ipswich.qol.gov.au>. The assessment of larger arterial roads in the region are not part of this project and do not form part of the actions being undertaken by DHA as the proponent for the development. Large roads constructed and controlled by State and Local Governments must navigate their own approval matrix which in many instances include the EPBC Act process.

As stated in the 'Retention of critical Koala habitat' section of this response, the removal and loss of function of all defined critical Koala habitat areas is to be fully compensated in accordance with the EPBC Act's Environmental Offset Policy. A direct offset will compensate for 100 percent of the quantum of impact as stated in PD Part A (**Sections 5.2 & 5.3**). These offsets will be assessed and approved by the **DEE** and legally secured before any works for the proposed development are able to commence. For more information on direct offsets please refer to the **DEE's Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy**, which can be found on the **DEE** website at www.environment.gov.au.

The location of the development

The location of the development has been highlighted as a concern as the Rawlings Road Residential Development project occurs adjacent to the States Priority Development Area (PDA). Regardless of the PDA extent and jurisdiction, the land is included within the ICC Planning Scheme as an area zoned and supported for residential housing as evidenced by the ICC Development Permit for this use. The assessment of this Commonwealth application is focused on MNES. The **DEE** does not have the jurisdiction to assess the Rawlings Road Residential Development on its zoning or locality relative to declared PDAs rather the EPBC Act focuses on the direct and indirect impact on MNES caused by the project. The project has been determined by the **DEE** to result in a Significant Impact on critical habitat for the Koala and as a result will provide compensation in the form of environmental offsets delivered in accordance with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*.

Animal refuge on the subject site due to regional clearing (including Koala)

Regional clearing has occurred in the area and is listed as a concern in one of the submission with particular reference to habitat refuge on the Rawlings Road Residential Development site. Under the ICC approval, conditioned items on Vegetation Management (Condition 15) and Fauna Management (Condition 16) are required to be submitted to, and assessed by **ICC** before any land clearing actions are lawfully entitled to commence. A full copy of the conditions of approval issued by **ICC** can be viewed at <http://pdonline.ipswich.qol.gov.au>. A specific requirement of the development permit is that no vegetation clearing can occur without a detailed pre-site assessment completed by a Department of Environment and Heritage Protection licensed Fauna Spotter Catcher (FSC). A FSC is also required to

be on-site while any vegetation clearing is occurring. Under the current approval process, **ICC** are responsible for ensuring this aspect of the development process is achieved.

Specific mention has been made for the potential of the development to result in fauna movement being directed towards the Centenary Highway locating animals within direct conflict high volume and fast moving vehicle traffic . As outlined in the PD Part A (**Section 2.4 & Plan A5**) existing Koala Exclusion fencing constructed by the Queensland Department of Transport and Main Roads extends along the southern section of the land adjacent to the Rawlings Road Residential Development. This existing fencing is specifically located and designed to exclude Koalas and other fauna species from accessing the Centenary Highway. The fencing has been installed in accordance with detailed specifications and standards documented by the Department of Transport and Main Roads (**Section 2.3.1 and Attachment A6**)

Analysis of the two (2) submissions provided on the Rawlings Road Residential Project showed they raised a number of valid and broad environmental concerns regarding impacts of the project and the more holistic advancement of the Greater Ripley Priority Development Area. Upon a more detailed review it was considered the concerns relating specifically to the site had also previously been identified by the **DEE** and therefore considered adequately assessed and addressed within the advertised Preliminary Documentation Package. Contextual issues raised around the collective development of the region or even the entire local government area are beyond the control of the proponent and referred action for which approval is required. Based on this analysis no direct changes are proposed to the advertised Preliminary Documentation submission, with this additional memo to be provided as an explanatory frontispiece to the document, which is now proposed to be published as the final version.



Executive Summary

This Preliminary Documentation Report has been prepared in direct response to additional information requested by the Commonwealth **Department of the Environment and Energy (DoE)** as part of the “Controlled Action: Preliminary Documentation” determination for the Deebing Development made on 2 August 2016 (EPBC Reference: 2016/7723). The Controlled Action decision is based on the **DoE’s** assessment of the project as potentially resulting in a Significant Impact on the following *Matters of National Environmental Significance* (MNES):

1. Listed Threatened Species & Communities (Sections 18 & 18A) – more specifically, as defined in the request for further information, on the Koala (*Phascolarctos cinereus*).
2. Commonwealth action (section 28).

Information provided within this report is predominantly in response to an information request from the **DoE** received on 29 March 2017, and includes:

- Description of the environment – including Koala habitat, current nature, extent, and severity of threats to the Koala and Koala habitat, and information on Koala exclusion fencing and Koala movement devices;
- Quantification of impacts on Koala habitat – including area of Koala habitat to be directly and indirectly impacted, and expected extent, nature, and severity of edge effects impacts;
- Avoidance and mitigation – including details and measures to on avoid and mitigate edge effects, and expected effectiveness;
- Proposed offsets – relevant to any residual impacts to affected MNES, including direct offset location, time-specific outcomes, management actions, and offset scores; and
- Social and economic costs and benefits.

Koala (*Phascolarctos cinereus*)

The Koala populations of Queensland, New South Wales, and the Australian Capital Territory are listed as a Vulnerable species under the *Environment Protection and Biodiversity Conservation Act, 1999*. As such, an action considered likely to have a significant impact on the Koala or Koala habitat must be referred for controlled action assessment. This report addresses the *EPBC Act Referral Guidelines for the Vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (Guidelines). The relevant legislation encompasses a significant portion of Queensland’s naturally occurring vegetation, particularly in South-East Queensland, where Koala food tree species are prevalent across most landscapes. Portions of the Deebing Development project area and allotments to the south are vegetated with communities that satisfy the *critical habitat* criteria, resulting in the determination of the project as a Controlled Action. Evidence from targeted fauna surveys suggest that the site is potentially utilised at a low level perhaps by transient Koala individuals. While the project will result in the removal of some critical habitat, evidence supports that the project is unlikely to have a significant impact on the Koala given the limited evidence of Koala activity in the area and the significant levels of fragmentation and disturbance.

Deebing Development

The proposed action is for a residential development consisting of 295 new lots with 332 dwellings, with a development footprint of 25.37 hectares located in one of the fastest growing residential areas in Australia. The development will result in the clearing of vegetation already disturbed by existing agricultural uses and severely



fragmented, and possible indirect impacts on potential, equally disturbed and fragmented Koala habitat to the south.

Impacts

As detailed in previous referral documentation and augmented in this report, the proposal will result in clearing and potential edge effect impacts on 15 and 14.7 ha, respectively, of Koala critical habitat with a score of 5. Direct evidence of localised Koala mortality is presented in support of this determination. As per the referral guidelines, this is well below the example of 100 ha of critical habitat with a score of 5 that could be expected or likely to result in a significant impact. As such, an offset for clearing of critical habitat and the exacerbation of existing disturbance and fragmentation levels on the site and surrounds is to be provided off-site.

Management Plans & Mitigation Measures

This document outlines a number of preliminary management plans relating specifically to Koala. The plans remain preliminary to provide the **DoE** with some certainty that potential impacts can be mitigated and managed, however, it is noted that conditions associated with an approval are likely to be outcomes based in accordance with the **DoE's** *Outcomes-based Conditions Policy 2016*.



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Attachment A5: TMR's Standard Drawing 1603
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Attachment A8: Koala Habitat Offset Management Plan
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Acronyms

AKF Australian Koala Foundation
DoE Department of the Environment and Energy (Cth)
DILGP Department of Infrastructure, Local Government and Planning
EHP Department of Environment and Heritage Protection (Qld)
EPBC *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
FMP Fauna Management Plan
ICC Ipswich City Council
MNES Matters of National Environmental Significance
NCA *Nature Conservation Act 1992 (Qld)*
PDA Priority Development Area
PMST Protected Matters Search Tool
QPWS Queensland National Parks and Wildlife Services
RE Regional Ecosystem
SPP State Planning Policy (Qld)
SPRP State Regulatory Planning Provisions (Qld)
TEC Threatened Ecological Community
TMR Transport and Main Roads
VCMP Vegetation Clearing and Management Plan
VMA *Vegetation Management Act 1999 (Qld)*



I. Introduction

The *Environmental Management Division* of **Saunders Havill Group (SHG)** act on behalf of **Defence Housing Australia (DHA)** in the coordination and response to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Controlled Action Assessment (2016/7723) for the Grampian Drive development on the corner of Grampian Drive and Rawlings Road, in Deebing Heights, Queensland.

On 10 June 2016, a referral under the EPBC Act was made to the Commonwealth **Department of the Environment and Energy (DoE)** for Controlled Action assessment. On 2 August 2016, this application was deemed a Controlled Action requiring assessment by "Preliminary Documentation". The Controlled Action decision was based on the following:

- 1) Listed threatened species and communities (sections 18 & 18A);
- 2) Commonwealth action (section 28).

The Controlled Action Decision was accompanied with a supporting letter, which is contained in **Attachment A1**. The request for Additional Information for the Preliminary Documentation assessment was received on 29 March 2017, and is also provided at **Attachment A1**.

I.I. Site Description and Details

Address	Rawlings Road, Deebing Heights
RPD and Area	Part of Lot 194 on SP193445 – 10.8 ha Lot 195 on S3157 – 14.57 ha
VMA 1999	Category X Non-remnant Vegetation Category B Regulated Vegetation that is Least Concern
NC Act Protected Plants	Not Applicable
Koala SPRP	Koala Assessable Development Area that is a Broad Hectare Area (western portion only)
Koala SPP	Medium Value Bushland Habitat (western portion only) Low and Medium Value Rehabilitation Habitat (western portion only) Generally Not Suitable (western portion only)
SPP	Biodiversity – Regulated Vegetation Intersecting a Watercourse & Wildlife Habitat Water Quality – Climatic Regions Natural Hazards – Bushfire Hazard
Local Government Area	Ipswich City Council
Planning Scheme / Zoning	Ipswich Planning Scheme / Future Urban
Existing Land Use	Rural residential
Proposed Land Use	Low density residential



1.2. Site Context

Contextually, the site is located approximately seven kilometres (km) south of Ipswich City, in Queensland. The application site is approximately 25 hectares (ha) in area, constituting the entire lot 195 on S3157 (14.57 ha) and part of Lot 194 on SP193445 (10.8 ha). The landscape surrounding the subject site consists of a mixture of land cleared for residential and agricultural purposes and bushland. The site is bound by existing roads with the Centenary Highway to the west, Rawlings Road to the north, and Grampian Drive (also known as South Deebing Creek Road) to the east. The Centenary Highway transects the adjacent properties approximately 200 m south of the subject site. The remainder of Lot 194 to the west of the Centenary Highway is not earmarked for development as part of this proposal. Allotments to the east of the site are included within the Ripley Valley Priority Development Area (PDA) and are either earmarked for or under development. Land to the north of Rawlings Road and to the east of South Deebing Creek Road and Grampian Drive has been cleared and is being developed into residential properties. To the west, the land is largely cleared and used for rural purposes. Refer to the site context map (**Figure A1**) and site aerial (**Figure A2**).

The development site is adjacent to the Ripley Valley Priority Development Area (PDA), which was declared by the Queensland **Department of Infrastructure, Local Government and Planning (DILGP)** on 8 October 2010 for specific accelerated development with a focus on economic growth. It covers a total area of 4,680 hectares and provides opportunity to provide approximately 50,000 dwellings to house a population of approximately 120,000 people.

1.3. General Environmental Values

The site has been subject to desktop review and on-site ecological assessments. Flora and fauna field surveys conducted by Senior Ecologists from **SHG** in January, February, and December of 2016 found the site to be highly modified due to past and present land uses, including vegetation clearing and agricultural grazing practices. Although historically disturbed, the application area contains a small patch of mapped remnant vegetation that is a Least Concern Regional Ecosystem (RE 12.9-10.2) under the *Vegetation Management Act 1999* (VMA), with the majority of the site containing non-remnant vegetation (refer to **Figure A3**).

Site survey confirmed the dominant vegetation in the remnant and regrowth areas is mature and semi-mature canopy forming the ecologically dominant layer. Vegetated areas were uniform in density and age structure, with only mild variations occurring in tree species dominance and co-dominance. Generally, these variations coincided with topographical features (ridges, plains, gullies, etc.), soils and geology. As typically found in woodland structures, very few shrub species were recorded with the ground layer dominated by a mix of native and exotic grass species.

The site includes approximately 1.84 ha of mapped Least Concern RE 12.9-10.2 (refer to **Figure A3**). The majority of this remnant polygon exists on the adjacent property to the south, with the portion on Lot 195 effectively forming a small projection. This RE community is described as *Corymbia citriodora subsp. variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks. Site survey confirmed species within this remnant patch to be dominated by *Corymbia citriodora* (Spotted Gum) and consistent with the current Regional Ecosystem mapping.



The balance of the site is open paddocks with some patches of juvenile vegetation, and infrastructure for the existing residence including a house, sheds, and constructed garden beds, reflecting the non-remnant status as mapped under the VMA. The juvenile vegetation recorded on-site contained patches dominated by either *Corymbia citriodora* or *Eucalyptus crebra* (Narrow Leaf Ironbark). All of these patches are largely devoid of understorey species with a very sparse sub-canopy layer. Species within this layer included Spotted Gum, Narrow Leaf Ironbark, *Corymbia intermedia* (Pink Bloodwood), *Corymbia tessellaris* (Moreton Bay Ash), *Acacia disparrima* (Hickory Wattle), and *Alphitonia excelsa* (Soap Tree).

A total of 99 flora species were observed on-site, consisting of 49 native and 50 introduced species. A number of the native species have been planted in the constructed garden beds, while a number of the introduced species are considered to be weeds under the Queensland *Biosecurity Act 2014* and under Ipswich City Council. The majority of declared weeds were observed as isolated individuals or within small isolated clumps, however, *Lantana montevidensis* (Creeping Lantana) was observed in greater densities throughout the site. Severe infestations of *Lantana camara* (Lantana) were observed within the adjacent properties to the south, however, infestations on the subject site have largely been managed.

Six threatened plant species listed under the provisions of the EPBC Act are considered to have potential to occur within the vicinity of the application site, along with three listed Threatened Ecological Communities (TECs). Six flora species listed under the *Nature Conservation Act 1992* (NCA) were also identified as potentially occurring on-site. No threatened flora specimens or TECs were observed on-site or within the vicinity of the site. In its current condition, the site would not be considered high value habitat to support any threatened flora species or TECs.

Two stream order one drainage lines are located on-site, one near the centre of the site in a south to north direction, and one in the eastern portion of the site in a southwest to northeast direction (**Figure A3**). Both waterways were found to be highly modified from their natural state as a result of vegetation clearing and a number of constructed dams. Both waterways were considered to not contain defined bed and banks, and are more likely representative of a "drainage feature" as defined under the *Water Act 2000*.

The central waterway was noted to have a distinct lack of riparian vegetation in this area with established canopy trees dominated by Spotted Gum and Narrow Leaf Ironbark, with scattered Forest Red Gum and *Eucalyptus moluccana* (Gum Topped Box) specimens. The flora species observed within and along the edges of the constructed dam were all common species typical of such modified environments including both native and exotic species – *Nymphaea caerulea* (Blue Water Lilly) and *Nymphoides indica* (Water Snowflakes) were the dominant water lilies identified in the dam with patches of *Cyperus polystachyos* (Bunchy Sedge) and *Juncus usitatus* (Juncus) along the edges.

The eastern drainage line has been almost completely cleared of vegetation with only a few scattered and established native trees remaining. The ground layer is dominated by introduced grasses and weed species. The flow paths were limited to certain sections of the mapped waterway, with the balance areas typical of flood plain conditions. The watercourse contained limited water pools (mostly in the lower portion) and appeared to only run in times of relatively high rainfall. As such, very limited instream habitat types were recorded. The waterways are not considered suitable habitat for threatened species given the relatively high levels of disturbance, primarily from weed incursion, stock watering, and pastoral activities.

Vegetation located in this area is typical of floodplains and includes Gum Topped Box woodland with other frequently occurring species including Forest Red Gum, Narrow Leaf Ironbark, Grey Ironbark and Pink Bloodwood. A small patch of vegetation dominated by *Allocasuarina luehmannii* (Bull Oak) with scattered *Corymbia tessellaris*



(Moreton Bay Ash) and Forest Red Gum is also located adjacent to the eastern boundary within the mapped watercourse. The balance of the mapped eastern watercourse is dominated by both introduced and native ground layer species including large patches of *Imperata cylindrica* (Blady Grass), *Megathyrsus maximus* (Guinea Grass) and in the dryer areas *Chloris gayana* (Rhodes Grass). All other species observed are common to the local area.

Thirty-seven fauna species were observed on-site, consisting of 28 bird species, two mammal species, five reptile species, and two amphibian species. Eighteen threatened fauna species listed under the EPBC Act are considered to have potential to occur within the vicinity of the application site and eight fauna species listed under the NCA. No threatened fauna specimens were observed on-site or within the vicinity of the site.

Desktop assessment identified some potential for *Lathamus discolor* (Swift Parrot), *Phascolarctos cinereus* (Koala), and *Pteropus poliocephalus* (Grey-headed Flying-fox) to occur on-site. Assessment of on-ground conditions at the site found that the Swift Parrot (Endangered) and the Grey-headed Flying-fox (Vulnerable) could potentially be visitors to the site due to the presence of suitable food resources in the form of winter flowering eucalypts. However, the quality and amount of food resources available is considered insignificant in the context of the surrounding landscape. Some evidence of the Koala (in the form of scats) was recorded on-site. It is considered that the site provides low value habitat for the Koala and site surveys found only signs of low usage.

Two migratory species were observed on-site (the Rainbow Bee-eater and Cattle Egret) however, these species are considered common within the local area, are generalist species that utilise a broad range of foraging habitats and have since been de-listed from the EPBC Act. The site could provide low value foraging habitat for some listed migratory species, however, the habitat and vegetation values present are not considered to provide any significant or unique ecological values for these species. Further, it is not expected the proposed development would impact upon these species.

Stratified log, leaf litter, and habitat searches did not reveal any other signs of usage by listed threatened species, and the site's ability to support such fauna species is highly unlikely as these species are generally highly sensitive, specialised, and require particular habitat features, which this site does not provide. Field surveys did not detect any evidence of other listed fauna species utilising the site, including a lack of records with motion-detection cameras. As a result, the site is not considered to provide any significant or unique values for these species. Utilisation of the site is limited to fauna that can adapt to a highly modified and disturbed landscape containing anthropogenic influences.

1.4. Approval History

The Grampian Drive development involves a master planned residential development adjacent to the Ripley Valley PDA. The proposed action is for the construction and operation of the residential development, converting approximately 25 ha of rural residential land into a residential development, providing new homes for the region as well as open park space (refer to **Attachment A2**).

The proposed development site is located within the **Ipswich City Council (ICC)** Local Government area, in South East Queensland, and therefore subject to the provisions of the Ipswich Planning Scheme and Queensland's *Sustainable Planning Act 2009* (SPA). The project is currently in the process of progressing State and Local Government approvals and is expected to obtain all relevant planning approvals by the end of April 2017 and engineering approvals by June 2017.



On 10 June 2016, the project was referred to the **DoE** for Controlled Action assessment under the EPBC Act. The action was determined to be a Controlled Action requiring assessment by "Preliminary Documentation" on 2 August 2016, based on potential impacts to Listed threatened species and communities (sections 18 & 18A), and it being a Commonwealth action (section 28). On 29 March 2017, the request for additional information required for preliminary documentation was received. Accordingly, this Preliminary Documentation Report responds to this additional information request.

I.5. Proposal Description (Action)

The site the action is proposed on is located on Rawlings Road, Deebing Heights. The site area is 25.37 ha, and will provide 295 new residential lots with 332 dwellings (**Attachment A2**). The development area includes the clearing of 15 ha of disturbed vegetation and the allocation of over 4 ha as Open Space, located along drainage features in the north and the southeast of the site (refer **Attachment A2**). These Open Space areas will retain existing vegetation, and allow for weed management and infill planting works. Additionally, a small portion of Lot 194 on SP193445 exists to the west of the Centenary Highway, and is outside of the development footprint. This portion of land represents the most densely vegetated area of the site, and the retention of the vegetation in this area will allow for continued habitat values west of the Centenary Highway, which fragments the referral area. As well as the two large areas of Open Space, there will be additional park areas, trees and landscaping within the development area.

The area surrounding the proposed development site is highly impacted and fragmented. The site to the north of Rawlings Road has been completely cleared, with the commencement of the construction of Sovereign Pocket residential development and a school. There are also numerous surrounding residential developments proposed and under construction, such as Paradise Heights, Paradise Waters, and Ripley McHale, which have all been deemed not a controlled action or received approval under the EPBC Act to proceed, and sites to the south of Centenary Highway, and on both sides of Grampian Drive (south of the subject site) currently within the EPBC Act referrals process. Several more developments are also likely to occur within the next few years, in line with the State and Local Government planning intent for the area. Refer to **Section 2** of this report for further detail on surrounding developments. It is noted that the developments surrounding the subject site significantly limits the connectivity and vegetation values remaining in the landscape. Furthermore, the vegetation currently existing on-site is isolated on all sides by highways and roads and is likely to become increasingly isolated as future development occurs.

In terms of environmental impacts and potential impacts on Matters of National Environmental Significance (MNES), the action can be described as:

- Clearing of 15 ha of disturbed vegetation, including only 1.84 ha of remnant Least Concern vegetation, with the remainder being regrowth and scattered trees;
- Potential edge effects imposed on adjoining vegetation;
- Removal of Koala food trees;
- Earthworks linked to creating grades to support roads, new allotments and drainage patterns;
- Establishment of hard stand areas on land which is currently used for rural purposes; and
- Expansion of surrounding land uses by increasing the available property lots by 295, which will potentially increase the number of domestic pets and exotic garden plant species in the area.



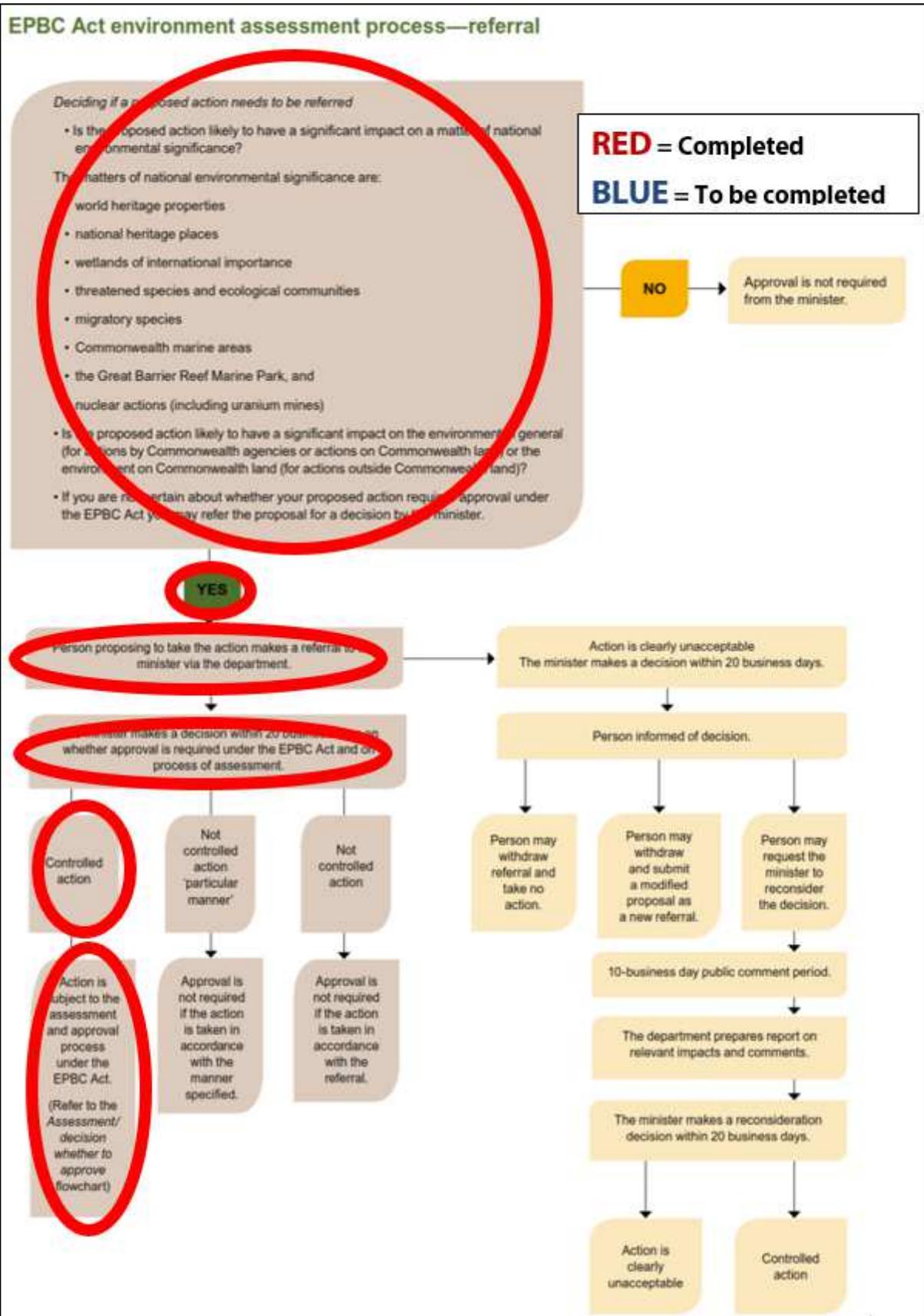
I.6. EPBC Act Process

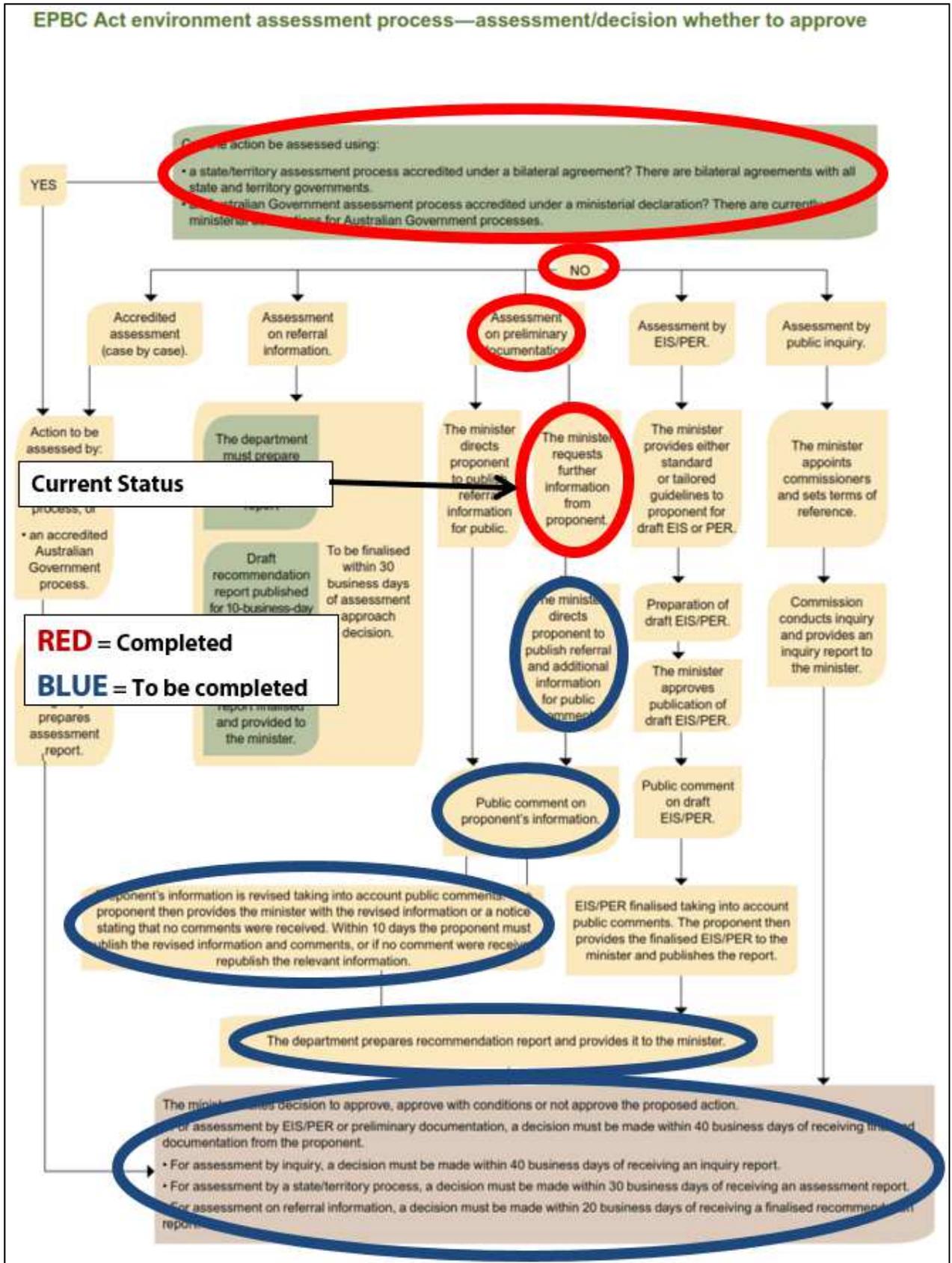
The Rawlings Road Development, Deebing Heights Ipswich, Queensland (EPBC) 2016/7723) residential development was issued a Controlled Action determination under the EPBC Act by the **DoE** on 2 August 2016. The referral submission nominated the project as Not a Controlled Action, however, the **DoE** deemed it to be a Controlled Action based on potential impacts to Listed threatened species and communities (sections 18 & 18A), and it being a Commonwealth action (section 28).

Consequently, the project is to be assessed through “Preliminary Documentation”, which is one of six assessment processes available under the EPBC Act. The assessment flowchart, provided below, has been highlighted in red to show components of the assessment already completed, also noting the current status of the project and remaining actions to be undertaken in blue. With the Controlled Action determination, the **DoE** has listed out the additional information they require to be provided within this Preliminary Documentation report, received on 29 March 2017. The additional information requested revolves around the Koala (*Phascolarctos cinereus*), with a focus on the following items:

2. Description of the environment – including Koala habitat, current nature, extent, and severity of threats to the Koala and Koala habitat, and information on Koala exclusion fencing and Koala movement devices;
3. Quantification of impacts on Koala habitat – including area of Koala habitat to be directly and indirectly impacted, and expected extent, nature, and severity of edge effects impacts;
4. Avoidance and mitigation – including details and measures to on avoid and mitigate edge effects, and expected effectiveness;
5. Proposed offsets – relevant to any residual impacts to affected MNES, including direct offset location, time-specific outcomes, management actions, and offset scores; and
6. Social and economic costs and benefits.

The full request for Additional Information issued by **DoE** is included at **Attachment A1**.







I.7. Purpose of this Preliminary Documentation Report

The purpose of this Preliminary Documentation Report is to provide additional information to the **DoE** to accompany the Preliminary Documentation assessment process and ultimately obtain formal approval for the Rawlings Road Development, Deebing Heights Ipswich, Queensland (EPBC) 2016/7723) project. To achieve this purpose, the structure of the report lists out and responds to each item of additional information items requested by the Department. In many instances the response draws on technical documents included as Attachments to this report.

Table A1 shows where the response to each Additional Information request item can be found within this document (as required under Additional Information request item #1.3).



Table A1: Reference table indicating where items from additional information request are located in this report.

Additional Information Request Item		Section of PD Report
Item Number	Item	
1	General	
1.1-1.4	General items to be addressed in report	Throughout report
2	Koala: Description of the Environment	
2.1	Koala Habitat in Eastern Portion of Site	2.1
2.2	Nature, Extent, and Severity of Threats to Koala and Habitat	2.2
2.3	Detail on Koala Exclusion Fencing and Koala Movement Devices	2.3
2.4	Extent and Quality of Koala Habitat on Southern Lots	2.4
2.5	Extent, Nature, and Severity of Edge Effects to Koala Habitat on Southern Lots	2.5
2.6	Limitations	2.6
	Summary of Threats and Contextual Information	2
3	Koala: Quantification of Impacts	
3.1	Area of Koala Habitat to be Directly and Indirectly Impacted	3.1
3.2	Extent, Nature, and Severity of Edge Effects to Koala Habitat on Southern Lots	3.2
3.3	Limitations	3.3
4	Koala: Avoidance and Mitigation	
4.1	Proposed Avoidance and Mitigation Measures for Edge Effects	4.1
4.2	Assessment of Expected Effectiveness of Avoidance and Mitigation Measures	4.2
4.3	Limitations	4.3
4.4	EMP Details	4.4
5	Koala: Offsets Assessment	5
6	Social and Economic	6



2. Koala: Description of the Environment

The following was requested by the **DoE** in Item 2 of the Additional Information required to complete the Preliminary Documentation assessment, with regards to Koala (*Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)).

The Department considers the area of Koala habitat on the project site is likely to be larger than stated in the referral. It is unclear why mapped trees at the eastern end of the project site are not considered Koala habitat. To clarify the above, the Preliminary Documentation must:

2.1: explain (with supporting literature) why the trees at the eastern end of the project site are not considered Koala habitat

OR

provide a map of all Koala habitat trees and area of Koala habitat (in hectares) on the project site, including at the eastern end of the project site. Trees must be included in the map if they are ≥ 100 mm diameter at breast height and are food trees, could provide refuge from predators, or could be used by Koala for shelter and/or thermoregulation;

2.2: provide an empirical assessment of the current nature, extent and severity of threats to the Koala and its habitat on both the proposed action site and the lots adjoining the southern edge of the project site (lots 198 and 199);

2.3: provide empirical information on the presence, location, design type, and dimensions of any Koala exclusion fencing and Koala movement devices (underpasses) on the Centenary Highway, South Deebling Creek Road, and Rawlings Road surrounding the project site;

2.4: provide an empirical assessment of the extent and quality of Koala habitat present in the lots adjoining the southern edge of the project site (lots 198 and 199). The assessment must use the same methodologies as applied to the project site, including use of the Koala Habitat Assessment Tool from the Koala Referral Guidelines. If these properties are not legally accessible please provide desktop assessment;

2.5: provide an assessment of the extent, nature, and severity of current edge effect impacts on Koala habitat within lots 198 and 199 resulting from the Centenary Highway, South Deebling Road. If these properties are not legally accessible please provide desktop assessment; and

2.6: detail all limitations in the methodologies, results, technologies, information and work done to complete items 2.1 through 2.5 of this information request.

2.1 Koala Habitat within Eastern Portion of Site

The area of Koala habitat on-site included in the referral was initially guided by the *South East Queensland Koala Conservation State Planning Regulatory Provisions* (Koala SPRP) mapping. The Koala SPRP came into effect in May 2010, aiming to protect areas of highest priority for Koala conservation action by regulating new development at the assessment stage. It therefore targets areas of the Koala Coast and Pine Rivers (Priority Koala Assessable Development Areas) and prohibits clearing bushland habitat in these areas, as well as areas outside the urban footprint. It also covers Koala Assessable Development Areas, which are areas managed under previous state Koala conservation initiatives.

The eastern portion of the site, including the area queried in the Additional Information request is mapped under the Koala SPRP as Low Value Rehabilitation Habitat (refer **Figure A4**) and is therefore not considered to be Koala habitat under the SPRP.



Similarly, specific to vegetation type and condition on-site, the *Vegetation Management Act 1999* (VMA) maps the majority of the property as non-regulated vegetation, including that within the eastern portion of the site (refer to **Figures A3 and A4**) and therefore not likely Koala habitat. The eastern portion of the site does not constitute a forest or woodland under the definition and is therefore not considered Koala habitat. The Koala Habitat Assessment Tool states that:

"Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata" as the site is not consistent with a forest, woodland or shrubland by definition it is not considered to be Koala habitat.

The eastern portion of the site can best be described as an open paddock with only a handful of canopy trees. The mid canopy is all but void of any species and the canopy species (Refer to **Photos 1-4**)



Photos 1-2. Eastern portion of site, facing north along South Deebing Creek Road.



Photos 3-4. General site vegetation – regrowth and scattered trees over maintained paddocks.

Vegetation located in the eastern portion of the site has been left out of the critical habitat as the sparsity of the canopy does not constitute a woodland or shrubland. Current vegetation density on the eastern portion of the site has been calculated to be 1 tree every 654.3 m² (7 ha / 107 trees, or at 0.004 ha per tree as per the Koala SPRP, approximately 6%) canopy cover of open Shrublands or Woodlands vary from 50% to 20% (Bulter, 2014).



Any transect completed for structural form would lead to a canopy cover of much less than 20% and in most cases 0%, and therefore does not constitute an Open Woodland or Scrubland (Neldner, 2012). Considering the sparsity of the vegetation, the vegetation composition scoring system in the Koala habitat assessment tool and the lack of canopy, the eastern portion of the site is not considered to be critical habitat.

Under the Koala Habitat Assessment Tool this portion of the site would score a 3 as the onsite vegetation does not constitute a forest, woodland or shrubland. As the eastern portion of the site scores a 3 under the Koala Habitat Assessment Tool, it is not considered critical habitat.

2.2 Current Nature, Extent, and Severity of Threats to the Koala and its Habitat

Following the lodgement of the original Referral for the site and the resulting Controlled Action decision, further desktop and site survey work has been conducted to collate more information on the site and the surrounding area, for inclusion in this Preliminary Documentation Report. This information is presented throughout this report, and in response to the Additional Information request received.

2.2.1 Desktop Research: Koala Sightings

Additional Koala desktop research has been conducted, with all searches performed on 11 January 2017, to update the previous searches completed in April/May 2016. The results show no new Koala sightings recorded in proximity to the development site, as found on the **Koala Tracker** map (refer **Figure A5**, Koala Tracker is a crowd sourced National Koala sighting records database) or on the **Atlas of Living Australia** database map (refer **Figure A6**).

The **Koala Tracker** map shows the two most recent sightings of live Koalas were recorded in 2015. One sighting was near Churchill, approximately 3.8 km north of the development site, and the second was 7.8 km to the south west of the site (**Figure A5**). The Figure also shows the landscape as heavily fragmented between the site and the location of the Churchill sighting, by major roads (including the Cunningham Highway), and dense residential development. The increased amount of residential development and roads in this area brings with it an increased number of dogs and volume and frequency of traffic, which are both known threats to the Koala (EPBC Referral Guideline). The Koala sighting to the south west of the site is fragmented from any vegetation on the subject site by the Centenary Highway (which includes fauna fencing) and Ipswich-Boonah Road. In addition to these two main roads and other roads in the area, the vast majority of vegetation between the site and the Koala record has been cleared, and is regularly maintained as paddock for the surrounding rural residential and grazing properties, limiting connectivity of vegetation to the site.

The records from the **Atlas of Living Australia**, within a 10 km radius include three from the 1970s (two in Amberley in 1972, and one southwest of the development site in 1975 – outside the range shown in **Figure A6**). There is also one record east of Deebing Heights, named only as an undated “preserved specimen” (**Figure A6**). There are no records of sightings of live Koalas in the area in this database since 1975.

A search for all Koala records within the area, captured in the Queensland **Department of Environment and Heritage Protection (EHP) WildNet** database are displayed on **Figure A7** for the site, applying a 5 km radius. As shown on **Figure A7**, only one record of Koala has been recorded on the project site, from July 2002. Four records exist on the two properties to the south between the site and the Centenary Highway. These four records occur in two locations, with the western icon on **Figure A7** representing sightings in September and October 2010, and the



icon in the east representing two records on the same date in November 2004. One record from 1987 occurs immediately to the north-west of the site, and one further north, along Grampian Road between the site and the Cunningham Highway from 2007. One record of a Koala exists on the property to the east, across Grampian Drive, dated 2010.

The majority of Koala records in the broader area from the **WildNet** database are centred around Middle Road (approximately 3 km to the east of the site, across the Centenary Highway and Ipswich-Boonah Road), dated from 1987 – 2005; along Purga Creek, approximately 4.5 km to the south-west (again, across the Centenary Highway and Ipswich-Boonah Road, dated from 1987 to 2010), and the now developed areas of Churchill (across development, roads, and the Cunningham Highway) and Ripley (approximately 2.8 km to the east, across multiple roads).

Additionally, the **Australian Koala Foundation** database map of Koala sightings was also reviewed on 11 January 2017. This map showed the closest sightings of healthy Koalas to be approximately 1.2 km away, but on the northern side of the Cunningham Highway, between the highway and Churchill. These two records are from 2009 and 2013. An additional record was in Willowbank in 2011, approximately 5 km west of the site. The closest sighting from the southwest of the site was approximately 15 km away. As with most other databases, no recent sightings near to the project site were recorded.

The **Koala Tracker** map also shows two records nearby of sick / injured Koalas – one recorded as being sick by disease (approximately 5.6 km to the northeast in September 2012), and one injured by car (approximately 4.2 km southwest in August 2013) (refer to **Figure A5**). One record from March 2010 shows a Koala killed by disease, approximately 5.1 km to the southwest. These records indicate that the threats of vehicle strike and disease have been present in the area for over seven years. With the developments which have occurred to date, and those that are approved and/or planned to occur in the future as part of the Ripley Priority Development Area, these threats to Koala persistence in the area will continue to increase.

The **Department of Environment and Heritage Protection** has published data sets of Koala incidents obtained from the Daisy Hill and Moreton Koala hospitals in South East Queensland. These data sets provide locations only, and do not specify the type or severity of the incident, nor the date of recording. On review of the data, it was determined that there have been seventeen (17) recordings of Koala incidents requiring hospitalisation within 4 km of the subject site over an unspecified period (refer **Figure A8**). Recorded incidents surround the site, but are concentrated to the north in areas of human habitation where conflicts and public records are most likely (**Figure A8**). There is clearly a high incidence of Koala incidents requiring hospitalisation within proximity to the subject site.

In general, the most recent live Koala sightings recorded were in 2015. The vegetation and habitat between the sighting and the development site are heavily fragmented, providing minimal vegetated connectivity. The increase in residential development throughout this area (which is a declared Priority Development Area for Queensland) has resulted in vegetation clearing, development of road networks, a proposed rail line, implementation of fauna fencing along main roads, increased traffic, and an increased number of dogs in the area. All of these aspects would be considered to provide threats to Koalas, and act as deterrents for Koala movement.



2.2.2 Desktop: Updated Contextual Information

As mentioned in **Section 2.2.1** above, the area surrounding the proposed development site is severely fragmented from other vegetation through the recent establishment of highways, roads, and increasing residential development. The Referral documentation described the site's location on Rawlings Road (also known as Siddans Road), approximately seven kilometres south of Ipswich City, and approximately 30 km southwest of Brisbane CBD. The site is immediately adjacent to the Ripley Valley Priority Development Area (PDA), which was declared in 2009 under the South East Queensland Regional Plan 2009-2031 (SEQRP) by the State Government because of its potential to absorb a vast proportion of the regional area's population over the two-decade timeframe. The SEQRP indicates a serious population influx to the region, with projections of 120,000 residents needing to be accommodated in more than 50,000 dwellings.

The site is bound by existing roads, with the Centenary Highway (which connects the Springfield area to the Ipswich and Cunningham Highways) to the west and south, Rawlings Road to the north, and South Deebing Creek Road to the east. The Cunningham Highway is approximately 1 km north of the site. As described in the Referral, the project site is surrounded by recently developed residential areas, including immediately north of Rawlings Road, immediately south of the Centenary Highway, and east of the site, with many more developments in the wider landscape (refer **Part B Plan 2**). These developments have resulted in the clearing of these surrounding properties fragmenting the landscape throughout much of the Ripley Valley.

Further, there are a number of areas surrounding the project site that are not yet developed or within the approval process, as shown on **Part B Plan 2**. The Ripley Valley PDA zoning has declared a number of these areas (particularly those close to the subject site) as being for Urban Living Areas (refer **Plan A1**). **Plan A2** shows the outlines of these developments, with the latest available aerial imagery showing where vegetation currently remains (noting the aerial imagery is from 2015 and developments and vegetation clearing in the area have progressed rapidly over the last two years).

Additionally, the area immediately surrounding the proposed development site is highly impacted and fragmented. The site to the north of Rawlings Road has been completely cleared and construction of the residential development has commenced (refer **Plans A1, A2.1, A2.2, A2.3 & A2.4** and **Part B Plan 2**). There are also numerous surrounding residential developments proposed and under construction, such as Paradise Heights, Paradise Waters, and Ripley McHale, which have all been deemed not a controlled action or received approval under the EPBC Act to proceed (**Plans A1, A2.1, A2.2, A2.3 & A2.4** and **Part B Plan 2**). In addition, there are currently proposals for sites to the south of Centenary Highway, and on both sides of Grampian Drive (to the south of the subject site) which are under referral with several more likely to occur within the next few years. The PDA also includes an extensive road network, in addition to the established Centenary Motorway, and the proposed Ipswich-Springfield rail line, both of which transect and fragment the PDA.

These developments are in line with the State and Local Government planning intent for the area, however, it is noted that the proposed developments surrounding the subject site significantly limit the connectivity and vegetation values remaining in the landscape. Furthermore, the existing site is isolated on all sides by highways and roads and is likely to become increasingly isolated as future development occurs.

2.2.3 Threats

The development of a residential estate is likely to increase the number of dogs entering the area. However, it is expected that dog activity already occurs on surrounding properties, and possibly on the subject site. Dogs are a known threat to the Koala (Oliveria S, 2014). The residential development will implement appropriate governance



and guidance regarding dog ownership to new home buyers, ensuring interaction between dogs and Koalas is mitigated, and therefore it is not expected that dog attacks on Koalas will increase as a result of the development. There have been seventeen (17) recordings of Koala incidents requiring hospitalisation within 4 km of the subject site over an unspecified period (refer **Figure A8**).

Vehicle activity will increase in the area, and through the site, as a result of the development (Oliveria S, 2014) (Dique, 2003). However, given the site is surrounded by Major roads and highways as well as various forms of urban development, no Koalas were recorded on-site and very few Koalas have been recorded in the last few years within 5 km of the site, and the relatively small size of the proposed development, interaction between vehicles and Koalas is considered unlikely to be significantly exacerbated as a result of the development.

Most of South East Queensland's Koala populations (including within the Ipswich area) are already known to have a high prevalence of Chlamydia infection and Koala Retrovirus (Oliveria S, 2014). The symptoms of these diseases are often observed within Koala populations undergoing environmental stresses, such as overcrowding and poor nutrition. The project is unlikely to cause pressure on a local Koala population (noting that no Koalas have been seen on-site or in close proximity to the site) to the point where these diseases manifest. Further, the project is extremely unlikely to introduce or spread disease or pathogens into any Koala habitat areas.

While the proposal will restrict Koala movement through the site, given that the vegetation existing on-site is already highly isolated and fragmented from any other vegetation due to surrounding roads on all sides, it is arguable that this will not result in impacts to dispersal. As it currently stands, the site and areas potentially edge effected are largely fragmented from other habitat patches due to these roadways and encroaching development, and therefore there is no means currently for the safe movement of the Koala to or from the site. In addition, the surrounding properties are earmarked for residential development in line with planning intent, with properties to the north of Rawlings Road already established. This surrounding development will further isolate any vegetation on-site. As such, the impacts caused by potential barriers to dispersal within the development area are considered to be minimal (Oliveria S, 2014).

2.2.4 Additional Field Survey Results

Additional field surveys were conducted in late 2016 to collect further information on Koala usage of the site and surrounding areas, and potential threats to ongoing use. Methods used included the Spot Assessment Technique (SAT, following Phillips & Callaghan 2011), as well as searches for other signs of usage, including scratch marks.

The SAT method is an assessment of Koala activity involving a search for any individuals and signs of usage. The SAT involves identifying a non-juvenile tree of any species within the site that is either observed to have a Koala or scats or is known to be a food tree or otherwise important for Koalas, and recording any evidence of Koala usage of that tree including presence, identifiable scratches or scats. The nearest non-juvenile tree is then identified and the same data recorded. The next closest non-juvenile tree to the first tree is then assessed and so on until 30 trees have been surveyed. The number of trees showing evidence of Koala activity is expressed as a percentage of the total number of trees sampled to indicate the frequency of Koala usage. Assessment of each tree involves a systematic search for Koala scats beneath the tree within one-meter radius of the trunk. After approximately two person minutes of searching for scats, the base of the trunk is observed for scratches and the crown for Koala (refer Phillips & Callaghan 2011).

The SAT methodology developed by Phillips and Callaghan (2011) has been applied, with the corresponding **Australian Koala Foundation (AKF)** Koala activity level classification table for the East Coast (med-high) Activity



Category (**Table A2**). For this site, the **Australian Koala Foundation** Koala activity level classification East Coast (med-high) Activity Category has been applied, as it is applicable in habitats dominated by residual, transferral or alluvial type landscapes considered med-high nutrient soils with good water holding capacity (Steve Phillips, personal communication). The soil type mapped across the subject site is chromosols, which have medium water-holding capacity and chemical fertility. Additionally, the presence of low-lying land associated with the two mapped waterways on-site would suggest Koala density in the absence of disturbance and threats could be medium to high in this area, supporting the activity category applied.

Table A2: AKF Koala Activity Level Classification Table.

ACTIVITY CATEGORY	LOW USE	MEDIUM (NORMAL) USE	HIGH USE
Area (density)			
East Coast (low)	< 9.47%	≥ 9.47% but ≤ 12.59%	> 12.59%
East Coast (med – high)	< 22.52%	≥ 22.52% but ≤ 32.84%	> 32.84%
Western areas (med – high)	< 35.84%	≥ 35.84% but ≤ 46.72%	> 46.72%

As noted in the Referral (**Part B**), evidence of Koala usage was considered to be predominantly low to medium based on the four SAT surveys across the site, with no individual Koalas observed throughout the survey period. The additional field surveys included opportunistic observations of historical Koala activity within adjoining vegetation in the form of scats (refer **Plan A3**), Results for the SAT surveys are included in **Table A3**.

Table A3: Results from SAT surveys.

SAT (Spot Assessment Technique) Assessment No.	Evidence of Koala Use (%)	Koala Use (High / Medium / Low)
Original Field Survey		
1	23.33	Medium
2	16.67	Low
3	13.34	Low
4	20.00	Low

The survey also considered Koala movement constraints within proximity of the site, by assessment of features present on-site that allow and those that prohibit or encourage safe Koala movement. Features noted included barriers to movement, in the form of roads, fauna fencing, development, dogs and cleared land. Areas which would encourage Koala movement were also noted, generally being vegetated areas to allow safe, unimpeded movement for Koala, including suitable vegetation types and low densities of weeds which would otherwise prohibit movement. Features and locations were noted and photographed, and used to assess the movement constraints around the site. The results of these observations are also contained below.

2.3 Presence, location, design type and dimensions of Koal Exclusion Fencing

2.3.1 Koala Exclusion Fencing

Koala Exclusion fencing is discussed in the following section of this report. For the ease of the reader this will be discussed via graphical location in relation to the referral area. All Koala exclusion fencing is of the standard design set by the department of Transport and Main Road QLD. This standard is as follows:

environmental management preliminary documentation report



- 1800 mm in height;
- Main fencing consists of galvanised chain wire fencing;
- Additional koala exclusion material consists of a galvanised sheet securely fastened to the top 600mm of the 1800mm high fence; and
- Galvanised sheet is 600mm in width. Please refer to **photos (4-9)** for evidence of the koala fencing found in the immediate surround of the site.



Photos 4-8 Photo Evidence of Koala fencing found neighbouring the site.



Photo 9 Doctor Andrew Ridley (Senior Environmental Scientist) assessing the Koala Exclusion Fencing near the site to ensure fencing is compliant with TMR's Standard Drawing 1603.

Standard Koala proof fencing drawing 1603 can be viewed in **Attachment A5**. Fencing was assessed against this drawing as can be seen in the above photographic evidence. Fencing locations can be viewed on **Plan 5**.

2.3.2 North of the Project Site

The Sovereign Pocket estate is located immediately north of the subject site. This development has been completed, with residential properties established and inhabited. **Plan A2.1** and **Photos 10-21** show the layout and number of residential lots that have been established, as well as the road network constructed within the development. The vast majority of trees that were present on the site have been removed, with only a few, fragmented scattered trees remaining, adjacent to the new roads. Rawlings Road exists between Sovereign Pocket estate and the proposed DHA development (refer **Photos 11-16**), with fences along the southern boundaries of Sovereign Pocket estate.

With regard to potential Koala movement north of the subject site, the following observations were made:

- Rawlings Road bounds the site to the north, with the Sovereign Pocket estate to the north of the road.
- Directly north of the subject site and Rawlings Road is a recently constructed school, with very few remaining Koala trees and high density residential development.



- Movement north of the Cunningham Highway appears to be limited to the Kerners Road underpass (approximately 1 km to the north of the site). However, between the subject site and the underpass the majority of the land that would be traversed is open with limited vegetation, providing further risk to the likelihood of Koala survival.

It is considered that the number of new residential lots in this area, new roads and fencing, and the increased traffic do not provide suitable habitat or connectivity for native fauna, including the Koala. Attempting to provide habitat connectivity to the north, into the Sovereign Pocket estate, or toward the Cunningham Highway is unwarranted, and in fact, would exacerbate current dangers to the Koala.



Photos 10-11. Established Sovereign Pocket Development, immediately north of the project site.





Photos 12-15. Established Sovereign Pocket Development, immediately north of the project site.



Photos 16-17. Southern boundary of Sovereign Pocket, along Rawlings Road, across the road from the proposed development.





Photos 18-21. Southern boundary of Sovereign Pocket, along Rawlings Road, across the road from the proposed development.

2.3.3 East of the Project Site

The subject site is bound to the east by Grampian Drive (refer **Figure A1**), which is becoming an increasingly busy road as the Ripley Valley area is being developed. Grampian Drive forms the western extent of the Ripley Valley PDA (refer **Part B Plan 2**). The Grampian Drive road reserve, adjacent to the site (refer **Plan A2.3 & A2.4**), contains minimal vegetation, and as a result, there is an area of approximately 20 m completely cleared of all vegetation except grass. Additionally, as can be seen on the aerial, the eastern portion of the subject site is the most sparsely vegetated part of the site (refer **Plan A2.3 & A2.4**). The vegetation on the rest of the subject site is isolated and patchy, whereas the eastern area contains horses and a shrub and ground layer largely devoid of native species. The sparse canopy species towards the east are dominated by *Eucalyptus moluccana* (Gum Topped Box).

Across Grampian Drive from the subject site a development, South Deebing Road, has been assessed the **Department of the Environment and Energy** as Not a Controlled Action and it has therefore been determined that a significant impact is not considered likely (EPBC Reference number 2009/4818). The project is anticipated to consist of 137 residential lots, a shopping centre, townhouses, and linear open space (refer to **Plans A1 & A3** and **Part B Plan 2**). As can be seen from the aerial imagery below, even prior to any construction of this residential development, a large area of this site contains limited vegetation values, reflecting mostly cleared and maintained grass, with some scattered canopy trees. It is noted that the property east of Grampian Drive also contained a number of domestic dogs during the site survey in December 2016. This was an incidental observation off site and therefore not recorded in the Ecological Assessment. Dogs are a known threat to the Koala, therefore, their presence here presents further risk to Koala survival (Clive McAlpine, 2015) (Henning, 2015).

The following observations were made along Grampian Drive (adjacent and near the subject site) with relevance to potential Koala movement barriers:

- The application site is located off Grampian Drive, approximately 140 m north of the intersection of Grampian Drive and the Centenary Highway.
- Grampian Drive is within a 60 kilometre per hour speed zone and the site is located within an urban growth corridor, therefore an increasing number of vehicles are accessing the highway (Department of Infrastructure, Local Government and Planning, 2017) (Owens, 2014).



- Grampian Drive isolates the site from the vegetation to the east of the road.
- Only one round concrete pipe was located opposite the development site under Grampian Drive (refer **Photo 26**). This pipe is approximately 1.6 m in diameter and is not considered suitable for Koala movement. This pipe caters for a stream order one watercourse, and is highly disturbed at both ends – on the subject site and to the east of Grampian Drive. The likelihood that Koalas would utilise this pipe for movement to the east is considered limited (Queensland Department of Main Roads, 2002).

Overall, it is considered that the number of new residential lots expected in the area, with associated new roads and fencing, and the increased volume of traffic and number of dogs that will result from the increased development do not provide for suitable habitat or connectivity for native fauna, including the Koala (Council, 2009). It is considered that attempting to provide habitat connectivity across Grampian Drive, to the east is not warranted, and in fact would present increased danger to the Koala. (David S. Dique, 2003) Further, as this land to the east of Grampian Drive is approved for residential development, and does not provide for Koala habitat on the other side of the road.

The aerial image and associated **Photos** below provide visual context for the land adjacent to the east of the subject site.



Photos 22-23. Taken from the south eastern boundary of the subject site, looking across Grampian Drive. Some vegetation present, however in a highly disturbed condition, and adjacent to an increasingly busy road. As developments around this road are constructed, fauna fencing will be erected, and there will be limited opportunity or benefit for Koala movement.



Photo 24. Taken from the south eastern boundary of the subject site, looking across Grampian Drive. Some vegetation present, however in a highly disturbed condition, and adjacent to an increasingly busy road. As developments around this road are constructed, fauna fencing will be erected, and there will be limited opportunity or benefit for Koala movement.



Photo 26. Stormwater pipe located adjacent to the subject site, under Grampian Drive.

2.4 Assessment of the Extent and Quality of Koala Habitat (Southern and Western Road Reserve)

Additional assessments of the assessments of both the southern lots boundary (Lots 198 and 199) and western road reserve were implemented. Vegetation extent and quality of Koala habitat was consistent with that of the directly impacted portion of the subject site. The southern lots were not legally accessible therefore the assessment was made with line of sight observations, boundary line assessments and desktop mapping. From these assessments the following can be concluded.

- The additional site survey in December 2016 assessed the vegetation observed between the southern property boundary and the Centenary Highway (refer **Table A4**). This vegetation is dominated by *Corymbia citriodora* (Spotted Gum) with the occasional *Eucalyptus crebra* (Narrow Leaf Ironbark), *Eucalyptus tereticornis* (Forest Red Gum), and *Corymbia tessellaris* (Moreton Bay Ash) specimen. As per the field survey plan (**Plan A3**) this secondary investigation area is approximately 10.9 hectares in size and located within Lots 198 and 199 on SP193445.



- Within Lots 198 and 199, approximately 6.9 ha is mapped as Least Concern Regional Ecosystem (RE) 12.9-10.2, with the balance of the area mapped as containing non-remnant vegetation typical of the same RE, however, it is dominated by a number of *Acacia* species including *Acacia concurrens* (Black Wattle), *Acacia disparrima* (Hickory Wattle), and *Acacia leiocalyx* (Early Flowering Black Wattle) (refer **Table A4**).
- The vegetation opposite the southern property boundary contains greater densities of sub-canopy trees as well a shrub layer typical of this land zone and RE community. Forty-one flora species were identified throughout this polygon, of which approximately 41% are introduced species. It is also noted that *Lantana camara* (Lantana) was recorded throughout the majority of this external patch with a large portion containing severe infestations. Lantana is a known deterrent to Koala movement (Government, 2016).
- Two SAT surveys were completed in this area (road reserve) of vegetation to determine the level of Koala use, both of which showed Low Koala use of the area. One SAT survey found scats under two trees (equaling 6.67% use) and one found scats under one tree (3.33% use) (refer **Table A3**). Similar to the western area of vegetation described below, the southern portion of these lots is also bounded by the Centenary Highway, which has Koala exclusion fencing that ends at the intersection of Grampian Drive, to the east.



Photos 27-28. From photo location "A" looking toward the Centenary Highway. Highly disturbed vegetation, with weed infestations, bare ground, minimal canopy trees, and a fauna fence along the highway. Minimal opportunity for Koala movement, however further limited by fauna fencing.



Photos 29-30. From photo location "B" looking toward the Centenary Highway. Highly disturbed, with minimal vegetation. Minimal opportunity for Koala movement.



Table A4: Site Flora Species – Southern Boundary.

Scientific Name	Common Name
<i>Scientific Name</i>	Common Name
<i>Acacia concurrens</i>	Black Wattle
<i>Acacia disparrima</i>	Hickory Wattle
<i>Acacia glaucocarpa</i>	Hickory Wattle
<i>Allocasuarina littoralis</i>	Black She-oak
<i>Allocasuarina luehmannii</i>	Bull Oak
<i>Alphitonia excelsa</i>	Soap Tree
<i>Aristida calycina</i>	Dark Wiregrass
<i>Aristida sp.</i>	Wire Grass
<i>Bidens pilosa</i>	Cobbler's Pegs
<i>Calotis cuneifolia</i>	Burr Daisy
<i>Chloris gayana</i>	Rhodes Grass
<i>Chrysocephalum apiculatum</i>	Yellow Buttons
<i>Corymbia citriodora</i>	Spotted Gum
<i>Corymbia tessellaris</i>	Moreton Bay Ash
<i>Eremophila debilis</i>	Winter Apple
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus tereticornis</i>	Blue Gum
<i>Eustrephus latifolius</i>	Wombat Berry
<i>Flindersia australis</i>	Crow's Ash
<i>Glycine microphylla</i>	Cow Pea
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush
<i>Heliotropium amplexicaule</i>	Blue Heliotrope
<i>Jacksonia scoparia</i>	Dogwood
<i>Lantana camara</i>	Lantana
<i>Lantana montevidensis</i>	Creeping Lantana
<i>Lomandra longifolia</i>	Long-leaved Matrush
<i>Lomandra multiflora</i>	Many Flowered Mat Rush
<i>Lophostemon suaveolens</i>	Swamp Box
<i>Ludwigia sp.</i>	Peppergrass
<i>Melinis repens</i>	Red Natal Grass
<i>Ochna serrulata</i>	Ochna
<i>Opuntia sp.</i>	Prickly Pear
<i>Passiflora suberosa</i>	Corky Passion Vine
<i>Patersonia sp.</i>	Native Iris



Scientific Name	Common Name
<i>Pomax umbellata</i>	Pomax
<i>Portulaca pilosa</i>	Hairy Pigweed
<i>Sida cordifolia</i>	Flannel Weed
<i>Stachytarpheta cayennensis</i>	Dark Blue Snake Weed
<i>Themeda triandra</i>	Kangaroo Grass
<i>Typha sp.</i>	Bullrush
<i>Verbena bonariensis</i>	Purple-top Verbena

The additional field survey in December 2016 also included the vegetation between the western property boundary and the Centenary Highway (refer **Table A5**). The results of the site surveys in this area found that this vegetation is dominated by *Corymbia citriodora* (Spotted Gum) with the occasional *Eucalyptus crebra* (Narrow Leaf Ironbark), *Eucalyptus tereticornis* (Forest Red Gum), and *Corymbia tessellaris* (Moreton Bay Ash). This patch of vegetation is located within the existing road reserve, within an area proposed for the future Ipswich-Springfield rail line. The vegetation in this area is largely disturbed along the boundary and is best described as patchy, with a very sparse shrub layer and a ground layer dominated by introduced grasses. The boundary of the Centenary Highway contains Koala exclusion fencing which prevents any movement across the Highway and to the western side.

A single scat meander within the vegetation in this area resulted in locating a Koala scat (refer **Plan A3**). Although five (all identified as *Corymbia citriodora* (Spotted Gum)) of the 30 trees were recorded to have scats, this equates to a use level of 16.67%, which is a Low Koala usage level (refer **Table A3**), using the SAT methodology and **AKF** Koala activity level classification table for the East Coast (med-high) Activity Category (**Table A2**).

Twenty-seven flora species were identified within this portion of the assessment area, with over 60% of these identified as native species. Introduced species were largely confined to the ground layer with the occasional clump of *Lantana camara* (Lantana). Lantana is a known deterrent to Koala movement (Government, 2016).



Photos 34-35. From photo location "D" looking toward the Centenary Highway. Some Eucalypts present, however in a highly disturbed condition, and adjacent to the fauna fence bounding the highway, therefore no opportunity or benefit for Koala movement.



Photos 36-37. From photo location "E" looking west toward the Centenary Highway. Some Eucalypts present, in a highly disturbed condition, and adjacent to the fauna fence bounding the highway. No opportunity or benefit for Koala movement.



Photo 38. From photo location "E" looking west toward the Centenary Highway. Some Eucalypts present, in a highly disturbed condition, and adjacent to the fauna fence bounding the highway. No opportunity or benefit for Koala movement.



Photos 39-40. From photo location "E" looking north. Some Eucalypts present, however in a highly disturbed condition, and adjacent to the fauna fence bounding the highway on the west and the Sovereign Pocket estate to the north. No opportunity or benefit for Koala movement.



Table A5: Site Flora Species – Western Boundary.

Scientific Name	Common Name
<i>Acacia disparrima</i>	Hickory Wattle
<i>Acacia fimbriata</i>	Brisbane Wattle
<i>Acacia glaucocarpa</i>	Hickory Wattle
<i>Alphitonia excelsa</i>	Soap Tree
<i>Aristida calycina</i>	Dark Wiregrass
<i>Aristida sp.</i>	Wire Grass
<i>Bidens pilosa</i>	Cobbler's Pegs
<i>Cheilanthes distans</i>	Bristle Cloak Fern
<i>Chloris gayana</i>	Rhodes Grass
<i>Corymbia citriodora</i>	Spotted Gum
<i>Corymbia tessellaris</i>	Moreton Bay Ash
<i>Corymbia trachyphloia</i>	Brown Bloodwood
<i>Dianella caerulea</i>	Blue Flax-lilly
<i>Eragrostis brownii</i>	Brown's Lovegrass
<i>Eremophila debilis</i>	Winter Apple
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus tereticornis</i>	Blue Gum
<i>Lantana camara</i>	Lantana
<i>Melinis repens</i>	Red Natal Grass
<i>Opuntia sp.</i>	Prickly Pear
<i>Parsonsia straminea</i>	Monkey Rope
<i>Paspalum dilatatum</i>	Paspalum
<i>Passiflora suberosa</i>	Corky Passion Vine
<i>Pomax umbellata</i>	Pomax
<i>Portulaca pilosa</i>	Hairy Pigweed
<i>Sida cordifolia</i>	Flannel Weed
<i>Tagetes minuta</i>	Stinking Roger

Based on the above assessment the southern lots and western boundaries of the site it was concluded that the Site and the adjoining southern lots scored 5 of 10, as for the clearing area, when using the Koala Habitat Assessment Tool from the Koala Referral Guidelines (refer to **Attachment A6**).



2.5 Current Nature, Extent, and Severity of Threats to the Koala and its Habitat (Southern and Western Lots)

2.5.1 West and South of the Project Site

The western portion of the site is bound by the Centenary Highway (which connects the Springfield area to the Ipswich and Cunningham Highways). The Highway continues from the west, to the south of the subject site, with the road reserve on average approximately 120 m from the site, and the road itself approximately 200 m from the site boundary. Between the south of the site and the Centenary Highway there are two undeveloped freehold lots (Lots 198 and 199), which are currently vegetated with scattered native species, and a number of weed infestations. These two lots are not owned by **DHA** and are currently not earmarked for development. Refer to **Plan A2.3 & A2.4** and **Photos 27-33** below. A desktop assessment and surveys revealed the following:

- Koala exclusion fencing extends along the Centenary Highway preventing Koala movement directly south of the development site.
- Koala exclusion fencing extends along the Centenary Highway preventing Koala movement directly west of the development site.
- This Koala exclusion fencing has been installed from the intersection of Grampian Drive (east of the site) through to the intersection of the Cunningham Highway (north of the site). The exclusion fencing continues along the Highway east of Grampian Drive and currently ends at the power easement, approximately 850 m east of the Grampian Drive/Centenary Highway intersection.
- Fauna movement along the edge of the Centenary Highway (within the road reserve) appears to be limited to a thin and patchy strip of non-remnant vegetation which is mainly located within the proposed future rail alignment. This vegetation contains a variety of Koala food trees including *Corymbia citriodora* (Spotted Gum), *Eucalyptus crebra* (Narrow Leaf Ironbark), *Eucalyptus moluccana* (Gum Topped Box), *Corymbia intermedia* (Pink Bloodwood), and *Eucalyptus tereticornis* (Forest Red Gum), however, vegetated areas are separated from other patches by open areas dominated by introduced grasses and shrubs. This thin corridor is fragmented, suffers edge effect, and is largely isolated from any remaining viable patch of vegetation containing Koala food trees.
- Only one round stormwater pipe was observed going under the Centenary Highway near the application site. The pipe was approximately 1.6 m in diameter, and was considered not suitable for Koala movement. The likelihood that Koalas would utilise this pipe for movement to the west is severely limited.



Photos 31-33. From photo location "C" looking toward the Centenary Highway. Highly disturbed vegetation, largely reflecting maintained grass. Fauna fence bounds the highway, therefore no opportunity of benefit for Koala movement.

Further to the west, across the Centenary Highway, there is a parcel of **DHA** land (the other portion of Lot 194 on SP193445) which is excluded from the development site and is not proposed for development. Rawlings Road bounds the west of that part of Lot 194, and west of Rawlings Road are rural residential properties which are largely cleared, retaining some scattered native and exotic trees. The land to the south of the Centenary Highway is currently under approval and/or development (refer **Part B Plan 2**), which, similarly to Sovereign Pocket to the north of the subject site, will result in the clearing of most vegetation and the establishment of residential allotments. As described in the Referral, the project site is surrounded by recently developed residential areas, including immediately north of Rawlings Road, immediately south of the Centenary Highway, and east of the site, with many more developments in the wider landscape (refer **Part B Plan 2**).

2.6 Limitations

Under Section 5 of the EPBC Act referral guidelines for the vulnerable Koala, both direct and indirect survey methods have been used in assessing the likelihood of Koala. As stated in the federal guidelines "Due to the difficulty in observing Koalas and the variable density of Koalas across the landscape, indirect methods are often the most effective for gathering presence /absence data" (Australian Government Department of the Environment, 2014). It should be noted that both direct and indirect methods were employed on the site. Direct observations yielded no results, while indirect methods (SAT surveys) indicated low to moderate Koala usage. Limitations of the employed indirect methods are as stated below.



SAT surveys pose certain limitations that are required to be highlighted. It should be noted that these limitations are consistent with other rapid survey techniques. Rapid survey techniques are used due to the time limitations of the referral process. SAT surveys allow for both past and present Koala evidence of Koala to be interpreted but fails to distinguish between the two. This can lead to higher percentage presence of Koala where no Koalas actually exist. On the other hand, the absence of Koala scats and identifiable scratches is not necessarily evidence of absence (Woosnam-Merchez et al 2012, Phillips and Callaghan 2000).

Pellet deposition under trees is supported to provide evidence of browse consumption but has clearly shown to be an unreliable indicator of diet, or long term habitation (Ellis et al. 2002, Phillips and Callaghan 2011). Estimating Koala abundance from faecal pellet survey is not reliable without prior knowledge of the actual Koala density in the area (Sullivan et al. 2002 and Rhodes et al. 2011). The SAT survey technique is not reproducible due to the randomness of factors. Ecologists may start in different areas and may sample different trees which will then yield different results (Woosnam-Merchez et al,2012). Ground cover variability is another limitation in the SAT survey methodology. Looking for scats in areas of thick ground cover can often yield lower results (Sullivan et al. 2002 and Rhodes et al. 2011).

Assessment of Koala presence through desktop database searches relies on findings being reported to the various site administrators and government officials, therefore it is not considered to be a true reflection of the greater distribution of Koalas relative to the site, but rather an overall indication of potential Koala occurrence near or on the site. Currently, no other methods of large scale Koala assessments are able to be produced unless large scale monitoring programs over long periods of time were commissioned by Government Agencies, Koala care groups or private backers.

Location and scope of the study can also limit the accurate collection of data. Most studies are site specific and are not able to incorporate a greater area due to time, budget and land access constraints. Rather, information on greater area Koala densities has been inferred from sources such as Wildnet and The Atlas of Living Australia.

2.7 Summary of Threats to the Koala and Contextual Information

In summary, as described in the Referral document, and detailed further above, the application area is bordered by the Centenary Highway to the west, Rawlings Road to the north, and Grampian Drive (also known as South Deebling Creek Road) to the east. The Centenary Highway is also south of the site, approximately 200 m away. These major roads, some with Koala exclusion fencing, act as significant physical barriers for Koala movement and remove opportunities for safe passage (David S. Dique, 2003) between the site and potential habitat patches to the east and south. Land west of the site is generally cleared land used for grazing and rural residential areas with limited remnant vegetation. The property immediately to the south contains some remnant vegetation (the rest of the Least Concern RE polygon), however, the Centenary Highway bounds the south and west of the property and Grampian Drive bounds the east, thereby reducing any connectivity vegetation on this site retains (David S. Dique, 2003).

The majority of land within the Ripley Valley PDA, and adjoining the PDA, is slated for development, with many projects within approvals or site preparation phases. As a result, connectivity values surrounding the project site will only further decrease as these areas are developed (Council, 2009). While there is a patch of Least Concern remnant vegetation on the subject site (1.84 ha), the mapped polygon is fragmented by the Centenary Highway to the south and west, Grampian Drive to the east, and Rawlings Road to the north. As a result, this vegetation is not



considered a connectivity feature (or part of a corridor connecting habitats (David S. Dique, 2003) (C. E. Dexter A C, 2016)

There are two mapped watercourses on-site, however, these are both considered to represent drainage features, not watercourses (as described in detail in the Referral and supporting ecological report). They are highly modified, with no waterway-associated vegetation present, and the northern mapped water feature constitutes of a constructed dam. Neither are considered to provide an effective riparian corridor for Koala movement due primarily to the lack of riparian vegetation present, and the fragmentation by the highway and surrounding roads. It is noted, however, that the drainage feature does provide limited connectivity values beyond the site boundary. The proposed development layout includes the establishment of Open Space in the areas of both mapped watercourses which will retain vegetation and include rehabilitation activities.

Currently, there are a number of obvious threats to the survival of the Koala on and around the project site. Such threats include vehicle strikes and dog attacks, associated with the location of nearby main roads (including highways), and the increasing residential development (David S. Dique, 2003) (Clive McAlpine, 2015) (Council, 2009). These threats will increase as the Ripley Valley area is further developed, as per State and Local Government planning intent. Koala sighting databases also show a number of sick and injured Koalas in the area, reflecting these threats.



3. Koala: Quantification of Impacts

The following was requested by **DoE** in Item 3 of the Additional Information required to complete the Preliminary Documentation assessment, with regards to Koala (*Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)).

The Department considers the area impact is likely to be more than the area proposed to be directly cleared for urban development. The areas of Koala habitat to be retained would be fragmented, have little connectivity to other habitat, and be subject to substantial edge effect impacts. Further, the areas of Koala habitat adjoining the southern edge of the project site would also be fragmented, have little connectivity to other habitat, and be subject to substantial edge effect impacts.

On this basis, the Department considers that the area of Koala habitat directly impacted is larger than referred and that the retained/adjacent habitat is unlikely to maintain the habitat values necessary to support the Koala, representing habitat loss. To clarify the above the preliminary documentation must:

3.1: provide a revised area of Koala habitat that will be directly and indirectly impacted (including by edge effects, fragmentation, and isolation) by the proposed action, based on the results from section 2 of this information request;

3.2: determine the expected extent, nature, and severity of edge effect impacts on Koala habitat within lots 198 and 199 resulting from the proposed action. The expected edge effect impacts must be determined using robust scientific methodology supported by appropriate literature sources; and

3.3: detail all limitations in the methodologies, results, technologies, information and work done to complete items 3.1 and 3.2 of this information request.

3.1. Area of Koala Habitat to be Cleared and Edge Effected

The Department's position regarding the areas of potential Koala habitat adjoining the southern edge of the project site is that these areas may be edge effected by the proposal. It is important to note that these areas are currently effectively fragmented having limited if any connectivity to other habitat and no Koala were sighted in the area or the subject site during past and contemporary surveys. It is acknowledged that the proposal will exacerbate existing edge effects and disturbance levels, that are already relatively extreme, should Koala utilise this area. **Section 2** of this Preliminary Documentation has described the barriers and threats to the Koala and Koala habitat surrounding the subject site, and the land to the south, including:

- main roads and highways;
- fauna exclusion fencing;
- surrounding development;
- high levels of Lantana on the property to the south; and
- low evidence of usage by the Koala.

It is therefore considered that the vegetation on both the subject site and on the two lots to the south is already edge effected and constrained with regards to its use and value as Koala habitat. While the proposed project would potentially exacerbate edge effects on this vegetation through the removal of 15 ha on the subject site (refer **Plan A4** for Critical Habitat Analysis), all vegetation on these four allotments is already severely affected by fragmentation, lack of connectivity, isolation, and edge effects, by the current surrounding impacts. Therefore, it is not considered that the project would significantly exacerbate these existing, relatively extreme impacts.



Regardless, the area of Koala habitat to be cleared and adversely impacted by edge effects due to the project has been revised based on **DoE** assertions to include:

- 15 ha of impact through vegetation clearing in the subject lot; and
- 14.7 ha within retained areas on-site and through the southern allotments to be edge effected through development of the subject site, noting that this vegetation is already highly constrained and does not provide for connected or high quality Koala habitat. This vegetation is also heavily infested with Lantana, which is a known inhibitor to Koala movement (Government, 2016).

The referral for the project was submitted to the **DoE** (2016/7723) on 10 June 2016, with a Controlled Action decision made on 2 August 2016. As part of the referral an assessment of Koala habitat on the site was carried out using the *EPBC Act Referral Guidelines for the Vulnerable Koala*. The assessment resulted in a critical habitat score of 5/10 over an area of 15 ha. Generally, it is considered that the Koala referral guideline assessment is risk based aimed at identifying potential for a project to impact on habitat “critical” to the survival of the Koala. As a result, the referral assessment is generally considered to overestimate Koala habitat values in order to encompass projects that have any potential to impact on Koala habitat so that they are further assessed through the Controlled Action assessment process.

The *Environment Protection and Biodiversity Conservation Act 1999* environmental offsets policy (the Policy) outlines the Government’s approach to the use of environmental offsets. This Policy has an associated guide titled “How to use the Offsets Assessment Guide” (the Guide) which gives effect to the requirements of the policy, using a balance sheet approach to estimate impacts and offsets for threatened species and ecological communities. The Guide provides a method for assessing habitat quality for listed species.

The application of the Guide results in the quality score representing a measure of how well the site supports a particular threatened species (in this case, relevant to the Koala), and contributes to its ongoing viability. The three components that contribute habitat quality calculation are site condition, site context, and species stocking rates, as described below:

1. Site condition:

- Condition of a site in relation to the ecological requirements of a threatened species or ecological community.
- Includes considerations such as vegetation condition and structure, the diversity of habitat species present, and the number of relevant habitat features.

2. Site context:

- Relative importance of a site in terms of its position in the landscape, taking into account the connectivity needs of a threatened species or ecological community.
- Includes considerations such as movement patterns of the species, the proximity of the site in relation to other areas of suitable habitat, and the role of the site in relation to the overall population or extent of a species or community.

3. Species stocking rate:

- Usage and/or density of a species at a particular site.
- The principle acknowledges that a particular site may have a high value for a particular threatened species, despite appearing to have poor condition and/or context.



- Includes considerations such as survey data for a site in regards to a particular species population or, in the case of a threatened ecological community this may be a number of different populations.
- Also includes consideration of the role of the site population in regards to the overall species population viability or community extent.

The subject site covers a small area (approximately 25 ha) with historical and ongoing land uses resulting in disturbed vegetation, and low ecological quality and condition of vegetation. An assessment of the site and the overall value of Koala habitat on-site is provided below, as summarised from the Referral information (**Part B**) and supporting Ecological Assessment Report, and the detailed information provided in **Section 2.2** of this report.

With respect to the Koala, the **site condition is considered to be Low**. While there are some known Koala food trees present on-site, the lack of age structure and understory and ground cover, and connectivity to quality vegetation would likely deter or prevent Koalas from readily utilising the food trees present. Heavy infestations of Lantana on the neighbouring property to the south presents a recognised hindrance to Koala dispersal (Government, 2016). Further, the number of primary food trees present in this area is not considered to provide enough critical habitat to support a viable Koala population (McAlpine et al. 2006).

The **site context of Area A is considered to be Low**. The vegetation present provides low connectivity to other vegetation on-site and immediately adjacent, with no connectivity outside of the two subject lots and two southern adjoining lots due to highways and roads to the north, east, and south / west. Land surrounding the subject site is largely disturbed and has been cleared for rural residential purposes, and more recently residential development (as described in detail in **Section 2**). The two watercourses mapped on-site were found to be highly impacted drainage lines with limited amounts of riparian vegetation, so are not considered to currently provide connectivity for Koala habitat. The vegetation on-site is not considered to be important relative to the overall Koala population and Koala occurrence in the broader region.

As there were no Koalas observed on-site, and only evidence of low Koala usage was found, the **stocking rate is considered to be Low**. The area does not currently provide habitat for a transient Koala population, and is expected to have the potential to only support individual transient Koalas, as evidenced by the lack of observations or only very low usage observed during the site survey. The low evidence of Koala presence suggests that the site would not have a role relative to any site population, important population, or the overall species population of Koala.

In summary, **Table A6** below provides a consolidated list of the scores for the subject site and the southern allotments based on contemporary assessments herein, and a score for Critical Habitat that would be given to each area as per the Koala Referral Guidelines.

Table A6: Summary of Koala Habitat Quality.

Attribute	Cleared	Edge Effected (Site and Southern Lots)
Site Condition	Low	Low
Site Context	Low	Low
Species Stocking Rate	Low	Low
Critical Habitat Score	5	5
Size (ha)	15	14.7



Based on the above a total of 29.7 ha of potential Koala habitat with a score of 5 will be cleared and subject to edge effects.

3.2. Expected Extent, Nature, and Severity of Edge Effect Impacts on the Lots to the South

As described in detail in **Section 2.2**, and more specifically in **Section 2.2.5**, the vegetation on the two lots to the south of the project site is considered to be relatively constrained in terms of provision of quality Koala habitat. These lots already have significant pressures from edge effects occurring, as there is a highway (with fauna fencing) bordering the south and west of the site, a main road bordering the east and existing development to the north. The properties were also noted to have infestations of *Lantana*, which is a known inhibitor to Koala movement. Further, **Section 3.1** above provides a score of the Koala habitat value for these two allotments.

In summary:

- The site and southern lots are effectively fragmented from any nearby or distant habitat by fauna exclusion fencing, Highways, Main Roads and existing development and disturbance (**Plans A1 & A2.1 – A2.4** and **Part B Plan 2**);
- Contemporary surveys across the subject site and southern allotments did not directly detect the presence of Koala, despite site coverage and targeted searches (**Section 2**);
- Site habitat is considered degraded and not of adequate size and species structure to support a resident Koala population (McAlpine et al 2006);
- SAT surveys recorded historical evidence of Koala activity and inferred activity levels in the form of scats (as per Phillips & Callaghan 2011), and do not necessarily coincide with current activity levels;
- The site and southern lots are not considered to support a Koala population, important or otherwise, but rather, may pose as dispersal habitat for transient Koalas moving within the increasingly urbanised landscape;
- Edge effects are already significant prior to this development;
- The proposed development is not considered to pose a significant impact on habitat that is critical to the survival of the species.

It is therefore considered that the extent, nature, and severity of edge effect impacts on potential Koala habitat within lots 198 and 199 as a result of the proposed development on Rawlings Road will not be significantly exacerbated under the proposal. Under an assessment using the habitat assessment tool lots 198 and 199 yields a score of 5 (refer **Attachment 6**).

3.3. Limitations

Limitations apply to the quantification of impacts on the vulnerable Koala due to the tools and methods that are to be applied. The use of the habitat assessment tool is in part subjective and therefore is able to be interpreted differently, which can create discrepancy in the scoring of habitat. Vegetation composition crudely takes into account the presence of 2 or more habitat trees and does not delineate between primary and secondary Koala food trees, which may impact on the likelihood of the Koala occurring. The weighting system of the Koala habitat tool can lead to areas void of Koalas being referred under the assumption of the potential for optimal habitat where in reality surrounding pressures have already had an indirect result on Koala likelihood.



Lack of direct evidence of Koala on-site and a low connectivity score leads to the assumption that pressures pre-dating the development has perhaps had indirect impacts on the development area and are therefore already impacting the greater area whether the development takes place or not. The reduction of Koala habitat has negligible impact when the site is already functionally lost from previous developments and fragmentation of suitable habitat from major roads.

The fieldwork undertaken by **SHG** was both extensive and comprehensive, with site assessments occurring in January, February and December 2016. The site was extensively surveyed for both direct and indirect signs of Koala and ground truthed for vegetation composition and potential Koala occurrence.



4. Koala: Avoidance and Mitigation

The following was requested by **DoE** in Item 4 of the Additional Information required to complete the Preliminary Documentation assessment, with regards to Koala (*Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)).

The referral does not identify measures to avoid and mitigate edge effect impacts on the potential Koala habitat in lots 198 and 199. To clarify the above the preliminary documentation must:

4.1: provide a description of each proposed avoidance or mitigation measure in relation to edge effect impacts;

4.2: provide an assessment of the expected or predicted effectiveness of each proposed avoidance or mitigation measure; and

4.3: detail all limitations in the methodologies, results, technologies, information and work done to complete items 4.1 and 4.2 of this information request.

4.4: If you are proposing to use an environmental management plan (EMP), provide an EMP that details the proposed avoidance and mitigation measures and how those measures will mitigate impacts to the Hastings River Mouse, including clear, measurable and time specific:

- Performance criteria;
- Environmental outcomes to be achieved;
- Auditing regime to measure the implementation and effectiveness of the EMP.

Detail all limitation of any EMPs prepared for the proposed action.

4.1. Avoidance and Mitigation Measures

General impacts listed in the guidelines that must be considered include:

- Introducing or increasing Koala fatalities due to dog attacks;
- Introducing or increasing the risk of vehicle strike;
- Facilitating the introduction or spread of disease and pathogens;
- Creating a barrier to movement; and
- Degrading critical habitat due to hydrological changes.

Dog Attack

The development of a residential estate is likely to increase the number of dogs entering the area. However, it is expected that dog activity already occurs on surrounding properties, and possibly on the subject site. The residential development will implement appropriate governance and guidance regarding dog ownership to new home buyers, ensuring interaction between dogs and Koalas is mitigated, and therefore it is not expected that dog attacks on Koalas will increase as a result of the development. There have been seventeen (17) recordings of Koala incidents requiring hospitalisation within 4 km of the subject site over an unspecified period (refer **Figure A8**).

No residual impacts are identified.



Vehicle Strike

Vehicle activity will increase in the area, and through the site, as a result of the development. However, given the site is surrounded by Major roads and highways as well as various forms of urban development, no Koalas were recorded on-site and very few Koalas have been recorded in the last few years within 5 km of the site, and the relatively small size of the proposed development, interaction between vehicles and Koalas is considered unlikely to be significantly exacerbated as a result of the development. Road design, signage, and the imposition of a low vehicle speed will help mitigate any potential risks to Koalas.

No residual impacts are identified.

Disease and Pathogens

Most of South East Queensland's Koala populations (including within the Ipswich area) are already known to have a high prevalence of *Chlamydia* infection and Koala Retrovirus. The symptoms of these diseases are often observed within Koala populations undergoing environmental stresses, such as overcrowding and poor nutrition. The project is unlikely to cause pressure on a local Koala population (noting that no Koalas have been seen on-site or in close proximity to the site) to the point where these diseases manifest. Further, the project is extremely unlikely to introduce or spread disease or pathogens into any Koala habitat areas.

No residual impacts are identified.

Barriers to Dispersal

While the proposal will restrict Koala movement through the site, given that the vegetation existing on-site is already highly isolated and fragmented from any other vegetation due to surrounding roads on all sides, it is arguable that this will not result in impacts to dispersal. As it currently stands, the site and areas potentially edge effected are largely fragmented from other habitat patches due to these roadways and encroaching development, and therefore there is no means currently for the safe movement of the Koala to or from the site. In addition, the surrounding properties are earmarked for residential development in line with planning intent, with properties to the north of Rawlings Road already established. This surrounding development will further isolate any vegetation on-site. As such, the impacts caused by potential barriers to dispersal within the development area are considered to be minimal.

No residual impacts are identified.

Hydrological change

There will be an increase in hardstand areas across the site, due to the establishment of a residential development. Such increase in hardstand areas has the potential to affect the hydrology currently on-site, however, management plans will be implemented to address the requirements of State and Local government guidelines to ensure that impacts are minimised. The proposed development will retain Open Space areas where the watercourses are mapped on-site, which will assist to minimise changes to hydrology in these areas. It is anticipated that the project is unlikely to result in hydrological changes that will further degrade the site or impact neighbouring areas of potential Koala habitat.

No residual impacts are identified.

A range of management plans will be developed and implemented during the construction phase of the project. The purpose of the management plans is to firstly avoid any impacts to native fauna and flora, and then if unavoidable, reduce impacts to vegetation in conservation areas and to minimise any adverse impacts to fauna during vegetation clearing. Many of these plans will be conditioned as part of the approvals for the project. Some of the main procedures are described below.



4.1.1 Vegetation Clearing and Management Plan

The Vegetation Clearing and Management Plan (VC&MP), will provide an overview of core retention and removal areas within the application site. Additional VC&MPs will be prepared specific to development stages so that clearing mechanisms and management procedures are precise and will include the following details:

- Clearly show all trees to be removed and retained
- Include details of all civil works likely to impact on existing vegetation
- Temporary and permanent exclusion and protection fencing for riparian corridors and parklands
- Roles and responsibilities for site contractors, developer and the consultant group
- Stockpiling and site access locations
- A clearing sequencing plan showing the commencement of clearing and direction of removal (this should be in conjunction with the Fauna Management Plan to allow for the appropriate flushing of fauna towards surrounding safe haven areas.
- Links to weed management and revegetation proposals
- The stock piling and reuse of cleared vegetation
- Specific details on the removal of previously identified potential fauna habitat trees
- Where trees are shown to be retained occur within disturbance zones they should be accompanied by necessary arborist specifications incorporated into the VC&MP.
- The VC&MP will designate trees to be protected for the on-going life of the proposal which may require both immediate remedial works (Crown thinning, coppicing) and long term monitoring for the potential of future works.

4.1.2 Fauna Management Protocols

Under Queensland's *Nature Conservation Act 1992*, all native fauna are protected and as such the following activities are required to ensure that vegetation removal and construction does not adversely affect native fauna species:

- Immediately prior to the commencement of clearing of native vegetation, a daily visual inspection of the area must be carried out;
- In the event of an animal being located, an area of 5 metres radius should be established around the tree, excluding machinery from this area until the animal has relocated (usually overnight); or
- If an animal requires relocating, this must be undertaken by a suitable qualified fauna expert (e.g. fauna spotter-catcher) recognised by the Queensland Parks and Wildlife Service.
- Any native fauna orphaned or injured by the development process must be reported to the Queensland Parks and Wildlife Service.
- The site supervisor is responsible for the safe management of site fauna and implementation of these specific fauna requirements.

4.1.3 Role of QPWS Registered Fauna Spotter Catchers

It is the role of the Fauna Spotter/Catcher to take all reasonable steps to protect wildlife that may be impacted by vegetation clearing. These steps include:

- Undertaking wildlife load reduction measures through the pre-clearing trapping and relocation of wildlife 1-2 weeks prior to the approved clearing being conducted. Sequential clearing cannot be used as a primary fauna management measure;
- Clearly mark (flag) vegetation found to contain fauna or fauna habitat (such as tree hollows, arboreal termite mounds, stick nests or possum drays with flagging tape) and visually and verbally communicate



this information to the tree feller to ensure flagged trees are not felled until authorised by the fauna manager;

- Manage any Koalas identified on site in accordance with the Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016;
- Manages fauna habitat identified during the site inspection using the protocols discussed within the Fauna Management Plan;
- Work in conjunction with a professional tree feller in the removal of any vegetation;
- Schedule vegetation clearing to ensure that the impacts on wildlife are minimised and the likelihood of detection and capture of wildlife is maximised and wildlife load reduction measures are productive;
- Ensure vegetation and rubbish piles are not left to serve as refuge for displaced or roaming wildlife
- Limit the felling of habitat and hollow bearing trees to accepted standards

Adoption of the RSPCA / ESU of WW Draft Code for Fauna Spotting

The project will adopt the DRAFT Code of Practice for the welfare of animals affected by land-clearing and other habitat impacts (Draft Code) prepared by the Australia Zoo Wildlife Warriors and Voiceless. This Draft Code is not mandatory, however, is advocated by various environmental organisations as the leading practice method for minimising impacts of native wildlife during construction processes.

The Draft Code will be adopted to ensure that fair, reasonable and appropriate measures are undertaken to minimise the adverse impacts on wildlife as a result of vegetation clearing. The code provides standards and guidelines for the humane treatment of wild animals affected by land clearing by detailing the general responsibilities of people involved in land clearing and the specific roles of wildlife spotter/catchers. As emphasised within the Draft Code, it will be the responsibility of all relevant parties to:

- Take all reasonable steps necessary to prevent cruelty or suffering to animals;
- Minimise the loss of wildlife caused directly or indirectly by development or land clearing; and
- Conserve, as much as possible, the ecological values of the development site and their surrounding natural environment (Draft Code, p.5)

The following components of the code are to be adopted as the following actions for any clearing works:

Action 1 – Developer to Engage Fauna Spotter / Catcher

This action requires that the developer engage a Wildlife Fauna Spotter / Catcher with full registrations and licences provided in accordance with the Queensland Department of Environment and Heritage Protection (EHP).

Action 2 – Fauna Spotter to Prepare a Wildlife Protection and Management Plan (WPMP)

The WPMP should be submitted to the EHP and include the following information:

- Description of the project with reference to impacts on wildlife or wildlife habitat;
- Pre development plan of the site showing habitat areas, features, corridors, riparian habitats and adjacent areas;
- Results of any fauna surveys including pre-clearance surveys; and
- A wildlife and habitat impact assessment based on the proposed development works.



Action 3 – Prepare a Wildlife and Habitat Impact Mitigation Plan

Following completion and approval of the WPMP the fauna spotter should prepare a more specific Wildlife and Habitat Impact Mitigation Plan, which will include details on:

- Measures required to be completed to minimise wildlife and habitat impacts during operational works;
- Wildlife capture and removal plan;
- Contingency plan for wildlife requiring euthanasia, other veterinary procedures or captive care;
- Wildlife storage and housing plan;
- Wildlife release and disposal plan; and
- Post works measures to minimise impacts on wildlife.

Action 4 – Fauna Spotter Role at Pre-Start Meeting

Prior to the commencement of any construction works, a pre-start meeting is to be held between the project manager, site foreperson, plant operators and Local and State Government representatives. At the pre-start meeting, the Fauna Spotter is to outline the clearing process and the requirements of the approved Fauna Management Plan.

Action 5 – During Construction

The Fauna Spotter is to be on-site during all phases of construction which involve potential impacts on wildlife or habitat. This will enable the Fauna Spotter to make any necessary adjustments to the approved Vegetation Management Plan and WPMP to cater for any specific issues encountered during the clearing works.

Action 6 – Post Works Reporting

During the course of all site works, including the pre-clearance surveys, the fauna spotter is to keep an accurate record of all animals encountered, captured, incidents and disposals for each stage of the project. The records should form part of the Wildlife Management Report to be issued under licence requirements to the State Government. The Wildlife Management Report should consist of the following 3 sections:

1. Wildlife Habitat Management Plan – Aspects of the planning, design, construction and ongoing operation of the project in which risks to wildlife have been identified. This plan should also include recommendations and outline the type, frequency and timeframes for monitoring
2. Wildlife Capture and Disposal Plan – Should contain the following details for each captured animals:
 - a. Species
 - b. Identification name or number
 - c. Sex (M, F or unknown)
 - d. Approximate Age or Age Class (neonate, juvenile, sub-adult, adult)
 - e. Time and date of capture
 - f. Method of capture
 - g. Exact point of capture (GPS coordinates)
 - h. State of health
 - i. Incidents associated with capture likely to affect health
 - j. Veterinary intervention or treatments
 - k. Time held in captivity
 - l. Disposal method (euthanasia, translocation, re-release)
 - m. Date and time of disposal



- n. Detailed of disposal (GPS points of release)
 - o. For released animals, location relative to point of capture
3. Animal Injury and Euthanasia Report – similar details for the Wildlife Capture and Disposal Plan should be included in this report.

Koala Management Plan

The measures to avoid and mitigate the direct and indirect impacts from the proposed action on the Koala are to be detailed within the Preliminary Koala Management Plan (KMP) discussed, below.

4.1.4 Impact Summary

The proposed development has the potential to result in the following construction and operational impacts:

Construction:

- a) Removal of 15 hectares of vegetation defined as habitat critical to the survival of the Koala.
- b) Edge effects on adjoining habitat
- c) Risk of injury or mortality to Koalas during vegetation clearing and construction.
- d) Fragmentation of habitat restricting dispersal.
- e) Hydrological changes.

Operational:

- a) Loss of habitat
- b) Risk of injury or death caused by:
 - i. Vehicle strike
 - ii. Dog attack
- c) Creation of barriers to dispersal

It is unlikely that the project will facilitate the introduction or spread of disease or pathogens, nor is it likely to increase the threat from bushfires.

4.1.5 Koala Management Plan

The measures to avoid and mitigate the direct and indirect impacts from the proposed action on the Koala will be detailed within the Koala Management Plan (KMP). The purpose of the KMP is to provide a single explanatory management document for the inclusion in the design, construction and operation of the development.

The objectives of the KMP are:

- 1) To highlight the existing flora and fauna values on the subject site and in surrounding areas;
- 2) Describe key results from survey data, including Koala occurrence and the availability and quality of habitat;
- 3) Identify key direct and indirect impacts on the Koala and describe proposed avoidance and mitigation measures;
- 4) List out actions and legislative requirements to be put in place to manage construction impacts;
- 5) Provide a framework for a number of operational management measures including:
 - a. Conservation areas set aside for Koala usage;
 - b. Incorporation of education and prohibition signage within open space and road reserves;
 - c. On-lot education campaigns to raise consumer awareness of local Koala populations; and
 - d. Provide ongoing resources and facilities for monitoring the success of this management plan.



The KMP will include details on:

- Ecological values found on site;
- Identifies direct and indirect impacts on Koalas at the construction and operational phases of the project;
- Provides a risk assessment to identify risk ratings of identified impacts
- General management measures, including:
 - Site design and identification of conservation corridors
 - Statement of KMP objectives
 - Identification of key management personnel
 - Details on environmental training of site contractors and sub-contractors
- Construction management measures, including:
 - Use of a Fauna Spotter/Catcher and adoption of the *Code of Practice for the Welfare of Animals Affected by Land Clearing and Other Habitat Impacts*
 - Sequential clearing plan and clearing restrictions
 - Use of fauna exclusion fencing
- Operational management measures, including:
 - Maintenance of ecological corridors
 - Distribution of Lifestyle Guidelines to new residents
 - Planting and rehabilitation
 - Wildlife Crossings
- Monitoring and reporting procedures;
- Risk assessment and management plan review.

4.2. Expected Effectiveness

The following provides a summary of how the impacts identified above will be avoided and mitigated as per the KMP.



Table A7: Construction Impacts

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
<p>Loss of 15 hectares of critical habitat.</p>	<ul style="list-style-type: none"> ▪ Ecological assessments were undertaken to identify areas across the site that contain higher ecological values. These values generally included remnant vegetation and drainage lines. ▪ Areas to be cleared are relatively disturbed and contained no significant or unique values. Approximately 15 hectares was identified to contain habitat critical to the survival of the Koala. ▪ The loss of 15 hectares of critical habitat is unavoidable and cannot be mitigated. ▪ The site layout has been designed to retain some areas of habitat, however, these are considered to be indirectly impacted. 	<p>Ecological surveys and habitat assessment conducted across the site led to the precise spatial analysis of vegetation and habitat qualities. While the majority of the development footprint has been located within existing disturbed and modified areas, the project will result in the unavoidable loss of 15 hectares of critical habitat.</p>	<p>Loss of 15 hectares of critical habitat for the Koala.</p>
<p>Potential Edge Effects on 14.7 hectares critical habitat</p>	<ul style="list-style-type: none"> ▪ Two lots to the south is already edge effected and constrained with regards to its use and value as Koala habitat. ▪ All vegetation on adjoining allotments is already severely affected by fragmentation, lack of connectivity, isolation, and edge effects, by the current surrounding impacts. ▪ Contemporary surveys across the subject site and southern allotments did not directly detect the presence of Koala, despite site coverage and targeted searches. ▪ Site habitat is considered degraded and not of adequate size and species structure to support a resident Koala population. ▪ The site and southern lots are not considered to support a Koala population, important or otherwise, but rather, may pose as dispersal habitat for transient Koalas moving within the increasingly urbanised landscape. 	<p>Mitigation measures to be implemented will be hindered by the highly fragmented nature of the site and edge effected land. The cleared and edge effected areas are already severely compromised due to the constraints already imposed on the site by infrastructure and approved developments.</p>	<p>Edge effects imposed on 14.7 hectares of adjoining habitat</p>

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Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
<p>Risk of injury or mortality to Koalas from vegetation clearing and construction</p>	<ul style="list-style-type: none"> ▪ All clearing will be undertaken in accordance with a Vegetation Clearing and Management Plan and Fauna Management Plan. ▪ The proponent will engage a qualified Fauna Spotter/ Catcher to participate in all stages of vegetation clearing. The Fauna Spotter/Catcher will be required to adopt the <u>Draft Code of Practice</u> endorsed by the Australia Zoo Wildlife Warriors and Voiceless. ▪ The role of the Fauna Spotter/ Catcher is to ensure that no injury or deaths occur to Koalas or other fauna species. ▪ Vegetation will be cleared sequentially. Clearing will be conducted so that fauna are flushed into safe, vegetated areas and it will avoid pushing fauna into fragmented areas. ▪ Fauna exclusion fencing will be erected to prevent fauna dispersing into construction areas. 	<p>The use of a Fauna Spotter throughout clearing is an effective tool to:</p> <ol style="list-style-type: none"> 1. Identify they types of species on site prior to clearing; and 2. Identify and flag habitat features that require thorough examination before clearing. <p>Fauna Spotters have a primary role to ensure no fauna are in vegetation before it is cleared. Given the size of Koalas and their utilisation of tree branches, they can quite easily be observed from the ground. As such, it is extremely unlikely that a Koala will be killed or injured during vegetation clearing, particularly given the onerous and thorough procedures set out the Fauna Spotter Draft Code of Practice.</p> <p>The sequential clearing of vegetation will allow for the gradual loss of vegetation, giving fauna time to naturally disperse away from the disturbance. The use of fauna exclusion fencing around construction areas will ensure fauna do not disperse into unsafe, hostile areas, again minimising the risk of injury of death.</p> <p>Each of these measures will ensure that the risk of injury or death to Koalas as a result of construction are avoided and mitigated. The aim of these procedures is to support zero injuries or death to Koalas as a result of construction.</p>	<p>No residual impact</p>
<p>Fragmentation of Habitat during Construction</p>	<ul style="list-style-type: none"> ▪ Vegetation clearing has the risk of fragmenting habitat areas during the construction phase. ▪ To avoid this impact, the site design has allowed for the retention of vegetation areas. The project will not exacerbate isolation or fragmentation of vegetation patches. 	<p>Habitat isolation and fragmentation is a primary concern due to its impacts on fauna. However, this site and surrounds are already extremely fragmented.</p> <p>The directional clearing of vegetation in accordance with a <u>Vegetation Clearing and Management Plan</u> will ensure that</p>	<p>No residual impact</p>

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Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
	<ul style="list-style-type: none"> ▪ Vegetation clearing will be undertaken sequentially to allow fauna to disperse from construction areas. Clearing procedures that avoid the fragmentation of vegetation will be adopted within the Vegetation Management and Clearing Plan. ▪ Clearing will be done in a way that flushes fauna into connected areas of habitat and will avoid flushing fauna into fragmented or hostile areas. 	clearing does not create fragmented habitat islands that could trap fauna. Rather, procedures will be in place to ensure clearing flushes fauna away from construction areas into surrounding habitat areas that are connected to the wider landscape.	
Hydrological changes	<ul style="list-style-type: none"> ▪ The project footprint has avoided defined drainage lines. ▪ Stormwater detention technologies will be utilised to minimise the effects of excess rainwater flowing into catchments caused by the creation of hardstand areas. ▪ All work will be undertaken in accordance with appropriate management plans to ensure the hydrological changes across the site do not impact on surrounding vegetation. 	The implementation of Stormwater Management Plans as designed by engineers ensures that hydrological changes are appropriately accounted for and managed. These management measures will reduce impacts from higher levels of surface water flow caused by hardstand areas and ensures natural drainage lines continue to function as they naturally would have. Stormwater detention basins prevent localised flooding of drainage lines and waterways caused by increased runoff over hardstand areas and also contribute to maintaining water quality levels.	No residual impact

Table A8: Operational Impacts

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
Loss of 15 hectares of critical habitat and edge effects on 14.7 hectares of adjoining habitat	<ul style="list-style-type: none"> ▪ The project will result in the loss of 15 hectares of habitat critical to the survival of the Koala and potentially impose edge effects on 14.7 hectares of Koala habitat. ▪ The layout retains some habitat which will be supported by a range of management measures including: <ul style="list-style-type: none"> ○ Weed removal and management ○ Revegetation of degraded areas ○ Dog on lead restrictions ○ Educational and restrictive signage 	As stated above, the project will result in the unavoidable loss of 15 hectares of critical habitat and potential edge effects on 14.7 hectares. The listed measures for enhancing and controlling the retained habitat are regularly used to manage conservation areas with a proven record in managing impacts and maximising conservation functionality.	Loss of 15 hectares of critical habitat for the Koala and potential edge effects on 14.7 hectares

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Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
	<ul style="list-style-type: none"> ○ Ongoing monitoring, maintenance and reporting ○ Corridor to be legally secured 		
<p>Risk of injury of death from vehicle strike</p>	<ul style="list-style-type: none"> ▪ A number of measures will be imposed to avoid and mitigate the risk of Koalas being hit by vehicles. These measures include: ▪ Koala habitat will not form part of the primary landscaping of the development footprint so that Koalas are not enticed to enter residential areas. ▪ Imposition of low vehicle speeds (i.e. 50km/hr) to reduce the risk of collisions where adjoining conservation land. Under Queensland traffic laws, vehicle speed limits are restricted to 50km/h on built up residential roads. ▪ Erection of Koala awareness signage throughout the estate including within the conservation areas which propose nature based activities. ▪ Integration and construction of fauna movement solutions and signage where roads are near potential habitat. ▪ New residents will be issued with a “Lifestyle Guideline” to raise awareness about local wildlife and to educate residents about the protection of Koalas in the area. 	<p>The purpose of these avoidance and mitigation measures is to minimise the risk of injury or death to Koalas from vehicle strike. It will be important to minimise the incentive for Koalas to enter residential areas by restricting the availability of habitat in these areas. As such, street scaping will not be planted with suitable Koala habitat, which will in turn encourage Koalas to stay within conservation areas. Importantly, low vehicle speeds will be imposed along residential roads, minimising the risk of high-speed vehicle strikes which were identified in the literature review as accounting for a large proportion of vehicle related deaths. In addition, awareness signage and traffic calming devices will ensure motorists are aware that Koalas have potential to occur in the area, making them more conscious of potentially dispersing Koalas and encouraging them to maintain a low vehicle speed. The distribution of “Lifestyle Guidelines” has the purpose of instilling stewardship of the issue amongst residents, encouraging them to actively protect native wildlife and making them aware of the types of fauna that could disperse onto roads.</p> <p>Wildlife movement solutions have been identified as an effective tool to mitigate the effects of fragmentation cause by roads. In essence, wildlife crossings will include the following elements:</p> <ul style="list-style-type: none"> ▪ Reduced vehicle speed limits (≤50 km/h) ▪ Wildlife crossing signage ▪ Vegetation adjoining the road ▪ Demarcated road treatment surface to raise driver awareness 	<p>No residual impact</p>

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Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
		<ul style="list-style-type: none"> ▪ Where seen supportive of the crossing outcomes the inclusion of specific lighting regimes. ▪ Exclusion fencing funnelling animals towards the safest road crossing point. <p>Overall, these tools are considered to be effective measures to reduce the risk of injury or death of Koalas from vehicle strike. They have been officially adopted numerous times by the Queensland State Government in similar road conflict scenarios and are espoused as one of the effective solutions. The purpose of these measures is to enable the objective of no injury or death to Koalas as a result of vehicle strike. No residual impacts can be identified.</p>	
<p>Risk of injury or death from dog attack</p>	<ul style="list-style-type: none"> ▪ Dogs will be controlled on a lead. ▪ Fenced “off-leash” areas / dog facilities will be constructed within recreational parkland in the estate, to counter “dog on leash” areas. ▪ New residents will be issued with a “Lifestyle Guideline” to raise awareness about local wildlife and to educate residents about the protection of Koalas in the area and appropriate dog management. 	<p>While dogs already occur within the local area, and have historically occupied the site as part of the rural land uses, the project is likely to increase dog ownership numbers in the area. As such, the education of residents has been identified as a key management tool in reducing the risk or injury from dog attacks on Koalas. The Lifestyle Guidelines will make residents aware of the risk dogs pose to Koalas and other native fauna and will clearly identify “off leash” parks. The guidelines, along with awareness signage throughout the estate, will make it clear that dogs should be left on a lead at all other times when they are outside of residential housing lots. Again, instilling stewardship and ownership of the issue amongst residents is an effective way of ensuring compliance with dog on-lead restrictions. The Lifestyle Guidelines will allow residents to become aware of the issue and will encourage them to pro-actively manage and protect native fauna in the local area.</p>	<p>No residual impact</p>

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Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Residual Impact
<p>Creation of barriers to dispersal/ Fragmentation of Habitat</p>	<ul style="list-style-type: none"> ▪ The construction of residential and retail precincts will act as a barrier to movement through these areas, however, the site is already significantly fragmented. ▪ 	<p>The development of residential areas across the estate will create barriers to movement in the form of houses, roads, fences and other infrastructure. Given the level of fragmentation currently present on-site and surrounds, the proposal is not considered to significantly exacerbate the potential for this issue.</p>	<p>No residual impact</p>



4.3. Limitations

Mitigation measures are in essence limited by application and enforcement. Models have clinically demonstrated that bushland remnants have been anything but a refuge for Koala with high indicators of injury and mortality (Preece, 2007). To reduce mortality through the policing of mitigation measures, such as vehicle speed reduction and dog on leash requirements is difficult. Whilst reduction of speed limits and signage along roads are potentially effective they are difficult to police. The more direct impact of traffic issues are the roads themselves with the fragmentation of habitat which create barriers for koala connectivity (Mc Alpine c, 2009). Koalas that are unfortunately struck have a mortality rate of approximately 80% (Mc Alpine c, 2009). Roads and services are already in place in the vicinity of the development and therefore any mitigation measures are expected to provide proportionate benefits.

The success of dog eradication both domestic and wild solely relies a cultural change among landowners so that collective action to control domestic dogs and wild dog population becomes part or the norm (Department of Employment, Economic Development and Innovation Biosecurity Queensland, 2011). Currently there is no enforcement to make owners either leave domesticated dog on leads or in a secure lock up or to participate in baiting programs for wild dogs. Landscape and, ultimately, State wide control will only be achieved by linking the actions of local wild dog committees. Continuity of effort is required and local wild dog committees should establish succession planning to ensure success (Department of Employment, Economic Development and Innovation Biosecurity Queensland, 2011). Considering that is has been stated that 70% of Koala habitat is assumed to be found on private land, public participation is one of, if not the most, important factor of mitigation success (Department of Employment, Economic Development and Innovation Biosecurity Queensland, 2011).

The likelihood of a koala permanently taking refuge on the site is considered to be extremely low due the nature of the surrounding habitat and the lack of connectivity to and from the site. Although the general pattern of loss of Koala populations has been described, to date no quantitative studies of the effect of habitat loss and fragmentation have been conducted for this species. Consequently, the debate over how best to conserve Koala populations remains qualitative and fractured (MCALPINE C, 2004)

4.4. EMP Details

Item 4.4 of the Additional Information request refers to the Hastings River Mouse, however, this species is not known to be relevant to the subject site. An additional PMST search was conducted on 29 March 2017, applying a 10 km radius to the subject site, to be certain that this species is not relevant to the site, and the PMST search results (**Attachment A3**) did not include this species. Further, review of the species' information available through the Department's SPRAT website suggests that this species occurs predominantly in Northern NSW and some limited areas in the southern extent of Queensland, not as far north as the subject site. Consequently, Item 4.4 is not responded to in this Preliminary Documentation report.



5. Koala: Offsets Assessment

The following was requested by **DoE** in Item 5 of the Additional Information required to complete the Preliminary Documentation assessment, with regards to Koala (*Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)).

The Preliminary Documentation must clearly articulate how the 'avoid, mitigate' hierarchy will be applied to impacts to MNES and how proposed compensation (environmental offsets) will be provided for any residual significant impacts. To clarify the above the preliminary documentation must:

5.1: provide an assessment of whether the proposed action will have a residual significant impact on each affected MNES. Please demonstrate the use of the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* in making this assessment;

5.2: propose a direct offset for MNES where a residual significant impact/s is identified in 6.1 [sic]. If required, the direct offset must compensate for at least 90 per cent of the impact, as determined by the Minister/Department in accordance with the EPBC Act offsets policy. The identified offset must clearly state whether the conservation gain is proposed to be achieved by:

- Improving existing habitat for the protected matter;
- Creating new habitat for the protected matter;
- Reducing threats to the protected matter; and/or
- Averting the loss of a protected matter or its habitat that is under threat.

5.3: if the direct offset does not compensate for 100 per cent of the impact (using the Department's *Offsets assessment guide*), provide detailed and evidenced costings for the direct offset and detail any indirect offsets proposed including costs. Costing information is necessary to calculate the cost of the other compensatory measures component of the offset (but is only required where a direct offset does not compensate for 100 per cent of the impact);

5.4: identify the proposed offset's geographical location (including an appropriately scaled map);

5.5: detail the time-specific outcomes (Key Performance Indicators) against which achievement of the proposed offset outcomes will be measured. This includes interim milestones so the proponent can demonstrate they are on track to achieving the proposed offset outcomes. Please include a monitoring and evaluation plan that will be used to demonstrate that the offset is meeting the interim milestones and final outcomes;

5.6: detail the management actions for the proposed offset, describing how the outcomes will be achieved;

5.7: in order for the Department to consider whether any offset proposal meets the Department's Offset Policy, provide a table detailing the proposed offset's 'score' for each attribute of the Offsets Assessment Guide, an evidence-based justification for the score for each attribute, and literature references to support the evidence-based justification. If the offset involves improving habitat quality, the same methodology for measuring habitat quality must be used at both the impact and offset sites. Should the offset proposal be acceptable and the project be approved, please note that the information provided will be used in conditions to ensure that environmental outcomes are achieved; and

5.8: detail all limitations in the methodologies, results, technologies, information and work done to complete items 6.1 to 6.8 [sic] of this information request.



The preceding chapters of this Preliminary Documentation Report has strongly presented the case that the impact of the proposed work on the area in question, including the subject site and southern allotments, is not considered to constitute a significant impact on habitat critical to the survival of the Koala, for the following reasons:

- The site and southern lots are effectively fragmented from any nearby or distant habitat by fauna exclusion fencing, Highways, Main Roads and existing development and disturbance (**Plans A1 & A2.3** and **Part B Plan 2**).
- Contemporary surveys across the subject site and southern allotments did not directly detect the presence of Koala, despite site coverage and targeted searches (**Section 2**).
- Site habitat is considered degraded and not of adequate size and species structure to support a resident Koala population (McAlpine et al 2006).
- SAT surveys recorded historical evidence of Koala activity and inferred activity levels in the form of scats (as per Phillips & Callaghan 2011), and do not necessarily coincide with current activity levels.
- The site and southern lots are not considered to support a Koala population, important or otherwise, but rather, may pose as dispersal habitat for transient Koalas moving within the increasingly urbanised landscape.
- The site and southern lots are not considered to support a Koala population, important or otherwise, but rather, may pose as dispersal habitat for transient Koalas moving within the increasingly urbanised landscape.
- Edge effects are already significant prior to this development.
- The proposed development is not considered to pose a significant impact on habitat that is critical to the survival of the species.
- Seventeen (17) recordings of Koala incidents requiring hospitalisation within 4 km of the subject site over an unspecified period have noted in the Koala hospital data set.

It is therefore considered that the extent, nature, and severity of possible impacts on potential Koala habitat within the site and on the southern lots as a result of the proposed development on Rawlings Road will not be significantly exacerbated under the proposal. Regardless, as per **DoE** assertions, the proposal has been deemed to impose a significant impact and an offset is therefore required. The Proponent has secured land for the environmental offset of impacts to the Vulnerable Koala, which is to be offset in accordance with the EPBC Act's environmental offset policy. The proponent has enlisted the services of **QLD Trust for Nature (QTFN)** to deliver the Koala Offsets Management Plan.



5.1. Assessment of Proposed Impact

Assessment against the *Significant Impact Guidelines 1.1 – Matters of National Significance* was made in the original referral (see **table 6** of **Part B**). The table has been reproduced below for the ease of the reader.

Table A8: Significant Impact Assessment – Koala

Significant Impact Criteria	Description	Impact
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1. Lead to a long term decrease in the size of an important population of a species.	<p>While the site does contain some habitat assessed to be critical habitat for the Koala, the cleared area is approximately 15 hectares and the edge effected area is 14.7 hectares of habitat with a score of 5, which is the lowest range score on the spectrum. Of relevance, the proposed location for the referred action is adjacent to the Ripley Valley Priority Development Area, which means that the site will become more fragmented from the surrounding landscape due to current and future urban development. In addition, field assessments have failed to locate the Koala on-site, despite targeted searches, with only evidence of Low to Medium Koala usage, recorded in the form of scats. Available databases did not have records of the Koala being sighted within 3 km of the site, and the site is completely isolated from other vegetation. As such, Koalas that might utilise the site would be considered transient and more likely to inhabit more optimal habitat to the south of the site.</p> <p>It is considered unlikely that an important population is present on-site, and so the action is not expected to decrease the size of an important population.</p>	No significant impact likely
2. Reduce the area of occupancy of an important population.	<p>An important population is not considered present on the subject site or southern lots (lots 198 and 199) for the following reasons:</p> <ul style="list-style-type: none"> ▪ No Koalas have been recorded on-site, or immediately adjacent to the site (only evidence of their activity has been recorded) ▪ The site contains critical habitat scored as the lowest-range quality, with more optimal habitat south of the site ▪ The vegetation on the site is severely fragmented by highways and roads on all sides, and encroaching development in the wider landscape ▪ Koala records in the vicinity of the site include specimens carrying disease <p>Further, the exclusion of any development occurring on the western portion of the property (to the west of the Centenary Highway – refer to Plans 1 and 4 in section Part B) will facilitate continued connectivity in a north - south direction, outside of the majority of proposed development areas. As such, the proposal is not considered to reduce the area of occupancy of an important population.</p>	No significant impact likely
3. Fragment an existing important population into two or more populations.	<p>The action is proposed to occur on a site which is already significantly fragmented from surrounding habitat (Plan 2 in section Part B). Vegetation on the subject site adjoins some vegetation on the property to the south, however, these properties are isolated from any other vegetation, due to roads on all sides. At best, the site provides disjointed vegetation with no connectivity value on any side due to the adjacent Centenary Highway, Rawlings Road, and South Deebing Creek Road. Furthermore, an important population of the Koala is not considered to utilise the site given the low number of specimen records in the vicinity, and no evidence of the Koala recorded on-site. Regardless, it is anticipated that the retention of the western area and of the Open Spaces</p>	No significant impact likely



Significant Impact Criteria	Description	Impact
	within the development will maintain current connectivity values for the site and mitigate further potential fragmentation.	
4. Adversely affect habitat critical to the survival of a species.	While the proposed action results in the removal of Koala habitat, this habitat is disturbed by historical pastoral practices, and current grazing activities. It is also subject to edge effects from surrounding major arterial roads and increasing urban development. Further, this habitat is not considered to be unique or of special value (refer to Attachment 3 in section Part B). The retention of the Open Space areas within the development and the western portion of the property will ensure that areas with the potential to provide connectivity value are protected, and not developed. Given the disturbed nature of the site and zoning as Future Urban, adjacent to a Priority Development Area, the habitat on-site is not considered of importance to the interim recovery objectives for the Koala. Although it is acknowledged that 15 ha of critical habitat for the Koala (score of 5) as assessed under the Guidelines will be cleared and 14.7 hectares is to be edge effected. The habitat is not considered to constitute high or unique value, and, given the extent of more optimal habitat in the surrounding Beaudesert-Ipswich landscape, it is considered that the extent of potential loss will not adversely affect the survival of the species.	No significant impact likely
5. Disrupt the breeding cycle of an important population.	Detailed surveys on site did not identify any breeding Koalas. Evidence of Koala activity on-site was recorded in the form of scats, however, no individuals were recorded despite targeted searches. As such, the site is considered to most likely support transient individuals unlikely to constitute a breeding population or an important population. The development layout excludes development on the property to the west of the Centenary Highway, and includes two areas of Open Space within the development, therefore, it is considered that these areas will maintain current connectivity values for potential dispersal. It is considered unlikely that the breeding cycle of an important population will be disrupted by the proposed action.	No significant impact likely
6. Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	The habitat on this site was not recorded to contain any special or unique values. The removal of habitat at the site habitat is unlikely to have a significant impact on the availability of habitat throughout the broader landscape, given the vast quantity and availability of Koala habitat to the south which is a large area of more than 10,000 hectares of vegetation, with a range of habitat and landscape features. Individuals utilising the proposed development site are considered to be transient and not part of an important population. Further, the retention of vegetation as Open Space within the development, and as undeveloped land to the west of the development will provide continued connectivity values to the Koala, if present. As such, the proposal is not considered likely to lead to species decline.	No significant impact likely
7. Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Domestic dogs have the potential to become feral, are considered a major threat to Koala survival. Dogs are known to be present in the surrounding landscape. The proposed action is expected to result in an increase in the density of domestic dogs in the area, however, their potential to increase impacts on Koalas will be mitigated by effective governance. Neighbouring residential developments will also result in an increase in the number of dogs in the area. Evidence of invasive <i>Lantana camara</i> (a recognised hindrance to Koala dispersal) is present on-site, with the properties to the south noted as having significant infestations. It is likely that this invasive plant will be suppressed under the required rehabilitation efforts for the ongoing approval of the proposed	No significant impact likely



Significant Impact Criteria	Description	Impact
	development on the subject site. It is unlikely that the proposal will augment invasive species impacts already present in the area.	
8. Introduce disease that may cause the species to decline.	Most of South East Queensland's Koala populations are recorded as having a high prevalence of Chlamydia infection and Koala Retrovirus (KoRV). Sick and dead by disease Koalas have been recorded in the vicinity of the referral area. As such, the project is considered unlikely to cause pressure on the local Koala population to the point where these diseases manifest. Further, the project is extremely unlikely to introduce or spread disease or pathogens into Koala habitat areas.	No significant impact likely
9. Interfere substantially with the recovery of the species.	Assessment has concluded that the proposed action is unlikely to interfere substantially with the recovery of Koala (refer to Tables 4 and 5 in section Part B), primarily due to the relatively disturbed nature of the site, its current relatively high level of fragmentation, encroaching development (in line with planning intent) and the lack of records of the Koala utilising the site, or areas immediately adjacent.	No significant impact likely

Koala summary

Targeted field surveys (as per EPBC Act guidelines) were conducted across the site and resulted in no Koala observations on, or surrounding, the referral area. In addition, four SAT transects were performed and found Low to Medium Koala usage levels for the site (refer to Table 2). This suggests that the site has a low usage by Koalas, corresponding with the isolated and fragmented nature of the vegetation available on-site. Flora assessment and tree plots concluded that the site is dominated by species that are not identified as Koala Food trees, however some Primary and Secondary Koala Food Trees were recorded throughout the site. The critical habitat on the site was given a habitat assessment score of 5 using the Koala Referral Guidelines (refer to Table 4 in section **Part B**).

As discussed above, a number of factors diminish the adversity of impacts caused by the proposed clearing of 15 ha and edge effects upon 14.7 ha of score 5 critical habitat as defined by the Koala referral guidelines. These factors are summarised as:

- Although the proposal requires the clearing of approximately 15 ha of habitat of variable quality (see **Plan 4** and **Attachment 3** for data in section **Part B**), only 1.84 ha of Least Concern remnant vegetation will be cleared, and approximately 4 ha of critical habitat will be retained (refer to **Plan 4** in section **Part B**);
- 15 ha is considered a smaller area of clearing (<20 ha);
- 14,7 ha of land to the south is expected to be edge effected;
- The habitat score of 5 for the site is the lowest possible score for "critical habitat";
- The western portion of the property, across the Centenary Highway, is not proposed to be developed as part of this action (refer to **Plan 4** in section **Part B**). Additionally, two areas of Open Space (totaling 4.2 ha) are proposed for inclusion in the development and will retain existing vegetation and include rehabilitation activities. These three areas will assist to provide connectivity values through the landscape and ensure long-term habitat viability should Koalas be present;
- No Koalas were observed on-site; only historical evidence of Koala activity in the form of scats was recorded;
- The two mapped watercourses (in the north and the southeast of the site) will be retained and rehabilitated as Open Space (see **Plan 1** in section **Part B**);
- As vegetation on this site and the neighbouring property is completely isolated from any other vegetation due to roads and highways on all sides, the clearing of this vegetation will not result in fragmentation of a habitat area from a larger habitat area;



- Vegetation clearing will be undertaken sequentially under the guidance of a fauna spotter-catcher. This will ensure that the potential for injury or death to Koalas, if present, as a result of clearing is minimized; Whilst **SHG** firmly does not believe that the development will pose a significant impact an offset is to be provided.

5.2. Offset Conservation Gain

The direct offset compensates for 100 percent of the quantum of impact. The conservation gain will be achieved in accordance with the EPBC Act's Environmental Offsets Policy. Refer to **Attachments A7 and A9** for details relating to the Koala offset requirements, management and compensation details.

5.3. Direct Offset Compensation

The direct offset will compensate for 100 percent of the quantum of impact. The conservation gain will be achieved in accordance with the EPBC Act's Environmental Offsets Policy Refer to **Attachments A7 and A9** for details relating to the Koala offset requirements, management and compensation details.

5.4. Management Action of Offset Area

Management actions will be carried out in accordance with the EPBC Act's Environmental Offsets Policy. For all management actions relating to the offset area please refer to **Attachment A8 (QTFN's Koala Offset Management Plan)**. Official concerns and clarification from the DEE of the Koala Offset Management Plan can be viewed in Attachment A10.

5.5. Limitations

Environmental offsets are now a popular tool in attempting to mitigate the loss of biodiversity values, ecosystem function, ecosystem services, or all three (J.W. Bull, 2013). Whilst the uptake by governments in Australia has been swift there is little scientific data, rigour or empirical evidence behind the acceptable outcomes or success of the offsets framework that is currently being applied (J.W. Bull, 2013). Limitations are based on the basis that this mode of offsetting for environmental impacts is new and therefore success is not assured due to the limited duration (time) of the offsets progression. (J May, 2017). There are four main factors that provide limitation on the success of environmental offsets, these are

1. Uncertainty with compliance conditions;

Uncertainty of compliance issues are minimised by using professionals who are well versed in the notion and compliance of environmental offsets. The proponent has minimised this limitation by engaging consultants who are well versed in the federal environmental approvals and conditions phase of the project and the on ground implementation of conditioned offsets.

2. Conditions do not measure ecological outcomes; and

The use of the Koala Habitat Assessment Tool and the EPBC Environmental Offsets Calculator is the best way under the federal system to provide ecological improvement measures on areas that are required to be used as an environmental offset. This coupled with the use of specialised on ground contractors and rigorous reporting /



audit parameters is currently the best way to ensure the conditions are ecological measurable and correctly implemented.

3. Inadequate project planning.

The limitation of inadequate project planning is severely reduced with the employment of specialised environmental offset providers. The proponent is securing an offset through the engagement of services from an environmental offset provider.



6. Social and Economic

The following was requested by **DoE** in Item 6 of the Additional Information required to complete the Preliminary Documentation assessment.

The preliminary documentation must provide details on the social and economic costs and/or benefits of undertaking the proposed action.

The Deebling Heights development will be a masterplanned residential development comprising of 295 new residential lots. It is anticipated that approximately 125 lots will be retained by **DHA**, on which homes will be built for Defence members and their families, with the remaining lots available for public purchase. It is expected that the construction of homes for Defence members will be completed in two stages – the first stage consists of the completion of 56 homes by September 2018, and the second stage will be 69 homes completed in September 2019. Land lots will be marketed for public purchase across both stages, starting from mid-2017.

From a social context and accessibility perspective, the development is located approximately 10 km to the Ipswich CBD, 11 km from the RAAF Base, Amberley, close to schools and community facilities, and with convenient road and public transport access.

Economic benefits of the project include the investment by **DHA** of over \$60 million into direct costs of the residential development, over a time span of approximately four years. Further, the provision of approximately 125 houses for Defence members (and their families) who are based at RAAF Amberley, allows for quality housing, well located to support the growth of RAAF Amberley. Other indicative economic benefits for the Ipswich region (based on a similar scale project) that are expected to be realised by the Deebling Heights development project include the provision of 70 direct and indirect full time equivalent (FTE) jobs during development, a contribution of \$26 million to gross regional product (GRP), 27 direct and indirect FTE jobs ongoing per annum, and a direct employment contribution of \$1.2 million in GRP per annum.

The Deebling Heights project has included extensive stakeholder engagement. **DHA** commissioned a community engagement specialist, **CPR Group**, to carry out stake holder engagement, which included the contact and engagement with over 500 local residents and property owners in the Deebling Heights / Sovereign Pocket district, in the lead up to the commencement of the public notification comment period. Such engagement has included:

- On 1 September 2016, **DHA** and **CPR Group** representatives met with the Principal of the Deebling Heights State School, Mr Andrew McDonald, and the Business Services Manager, Ms Karen Mitchell;
- On 13 September, a mail out was hand-delivered and mailed to 496 residents and property owners, inviting them to attend a community information day;
- The Deebling Heights State School also distributed the information day invitation via the school's newsletter on 15 September;
- On 13 September, **DHA** and **CPR Group** representatives met and briefed members of the Deebling Heights State School P&C, on the DA and the progress of its assessment;
- On 24 September, a community information day was hosted at the Deebling Heights State School between 10 am and 2 pm;
- Local and future residents attended the information day and were briefed on the DA and the expected timing for a decision notice;

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- 20 people visited the information day and provided their feedback on the DA;
- Meetings were held with the Divisional Councillor David Pahlke (he attended by phone) and separately with Mayor Paul Pisasale; and
- The public notification comment period commenced on Monday 26 September.

The full report on pre-public notification stakeholder engagement is included in **Attachment A4**.



7. Conclusion

The *Environmental Management Division* of **Saunders Havill Group** were commissioned to develop Preliminary Documentation to support assessment of the proposed action (the Grampian Drive development), under the *Environment Protection and Biodiversity Conservation Act* (EPBC Act). The proposed action is a residential development at Rawlings Road, Deebing Heights, in South East Queensland. A Controlled Action assessment through Preliminary Documentation was determined for the development on 2 August 2016 (2016/7723), in response to the submitted Referral on behalf of the proponent, **Defence Housing Australia**. The decision was based on:

- Listed threatened species and communities (sections 18 & 18A); and
- Commonwealth action (section 28).

This Preliminary Documentation Report provides information requested by the **DoE** to assist the assessment manager in determining whether or not the development at Deebing should be approved. As detailed in previous referral documentation and this report, SHG believe that the proposal will result in clearing and potential edge effected impacts on 15 and 14.7 ha, respectively, of Koala habitat with a score of 5. As per **DoE** assertions, the proposal has been deemed to impose a significant impact and an offset is therefore required. The Proponent will provide an offset in accordance with the EPBC Act's Environmental Offset Policy.



8. REFERENCES

- Biodiversity Assessment and Management (BAAM) (2004). Draft Action Plan to Reduce Koala Hits from Vehicles in Redland Shire. Prepared for Redland Shire Council by Biodiversity Assessment and Management Pty Ltd.
- Biodiversity Assessment and Management (BAAM) (2012). Koala Habitat Review and Mapping – Redland City Mainland Areas. Prepared for Redland City Council by Biodiversity Assessment and Management Pty Ltd.
- Brearley, G, McAlpine, C, Bell, S and Bradley, A (2012). Influence of contrasting urban edges on arboreal mammal stress: A case study of squirrel gliders in southeast Queensland, Australia. *Landscape Ecology* 27: 1407-1419.
- J.W. Bull, K. S.-G. (2013). Biodiversity offsets in theory and practice. *Orynx*, 369-380
- Callaghan, J and Rhodes, J (2005). Koala Beach Estate Monitoring Program. Prepared for the Ray Group by the Australian Koala Foundation.
- Cork, SJ, Hume, ID and Foley, WJ (2000). Improving habitat models and their utility in Koala conservation. *Conservation Biology* 14 (3); 660-668.
- Department of the Environment (2016a). *Pteropus poliocephalus* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.
- Department of the Environment (2016b). *Maccullochella mariensis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.
- Department of the Environment (2016c). *Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT) in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.
- DERM (2009). Decline of the Koala Coast Koala Population: Population status in 2008. Department of Environment and Resource Management, Queensland.
- DERM (2010). Koala Coast Koala Population Report 2010. Prepared by the Queensland Department of Environment and Resource Management.
- Department of Infrastructure, Local Government and Planning. (2017, April 28). Ripley Valley. Retrieved from Queensland Government Department of Infrastructure, Local Government and Planning : <http://www.dilgp.qld.gov.au/planning/priority-development-areas/ripley-valley.html>
- Department of Employment, E. D. (2011). Wild Dog Management Strategy 2011-16. Brisbane: The State of Queensland, Department of Employment, Economic Development and Innovation.
- C. E. Dexter A C, R. G. (2016). Using complementary remote detection methods for retrofitted eco-passages: a case study for monitoring individual koalas in south-east Queensland. *Wildlife Research*, 369-379.



- Clive McAlpine, D. L.-H. (2015). Conserving koalas: A review of the contrasting regional trends, outlooks and policy challenges. *Biological conservation* .
- Council, N. R. (2009). National Koala Conservation and Management Strategy 2009–2014. Canberra: Department of the Environment, Water, Heritage and the Arts.
- David S. Dique, J. T. (2003). Koala mortality on roads in south-east Queensland: the koala speed-zone trial. *Wildlife Research* , 419 - 426 .
- Dique, DS, Thompson, J, Preece, HJ, deVilliers DL, and Carrick, FN (2003). Dispersal patterns in a regional Koala population in south east Queensland. *Wildlife Research* 30: 281-290.
- Dique, DS, Preece, HJ, Thompson, J and de Villiers DL (2004). Determining the distribution and abundance of a regional Koala population in south-east Queensland for conservation management. *Wildlife Research* 31: 109-117.
- David S. Dique, J. T. (2003). Koala mortality on roads in south-east Queensland: the koala speed-zone trial. *Wildlife Research* , 419 - 426 .
- Duncan, A., G.B. Baker & N. Montgomery (1999). The Action Plan for Australian Bats. [Online]. Canberra: Environment Australia. Available from:
<http://www.environment.gov.au/biodiversity/threatened/publications/action/bats/index.html>.
- Eby, P. (1998). An analysis of diet specialization in frugivore *Pteropus poliocephalus* in Australian subtropical rainforest. *Australian Journal of Ecology*. 23:443-456.
- EPA (2007). Report on Koala Coast Koala surveys 2005-2006. Prepared by the Queensland Environmental Protection Agency, Brisbane.
- Ellis, WAH, Melzer, A, Carrick, FN and Hasegawa, M (2002). Tree use, diet and home range of the Koala (*Phascolarctos cinereus*) at Blair Athol, central Queensland. *Wildlife Research* 29: 303-311.
- Ellis, W. M. (2002). . Tree use, diet and home range of the koala (*Phascolarctos cinereus*) at Blair Athol, central Queensland. . *Wildlife Research*, 303-311.
- Fahrig, L (2001). How much habitat is enough? *Biological Conservation* 100: 65-74
- GHD (2009). South East Queensland Koala Habitat Assessment and Mapping Project. Prepared for Qld Department of Environment and Resource Management.
- Government, N. (2016). NSW LAndcare Gateway. Retrieved from
<http://www.landcare.nsw.gov.au/groups/tregeagle-landcare-group/projects/tregeagle-koala-habitat-restoration-and-corridor-connections-nsw-environmental-trust-restoration-rehabilitaton-program>
- Henning, J. C. (2015). The causes and prognoses of different types of fractures in wild koalas submitted to wildlife hospitals. *Preventive Veterinary Medicine*, 371-378.



- Hughes, L (2003). Climate change and Australia: trends, projections and impacts. *Austral Ecology* 28: 423-443.
- Kanowski, J (2001). Effects of elevated CO₂ on foliar chemistry of seedlings of two rainforest trees from north-east Australia: implications for folivorous marsupials. *Austral Ecology* 26: 165-172.
- Lunney, D, O'Neill, L, Matthews A, Sherwin, WB (2002). Modelling mammalian extinction and forecasting recovery: Koalas at Iluka (NWS, Australia). *Biological Conservation* 106: 101-113.
- Lunney, D, Matthews, A, Moon, C and Ferrier, S (2000). Incorporating habitat mapping into practical Koala conservation on private lands. *Conservation Biology* 14: 669-680.
- J May, R. H. (2017). Are offsets effective? An evaluation of recent environmental offsets in Western Australia. *Biological Conservation*, 249-257
- McAlpine, CA, Bowen, ME, Callaghan, JG, Lunney, D, Rhodes, JR, Mitchell, DL, Puller, DV and Possingham, HP (2006). Testing alternative modes for the conservation of Koalas in fragmented rural-urban landscapes. *Austral Ecology* 31: 529-544.
- McAlpine, C, Rhodes, J, Callaghan, J, Bowen, M, Lunney, D, Mitchell, D, Pullar, D and Possingham, H 2006, 'The importance of forest area and configuration relative to local habitat factors for conserving forest mammals: A case study of Koalas in Queensland, Australia', *Biological Conservation*, vol. 132, no. 2, pp.153-165.
- Oliveria S, M. P. (2014). Ecology and movement of urban koalas adjacent to linear infrastructure in coastal south-east Queensland. *Australian mammalogy*, 45-54.
- Owens, C. (2014, April). RIPLEY VALLEY'S NEWBOOMTOWN Ripley Valley's new Providence to be home to 20,000: Massive residential development will be home to 20,000. *The Queensland Times*. Ipswich: The Queensland Times.
- Phillips, S. a. (2000). Tree species preferences of. *Wildlife Research* 27, 509-516.
- Phillips, S. a. (2011). The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus*. . *Australian Zoologist*, 774-780.
- Preece, H.J. (2007). "Identifying hotspots for threats to Koalas using spatial analysis. Pp. 1294-1300 in Proceedings of the MODSIM 2007 international congress on modelling and simulation, Modelling and Simulation Society of Australia and New Zealand.
- Prevett, PT, Hives, NW and Cerini, GE (1992). Koala Protection and Fenced Freeways. A report to Vicroads, Ballarat Bypass Project. Ballarat University College.
- Queensland Department of Main Roads, P. D. (2002). Fauna Sensitive Road Design. Brisbane: Dragon Prints.
- Rhodes, J. L. (2011). The consequences of using indirect signs that decay to determine species' occupancy. *Ecography*, 141 - 150.



Rhodes JR, Chooi, FN; deVilliers, DL, Preece, HJ, McAlpine, CA and Possingham, HP, (2011). Using integrated population modelling to quantify the implications of multiple threatening processes for a rapidly declining population. *Biological Conservation* 144 (3): 1081-1088.

Rowland, S. J. (1993). *Maccullochella ikei*, an endangered species of freshwater cod (Pisces: Percichthyidae) from the Clarence River system, NSW and *M. peelii mariensis*, a new subspecies from the Mary River, Qld. *Records of the Australian Museum*. 45 : 121-145.

Seebrook, L, McAlpine, C, Baxter, G, Rhodes, J, Bradley, A and Lunney, D (2011). Drought-driven change in wildlife distribution and numbers: a case study of Koalas in south west Queensland. *Wildlife Research* 38: 509-524.

Simpson, R. (1994). An investigation into the habitat preferences and population status of the endangered Mary River Cod (*Maccullochella peelii mariensis*) in the Mary River System, south-eastern Queensland. Dept Primary Industries, Brisbane.

Simpson, R. & Jackson, P. (1996). The Mary River Cod Research and Recovery Plan - 1996-2001. [Online]. QLD DPI. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/recovery/mary-river-cod/index.html>.

Simpson, R.R. & A.J. Mapleston (2002). Movements and habitat use by the endangered Australian freshwater Mary River Cod *Maccullochella peelii mariensis*. *Environmental Biology of Fishes*. 65:401-410.

Spencer, H.J., C. Palmer & K. Parry-Jones (1991). Movements of fruit-bats in eastern Australia, determined by using radio-tracking. *Wildlife Research*. 18:463-468.

Wager, R. & P. Jackson (1993). *The Action Plan For Australian Freshwater Fishes*. Canberra, ACT: Australian Nature Conservation Agency.

Woosnam-Merch 455-462ez O, C. R. (2012). What faecal pellets surveys can and can't reveal about the ecology of koalas *Phascolarctos cinereus*. *Australian Zoologist*, 192 - 200.



Attachments

Attachment A1:

DoEE Assessment Notification Letters

Attachment A2:

Layout Master Plan

Attachment A3:

Contemporary PMST Results

Attachment A4:

CPR Group Report

Attachment A5:

Transport and Main Roads Standard Drawing 1603

Attachment A6:

Koala Habitat Assessment Table

Attachment A7:

Koala Habitat Assessment (Offset Area)

Attachment A8:

Koala Habitat Offset Management Plan

Attachment A9:

Koala Offset Calculator



Attachment A1

DoEE Assessment Notification Letters



Mr Rob Winters
Senior Development Manager
Defence Housing Australia
26 Brisbane Avenue
BARTON ACT 2600

Dear Mr Winters

Additional information required for preliminary documentation — Rawlings Road Development, Deebing Heights Ipswich, Queensland (EPBC 2016/7723)

I write to you in relation to the above proposed action. On 2 August 2016 it was decided under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that the proposed action is a controlled action. On the same day it was also decided under section 87 of the EPBC Act that the proposed action will be assessed by preliminary documentation. In accordance with section 95A(2) of the EPBC Act further information is required to be able to assess the relevant impacts of the proposed action. Details outlining the further information required are at Attachment A.

Once the requested preliminary documentation information is provided to the Department you will be instructed to publicly notify the preliminary documentation for comment. Any public comments received will need to be addressed before the preliminary documentation can be finalised. Once complete, the preliminary documentation is then provided to the Department for a decision on whether to approve the proposed action. Further information is available from the Department's website at <http://www.environment.gov.au/epbc>.

If you have any questions about the assessment process or the further information required, please contact Ben Phillips, by email at ben.phillips@environment.gov.au or telephone 07 3837 3442 and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'James Barker'.

James Barker
Assistant Secretary
Assessments and Sea Dumping Branch

29 March 2017

Additional information required for preliminary documentation

1. General

1.1	The preliminary documentation must be contained as one document with attachments.
1.2	Please follow the structure of this information request when structuring the preliminary documentation.
1.3	Please also include a reference table within the preliminary documentation indicating where to find the information fulfilling this request.
1.4	In addressing this information request please ensure all work and conclusions: <ul style="list-style-type: none"> • are evidence based; • use scientifically robust methodologies; • are supported by peer reviewed literature; • are presented so as to not bias and/or obfuscate the information, or mislead the reader; • demonstrate consideration of relevant conservation advice and threat abatement plans.

Koala (*Phascolarctos cinereus* – combined populations of Queensland, New South Wales and the Australian Capital Territory)

2. Description of the environment

The Department considers the area of koala habitat on the project site is likely to be larger than stated in the referral. It is unclear why mapped trees at the eastern end of the project site are not considered koala habitat. To clarify the above the preliminary documentation must:

2.1	explain (with supporting literature) why the trees at the eastern end of the project site are not considered koala habitat – OR – provide a map of all koala habitat trees and area of koala habitat (in hectares) on the project site, including at the eastern end of the project site. Trees must be included in the map if they are ≥ 100 mm diameter at breast height and are food trees, could provide refuge from predators, or could be used by koalas for shelter and/or thermoregulation;
2.2	provide an empirical assessment of the current nature, extent and severity of threats to the koala and its habitat on both the proposed action site and the lots adjoining the southern edge of the project site (lots 198 and 199);
2.3	provide empirical information on the presence, location, design type, and dimensions of any koala exclusion fencing and koala movement devices (underpasses) on the Centenary Highway, South Deebing Creek Road, and Rawlings Road surrounding the project site;

2.4	provide an empirical assessment of the extent and quality of koala habitat present in the lots adjoining the southern edge of the project site (lots 198 and 199). The assessment must use the same methodologies as applied to the project site, including use of the <i>Koala Habitat Assessment Tool</i> from the <i>Koala Referral Guidelines</i> . If these properties are not legally accessible please provide a desktop assessment;
2.5	provide an assessment of the extent, nature, and severity of current edge effect impacts on koala habitat within lots 198 and 199 resulting from the Centenary Highway, South Deebing Creek Road. If these properties are not legally accessible please provide a desktop assessment; and,
2.6	detail all limitations in the methodologies, results, technologies, information and work done to complete items 2.1 through 2.5 of this information request.

3. Quantification of impacts

The Department considers the area of impact is likely to be more than the area proposed to be directly cleared for urban development. The areas of koala habitat to be retained would be fragmented, have little connectivity to other habitat, and be subject to substantial edge effect impacts. Further, the areas of koala habitat adjoining the southern edge of the project site would also be fragmented, have little connectivity to other habitat, and be subject to substantial edge effect impacts.

On this basis, the Department considers that the area of koala habitat directly impacted is larger than referred and that the retained/adjacent habitat is unlikely to maintain the habitat values necessary to support the koala, representing habitat loss. To clarify the above the preliminary documentation must:

3.1	provide a revised area of koala habitat that will be directly and indirectly impacted (including by edge effects, fragmentation and isolation) by the proposed action, based on the results from section 2 of this information request;
3.2	determine the expected extent, nature, and severity of edge effect impacts on koala habitat within lots 198 and 199 resulting from the proposed action. The expected edge effect impacts must be determined using robust scientific methodology supported by appropriate literature sources; and,
3.3	detail all limitations in the methodologies, results, technologies, information and work done to complete items 3.1 and 3.2 of this information request.

4. Avoidance and mitigation

The referral does not identify measures to avoid and mitigate edge effect impacts on the potential koala habitat in lots 198 and 199. To clarify the above the preliminary documentation must:

4.1	provide a description of each proposed avoidance or mitigation measure in relation to edge effect impacts;
-----	--

4.2	provide an assessment of the expected or predicted effectiveness of each proposed avoidance or mitigation measure; and,
4.3	detail all limitations in the methodologies, results, technologies, information and work done to complete items 4.1 and 4.2 of this information request.
4.4	<p>If you are proposing to use an environmental management plan (EMP), provide an EMP that details the proposed avoidance and mitigation measures and how those measures will mitigate impacts to the Hastings River Mouse, including clear, measurable and time specific:</p> <ul style="list-style-type: none"> • performance criteria; • environmental outcomes to be achieved; • auditing regime to measure the implementation and effectiveness of the EMP <p>Detail all limitations of any EMPs prepared for the proposed action.</p>

5. Proposed offsets

The Preliminary Documentation must clearly articulate how the 'avoid, mitigate' hierarchy will be applied to impacts to MNES and how proposed compensation (environmental offsets) will be provided for any residual significant impacts. To clarify the above the preliminary documentation must:

5.1	provide an assessment of whether the proposed action will have a residual significant impact on each affected MNES. Please demonstrate the use of the <i>Significant Impact Guidelines 1.1 - Matters of National Environmental Significance</i> in making this assessment;
5.2	<p>propose a direct offset for MNES where a residual significant impact/s is identified in 6.1. If required, the direct offset must compensate for at least 90 per cent of the impact, as determined by the Minister/Department in accordance with the EPBC Act offsets policy. The identified offset must clearly state whether the conservation gain is proposed to be achieved by:</p> <ul style="list-style-type: none"> • improving existing habitat for the protected matter; • creating new habitat for the protected matter; • reducing threats to the protected matter; and/or • averting the loss of a protected matter or its habitat that is under threat
5.3	if the direct offset does not compensate for 100 per cent of the impact (using the Department's <i>Offsets assessment guide</i>), provide detailed and evidenced costings for the direct offset and detail any indirect offsets proposed including costs. Costing information is necessary to calculate the cost of the other compensatory measures component of the offset (but is only required where a direct offset does not compensate for 100 per cent of the impact);
5.4	identify the proposed offset's geographical location (including an appropriately scaled map);

5.5	detail the time-specific outcomes (Key Performance Indicators) against which achievement of the proposed offset outcomes will be measured. This includes interim milestones so the proponent can demonstrate they are on track to achieving the proposed offset outcomes. Please include a monitoring and evaluation plan that will be used to demonstrate that the offset is meeting the interim milestones and final outcomes;
5.6	detail the management actions for the proposed offset, describing how the outcomes will be achieved;
5.7	in order for the Department to consider whether any offset proposal meets the Department's Offset Policy, provide a table detailing the proposed offset's 'score' for each attribute of the <i>Offsets assessment guide</i> , an evidence-based justification for the score for each attribute, and literature references to support the evidence-based justification. If the offset involves improving habitat quality, the same methodology for measuring habitat quality must be used at both the impact and offset sites. Should the offset proposal be acceptable and the project be approved, please note that the information provided will be used in conditions to ensure that environmental outcomes are achieved; and,
5.8	detail all limitations in the methodologies, results, technologies, information and work done to complete items 6.1 through 6.8 of this information request.

6. Social and Economic

The preliminary documentation must provide details on the social and economic costs and/or benefits of undertaking the proposed action.



Attachment A2

Layout Master Plan



REVISION
 A: 21/07/2016 - Amendments in response to RF1
 B: 05/08/2016 - Lot coding amendments
 C: 25/11/2016 - Amend layout & staging
 D: 20/01/2017 - Amend 1A & 1C

Note:
 All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.
 Dimensions have been rounded to the nearest 0.1 metres.
 Areas have been rounded down to the nearest 5m².
 The boundaries shown on this plan should not be used for final detailed engineers design.
Source Information:
 Site boundaries: RPS Survey.
 Adjoining information: DCDB.
 Contours: RPS Survey.
 Q10, Q20 & Q100: Water Technology.

- Legend**
- Site Boundary
 - - - Stage Boundary
 - - - Sub-Stage Boundary
 - ▨ Rail Resumption
 - ▨ Road Resumption
 - ▨ Stormwater / Drainage
 - ▨ Pedestrian Link
 - ▨ Active Open Space
 - ★ Potential Dual Occupancy
 - Q100
 - Q20
 - Q10
 - 500m Park Catchment
 - 800m Neighbourhood Centre Catchment

CLIENT

PROJECT
Grampian Drive Deebing Heights

Plan of Subdivision
 Over
 Lot 194 on SP193445 &
 Lot 195 on S1357

Date:	20 JANUARY 2017
Comp By:	WNW/MD
Checked By:	DG
DWG Name:	126663-ROL
Job Ref:	126663
Local Authority:	Ipswich City Council
Locality:	Deebing Heights
Scale:	1 : 2000
Sheet:	A1
Plan Ref:	126663 - 08
Rev:	D

RPS
 RPS Australia East Pty Ltd
 ACN 140 292 762
 ABN 44 140 292 762
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Yield Breakdown

Allotment Details			Stage 1A	Stage 1B	Stage 1C	Stage 2A	Stage 2B	Stage 2C	Stage 2D	Stage 3A	Stage 3B	Stage 3C	Stage 3D	Stage 4A	Stage 4B	Stage 4C	Stage 4D	Stage 4E	Stage 4F	Stage 5A	Overall	
Residential Allotments	Typical Size	Typical Area	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	
Villa Allotments	10.7m x 32m	342.4m ²	15	16	—	15	6	9	—	13	2	9	5	4	—	—	—	—	5	—	99	33.4%
Premium Villa Allotments	12.5m x 32m	400m ²	18	13	—	5	8	10	—	6	5	2	7	5	—	—	—	—	2	—	81	27.4%
Courtyard Allotments	14m x 32m	448m ²	11	7	—	8	8	—	—	9	2	5	4	1	—	—	—	—	1	—	56	18.9%
Premium Courtyard Allotments	16m x 32m	512m ²	5	3	—	1	5	3	—	2	—	3	2	—	—	—	—	—	—	—	24	8.1%
Traditional Allotments	18m x 32m	576m ²	6	1	—	2	2	2	—	9	1	3	2	—	—	—	—	—	—	—	28	9.5%
Total Residential Allotments			55	40	—	31	29	24	—	39	10	22	20	10	—	—	—	—	8	—	288	97.3%
Super Allotments																						
Medium Density Allotments			—	—	1	—	—	—	—	1	—	—	—	—	1	1	1	1	—	—	6	2.0%
Balance Allotments			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	0.7%
Total Super Allotments			—	—	1	—	—	—	—	1	—	—	—	—	1	1	1	1	—	2	8	2.7%
Total Allotments			55	40	1	31	29	24	1	39	10	22	20	10	1	1	1	1	8	2	296	100.0%

Land Use	Stage 1A	Stage 1B	Stage 1C	Stage 2A	Stage 2B	Stage 2C	Stage 2D	Stage 3A	Stage 3B	Stage 3C	Stage 3D	Stage 4A	Stage 4B	Stage 4C	Stage 4D	Stage 4E	Stage 4F	Stage 5A	Overall	
	Area	Area																		
Area of Subject Site	6.720 ha	2.449 ha	0.214 ha	3.803 ha	1.956 ha	1.524 ha	0.164 ha	2.746 ha	0.445 ha	1.329 ha	0.942 ha	0.870 ha	0.137 ha	0.128 ha	0.120 ha	0.120 ha	0.358 ha	3.417 ha	27.440 ha	100.0%
Saleable Area																				
Residential Allotments	2.516 ha	1.699 ha	—	1.317 ha	1.298 ha	1.009 ha	—	1.893 ha	0.445 ha	1.082 ha	0.868 ha	0.410 ha	—	—	—	—	0.324 ha	—	12.860 ha	46.9%
Medium Density Allotments	—	—	0.170 ha	—	—	—	0.164 ha	—	—	—	—	—	0.137 ha	0.128 ha	0.120 ha	0.120 ha	—	—	0.839 ha	3.1%
Balance Allotments	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.417 ha	12.5%
Total Area of Allotments	2.516 ha	1.699 ha	0.170 ha	1.317 ha	1.298 ha	1.009 ha	0.164 ha	1.893 ha	0.445 ha	1.082 ha	0.868 ha	0.410 ha	0.137 ha	0.128 ha	0.120 ha	0.120 ha	0.324 ha	3.417 ha	17.116 ha	62.4%
Road																				
Collector Streets	0.332 ha	—	—	0.220 ha	—	0.135 ha	—	—	—	—	—	—	—	—	—	—	—	—	0.687 ha	2.5%
Local Access Streets	0.924 ha	0.747 ha	0.044 ha	0.473 ha	0.658 ha	0.372 ha	—	0.853 ha	—	0.234 ha	0.049 ha	0.451 ha	—	—	—	—	0.034 ha	—	4.839 ha	17.6%
Pedestrian Connections	0.043 ha	—	—	0.038 ha	—	—	—	—	—	0.013 ha	0.025 ha	0.009 ha	—	—	—	—	—	—	0.128 ha	0.5%
Rawlings Road Resumption	0.113 ha	0.003 ha	—	0.016 ha	—	0.008 ha	—	—	—	—	—	—	—	—	—	—	—	—	0.139 ha	0.5%
Total Area of New Road	1.412 ha	0.750 ha	0.044 ha	0.747 ha	0.658 ha	0.515 ha	—	0.853 ha	—	0.247 ha	0.074 ha	0.460 ha	—	—	—	—	0.034 ha	—	5.793 ha	21.1%
Open Space																				
Active Open Space	0.379 ha	—	—	0.233 ha	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.613 ha	2.2%
Stormwater (Above Q100)	0.822 ha	—	—	1.506 ha	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.328 ha	8.5%
Stormwater (Q20 - Q100)	0.169 ha	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.169 ha	0.6%
Stormwater (Below Q20)	1.422 ha	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.422 ha	5.2%
Total Open Space	2.792 ha	—	—	1.739 ha	—	4.531 ha	16.5%													



Attachment A3

Contemporary PMST Results



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/03/17 16:53:56

[Summary](#)

[Details](#)

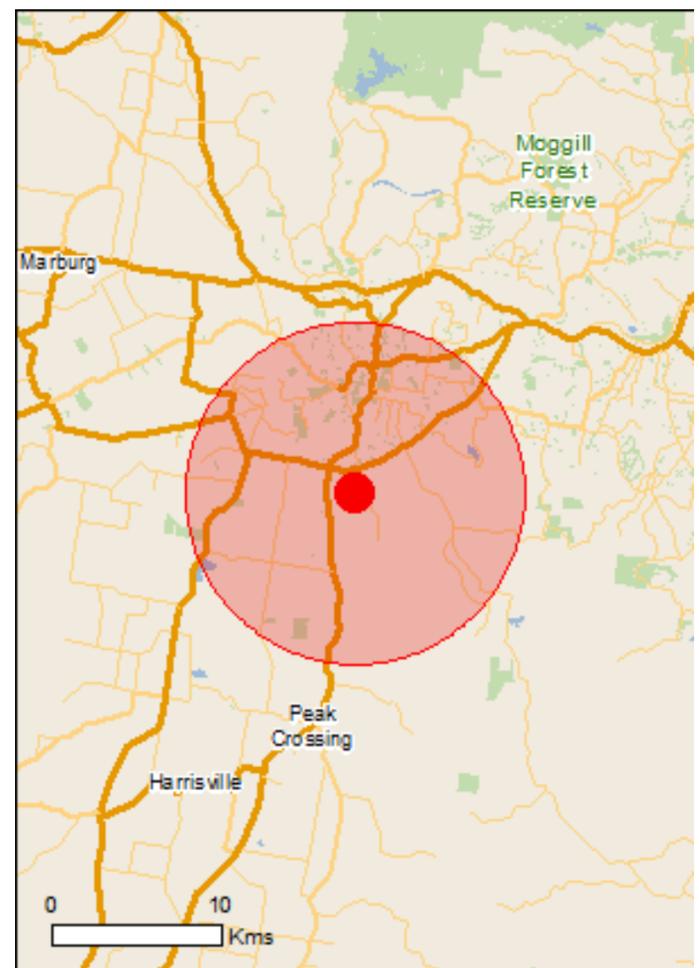
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

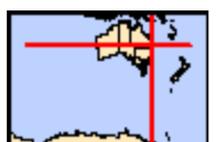
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	35
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	13
Commonwealth Heritage Places:	1
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Regional Forest Agreements:	None
Invasive Species:	43
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area
Swamp Tea-tree (<i>Melaleuca irbyana</i>) Forest of South-east Queensland	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Erythrorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Neoceratodus forsteri Australian Lungfish, Queensland Lungfish [67620]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Other		
Cycas ophiolitica [55797]	Endangered	Species or species habitat likely to occur within area
Plants		
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Bertya ernestiana a shrub [78349]	Vulnerable	Species or species habitat may occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Notelaea ipsviciensis Cooneana Olive [81858]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Notelaea lloydii Lloyd's Olive [15002]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Plectranthus habrophyllus [64589]	Endangered	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area

Reptiles

Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat likely to occur within area
Furina dunmali Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Saiphos reticulatus Three-toed Snake-tooth Skink [88328]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area

Migratory Wetlands Species

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - AMBERLEY - AP1 FIRE TRAINING
Defence - AMBERLEY - AP2 TRANSMITTING STATION
Defence - AMBERLEY - AP3 REMOTE RECEIVERS SITE
Defence - AMBERLEY - AP4 VHF STATION
Defence - AMBERLEY - AP5 MQ AREA LADY SHERGER
Defence - AMBERLEY - AP6 MQ AREA
Defence - AMBERLEY - AP7 BUFFER ZONE
Defence - AMBERLEY - AP8 BUFFER ZONE
Defence - AMBERLEY - AP89 BUFFER ZONE
Defence - AMBERLEY - AP90 SMALL ARMS RANGE (PURGA)
Defence - AMBERLEY - RAAF BASE
Defence - Commonwealth Centre - 3rd Floor
Defence - IPSWICH TRAINING DEPOT

Commonwealth Heritage Places [\[Resource Information \]](#)

Name	State	Status
Historic		
Amberley RAAF Base Group	QLD	Listed place

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species

Name	Threatened	Type of Presence
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		habitat may occur within area Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Denmark Hill	QLD
Ipswich Pteropus	QLD
Tir Na Crann	QLD

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
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Birds

Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
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Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
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Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
--	--	--

Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
--	--	--

Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
--	--	--

Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
---	--	--

Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
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Frogs

Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
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Mammals

Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
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Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
--	--	--

Equus caballus Horse [5]		Species or species habitat likely to occur within area
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Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
--	--	--

Name	Status	Type of Presence
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sage, Wild Sage [10892] <i>Lycium ferocissimum</i> African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
<i>Opuntia</i> spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
<i>Parkinsonia aculeata</i> Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<i>Parthenium hysterophorus</i> Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
<i>Protasparagus densiflorus</i> Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
<i>Protasparagus plumosus</i> Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
<i>Sagittaria platyphylla</i> Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
<i>Salix</i> spp. except <i>S.babylonica</i> , <i>S.x calodendron</i> & <i>S.x reichardtii</i> Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
<i>Salvinia molesta</i> Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
<i>Senecio madagascariensis</i> Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<i>Solanum elaeagnifolium</i> Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Reptiles		
<i>Hemidactylus frenatus</i> Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-27.67601 152.75136

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.



Attachment A4

CPR Group Report



REPORT

TITLE Pre-public notification stakeholder engagement
DATE 13 October 2016
PROJECT Deebing Heights residential development application
CLIENT Defence Housing Australia (DHA)

Suite 6 Primary Central
63 Primary School Court
Maroochydore Q 4558

✉ PO Box 2092
Sunshine Plaza Q 4558

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F 07 5443 6429
E admin@cprgroup.com.au

abn 38 097 022 994

Synopsis

DHA and CPR Group representatives are engaging with local residents, providing them with briefings and inviting their feedback, on the DHA development application (DA) for residential housing Lots in Deebing Heights. The DA is currently under the assessment of Ipswich City Council.

CPR Group and DHA representatives have contacted, and engaged with, over 500 local residents and business people in the lead up to the commencement of the public notification period for the DA. The DHA DA public notification comment period commenced on Monday 26 September 2016.

Deebing Heights State School (DHSS)

On 1 September 2016, DHA and CPR Group representatives met with the Principal, Mr Andrew McDonald, and the Business Services Manager, Ms Karen Mitchell. A briefing on the project was provided to the school staff and we coordinated the scheduling of the DHA Information Day, to be held at the school on Saturday 24 September 2016.

DHA and CPR Group representatives participated in a meeting of the DHSS P&C on 13 September 2016. During this meeting, we briefed six members of the P&C and recorded their feedback on the DA. Several P&C members confirmed that they had received the Information Day invitation in their letter boxes.

Information Day

DHA held a successful Information Day for stakeholders at DHSS on Saturday 24 September 2016.

Local residents and future residents who may have an interest in the DA were informed. A FreeCall phone number and contact email, for those requiring information but unable to attend on the day, were provided in the invitation. One call was received prior to the Information Day, from a nearby resident wishing to purchase land in the new estate.

**PROJECT RESOURCE
AND CONSULTATION
SPECIALISTS**

STAKEHOLDER
ENGAGEMENT

SPORT AND COMMUNITY
DEVELOPMENT

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 @CPRGroupAus

cprgroup.com.au



Invitations were letter box dropped and mailed prior to the school holidays. They were distributed as follows:

- Invitations were hand delivered to 496 homes in the area surrounding the DHA site
- 106 copies of the DHSS newsletter, distributed by DHSS on 15 September 2016, included the invitation
- The school uploaded the invitation to its Facebook page
- The invitation was sent to the Principal of the Bremer High School
- The invitation appeared on The Ripley Valley Facebook page
- Invitations were emailed to Mayor Paul Pisasale, Cr David Pahlke, Mr Shayne Neumann MP and Mr Ian Rickuss MP
- Invitations were hand delivered to representatives of Hallmark, Coral Homes, Stroud, Daryl Perry, Valesco, G&P Builders, Livit and L&S Holley
- Invitations were mailed to the 51 owners of vacant lots or homes under construction in Sovereign Pocket and Deebling Gardens. As these included people from the important location of Rawlings Road, DHA's nearest neighbours, we ensured that they knew about the event

People who have not yet moved into their new homes, at Sovereign Pocket and Deebling Gardens, expressed gratitude for the invitations being posted to them. It is estimated that in excess of 1000 people would have been aware of the event. About 20 people attended, which is notionally 2% of those invited. This could be taken to indicate a level of acceptance of residential development in this community. It is possible that interested people who received the invitation have accessed the available reports and are well informed and satisfied.

From 10am until 2pm, posters outlining aspects of interest about the project were displayed. A copy of the DA, the response to Council's Request for Information, and a Briefing Paper were referred to in briefings to local residents who attended.

Aspects of interest raised by attendees focused on two main areas - investment potential for people living close by, and future upgrades to Rawlings Road.

It was emphasised that DHA will market to owner occupiers. Attendees shared their concern that rental properties should not make up a significant proportion of the development. DHA shared its confidence in attracting owner-occupiers to buy homes and live at the new estate. This was supported by comments from some attendees who said that they are looking to buy a home at the DHA development in which they intend to live, and that they will rent out the properties in which they currently live, in other parts of Deebling Heights.

Of significance, was that the proposed works on the onsite dam to engineer the area to become a wetland, was not a focus for residents, nor were questions relating to small lot housing. Residents endorsed DHA's approach, which is to develop a mix of housing lot sizes to suit a variety of lifestyles and family sizes. Residents said that the development is consistent with the design of Stockland's Sovereign Pocket estate. One resident raised the management of stormwater flow, which was addressed by reference to the reports.

The potential development of a dog-off-leash park was discussed with some residents. DHA representatives advised residents that this is a possibility that had been suggested by Divisional Councillor, Cr David Pahlke. There was an overwhelmingly positive response to this idea from the residents with whom it was canvassed.

The project was well received by the community. This appeared to be partly because people were familiar with the high quality of DHA housing. Attendees were grateful that we provided them with a link to Council's PD Online system for their perusal of all relevant documentation.

The Information Day was held prior to the commencement of the public notification comment period.



Attendees were provided with a bookmark with the FreeCall phone number and contact email so they can contact CPR Group with questions at any time. Attendees were reassured that they will be kept informed at each stage of the DA assessment process, and during future construction if the DA is approved by Council.

Elected representatives

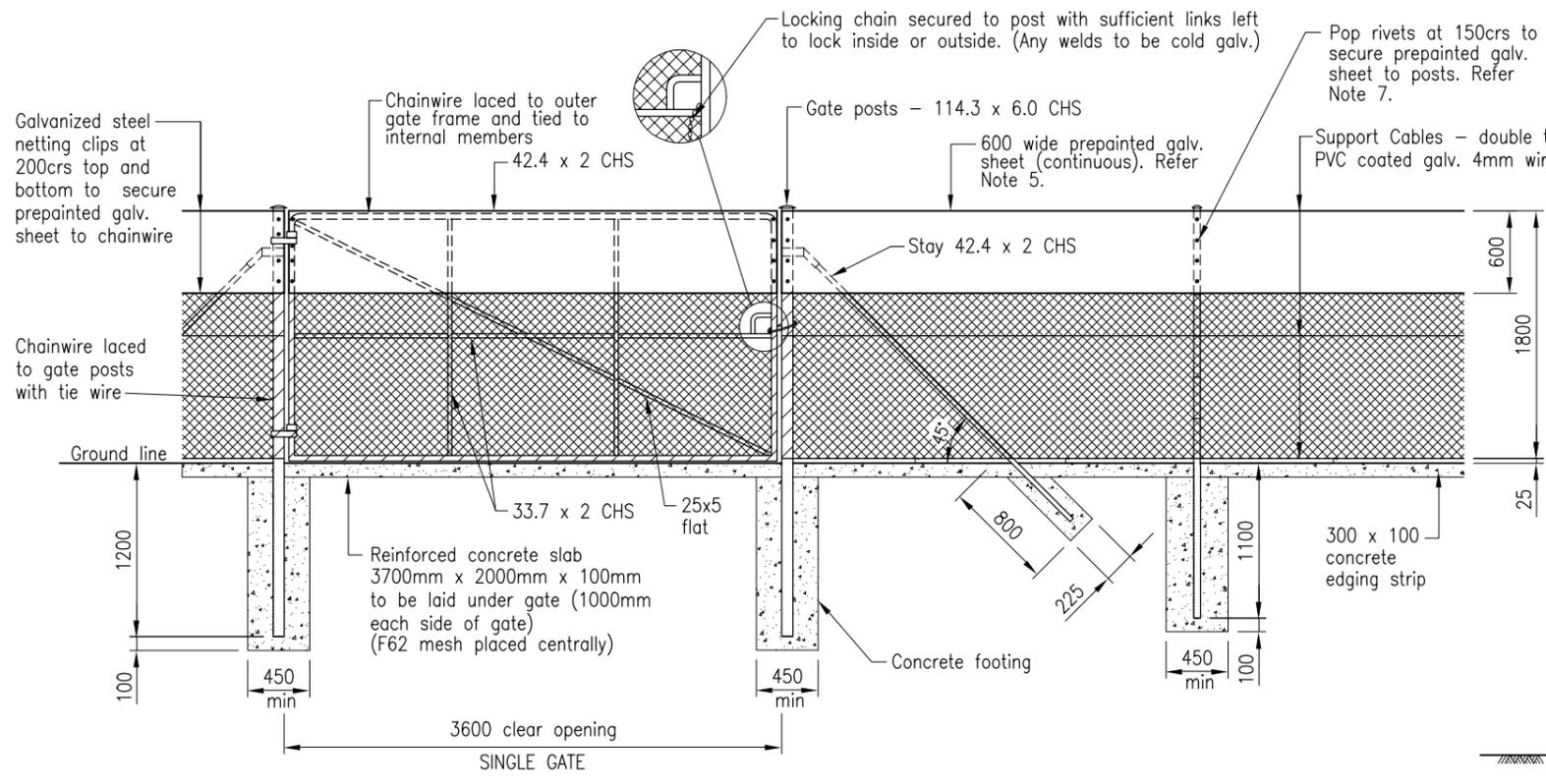
An individual briefing on the project has been offered to Cr Pahlke. A meeting has been held with Mayor Pisasale.



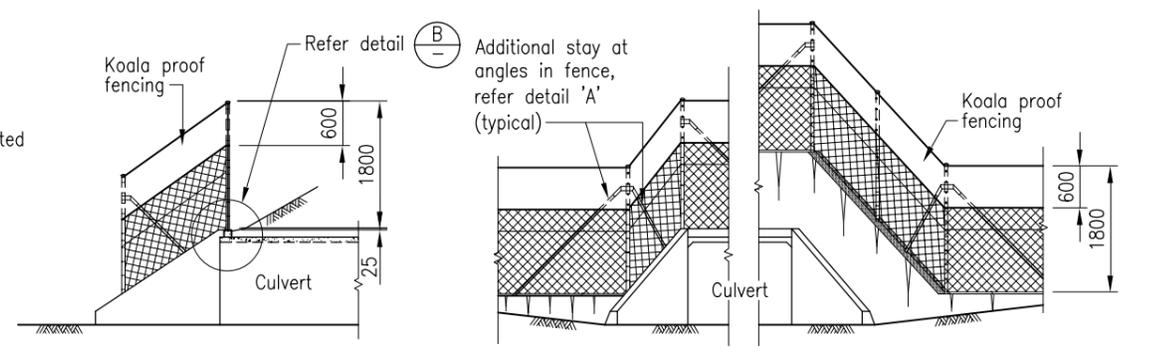


Attachment A5

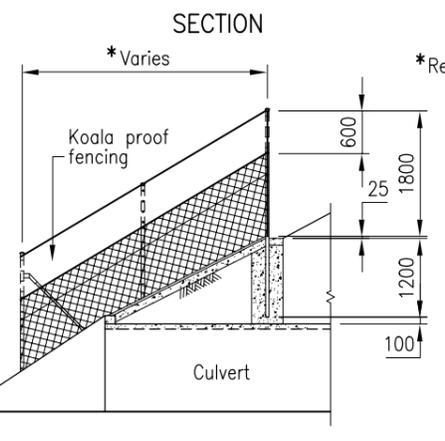
Transport and Main Road Standard Drawing I603



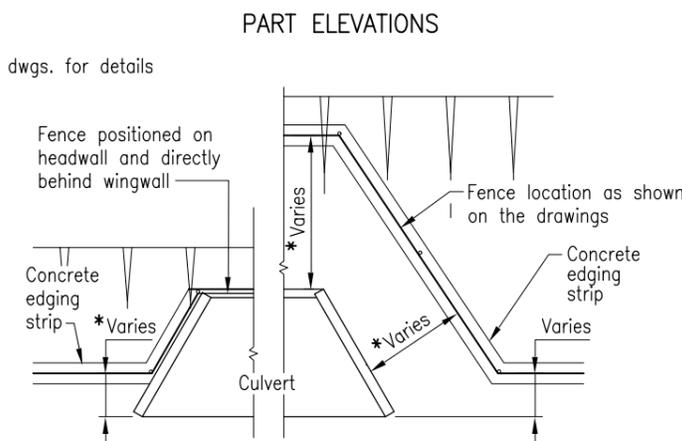
KOALA PROOF FENCE AND GATE (VIEWED FROM OUTSIDE ROAD RESERVE)



PART ELEVATIONS

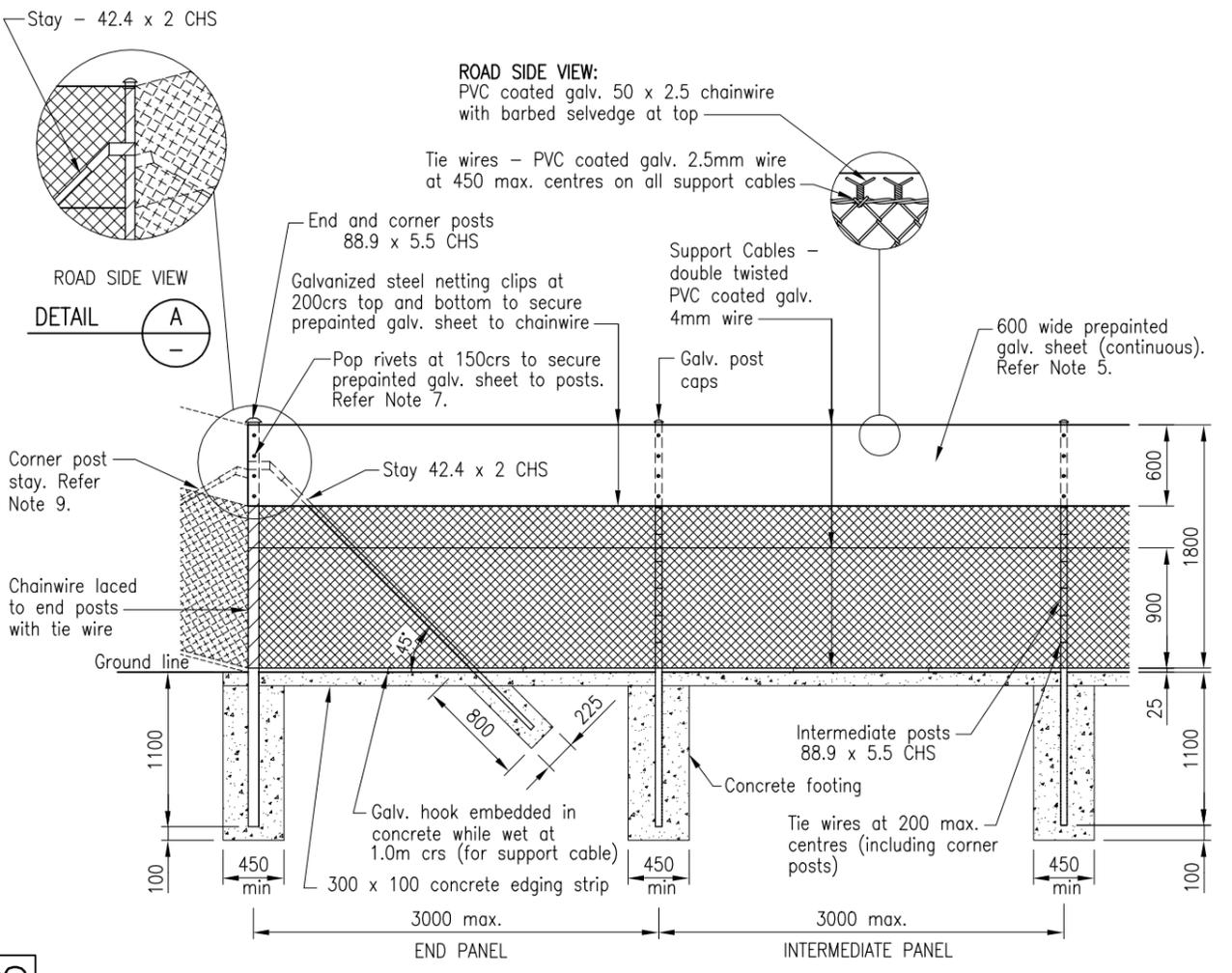


SECTION

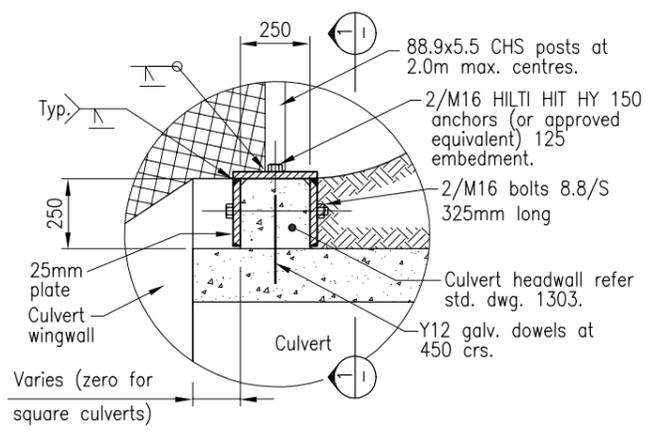


PART PLANS

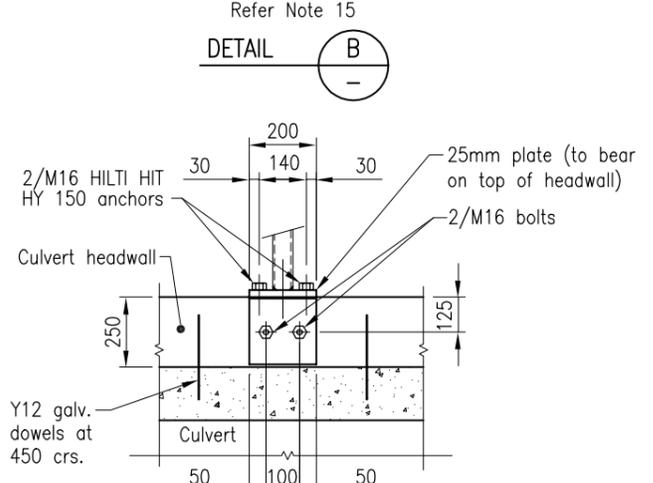
KOALA PROOF FENCE AT CULVERTS - TYPICAL ARRANGEMENTS



KOALA PROOF FENCE (VIEWED FROM OUTSIDE ROAD RESERVE)



DETAIL A



SECTION 1

NOTES :

- CIRCULAR HOLLOW SECTIONS (CHS) to be grade C350 to AS 1163.
- CONCRETE GRADE shall be N32/20.
- GALVANIZED CHAINWIRE shall conform to AS 2423, with a mesh size of 50mm and 2.5mm diameter wire, and coated with green PVC.
- SELVEDGES : Barbed selvedges shall be used at top except on gates where knuckled selvedges are used top and bottom.
- PREFINISHED/ PREPAINTED GALV. STEEL SHEET shall be 0.42mm BMT to AS 2728 coloured on both sides. The colour shall be "Mist Green" or "River Gum" subject to final approval of the Superintendent.
- CHAIN WIRE AND PREPAINTED GALV. SHEET shall be located on the opposite side of the posts to the roadway to prevent koalas climbing the CHS posts and stays.
- POP RIVETS WITH ALUMINIUM SHELL, STEEL STEM (LARGE FLANGED) maximum grip 9.5mm, drill bit No. 11 (4.9mm), shall be used.
- TIE/LACING WIRE shall be 1.57mm green PVC coated galvanized wire unless specified otherwise.
- CORNER POSTS to be adopted where the change in angle in horizontal alignment exceeds 20 degrees.
- BOLTS, NUTS AND WASHERS to be hot-dip galvanized to AS 1214.
- WELDING shall be to AS/NZS 1554.1.
- ALL STEELWORK AND FITTINGS shall be hot-dip galvanized to AS/NZS 4680.
- GALVANIZED FENCING WIRE to AS 2423.
- DESIGN BASED ON ULTIMATE WIND LOAD of 51m/s to AS 1170.2.
- KOALA PROOF FENCE:
 - Connection to culvert headwalls: all dimensions to be verified on site prior to fabrication of steel components. Formed/cored holes in headwall and drilled holes in plates for M16 bolts and anchors shall be 18mm dia.
 - Connection to bridges shall be as detailed in the bridge drawings.
- DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DOCUMENTS:
 Department of Main Roads Manual of Standard Drawings Roads
 Department of Main Roads Manual of Standard Specifications Roads

REFERENCED DOCUMENTS:
 Standard Drawings:
 1303 RC Box Culverts and Slab Link Box Culverts - Construction of Reinforced Concrete Wingwalls and Headwalls
 Standard Specifications:
 Road Furniture

FENCING			
KOALA PROOF FENCE AND GATE		Size A3	Drawing No
		as shown	1603
			Date 6/02

1603

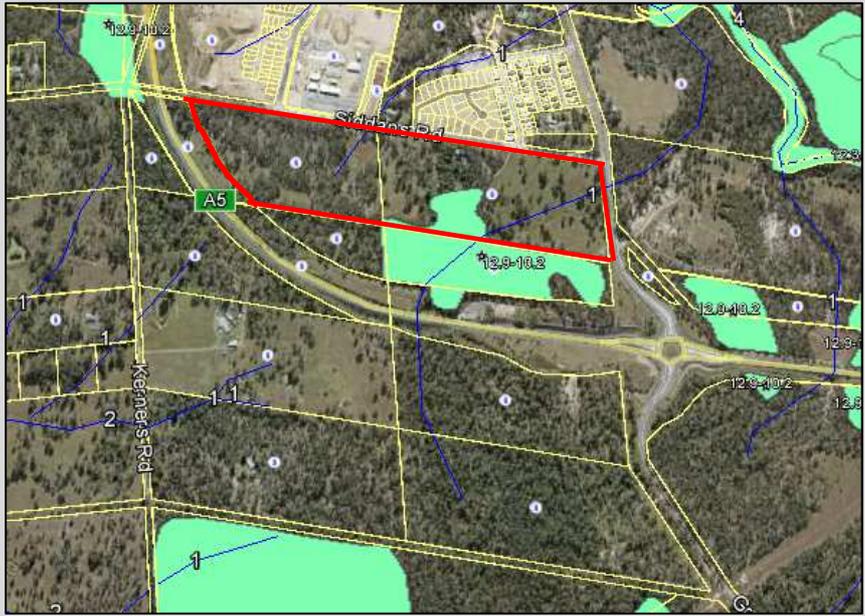
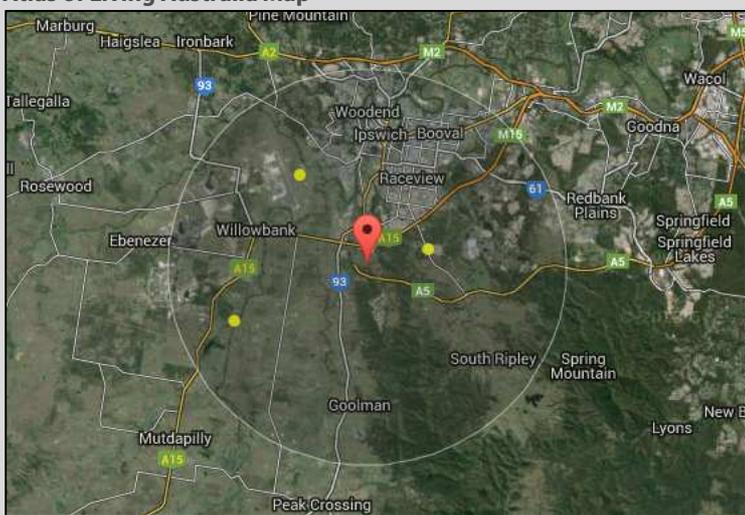


Attachment A6

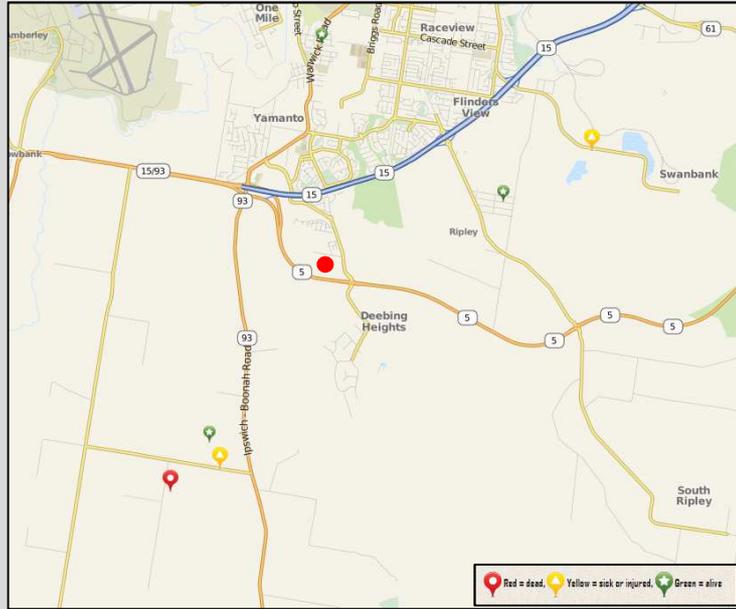
Koala Habitat Assessment Table

Attribute	Score	Comment
Koala occurrence	+2 (High)	<p><u>Desktop</u></p> <p>A Protected Matters Search (PMST) within a two kilometre radius of the subject site identified the Koala as having potential to occur. The Species Profile and Threats Database (SPRAT) for the Koala identifies that the highest density of Koala populations within Queensland occurs within the South-East Queensland region. Population estimates have focused on the Koala Coast and Pine Rivers area, however, Koalas are known to occur within the Ipswich City Council area.</p> <p>A Wildlife Online point search with a 2 km buffer generated under the Queensland <i>Nature Conservation Act 1992</i> (NCA) identified 36 Koala records within a two kilometre radius of the study area. The date pertaining to these observations is unknown. The Atlas of Living Australia shows only one preserved Koala specimen within a 5 km radius of the study area. Applying a 10 km radius search area results in three records, all dating to 1972 or 1975, suggesting there have been no recent records listed. Further, the site is not mapped as containing essential habitat for the Koala under the VMA, and the VMA Vegetation Management Supporting Map does not show any Koala records on, or in proximity to, the site.</p> <p><u>On-ground</u></p> <p>An assessment for Koala usage was conducted during site investigations in January and February 2016. No Koalas were observed on or surrounding the site. Koala scats were found on-site and four SAT surveys were conducted. Applying the SAT methodology (Phillips & Callaghan 2011) and the east coast (med-high) population density category (Table 3 In Section Part B) due to the prevailing landscape and vegetation structure, three of the four sites where scats were found showed 'Low Use' (< 22.5%) and one found 'Medium Use' (≥ 22.52 but < 32.84). Refer to Table 2 above for full SAT results and Attachment 3 – Appendix G in Section Part B.</p> <p>As there is evidence of one or more Koalas within two kilometres of the zone within the last five years, the 'Koala Occurrence' attribute has been given a score of +2 (High).</p>
Vegetation composition	+2 (High)	<p><u>Desktop</u></p> <p>The Queensland Government Vegetation Management Supporting Map (Regional Ecosystem 8.0 (RE)) identifies the study area as containing 1.84 ha of Category B (Least Concern) remnant vegetation RE 12.9-10.2 which is described as <i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus crebra</i> open forest on sedimentary rocks. The remaining 23.5 ha of the site contains non-remnant vegetation with some patches of regrowth vegetation. Site surveys confirmed the mapped RE to be accurate, with the majority of the site not considered to be remnant vegetation (refer to Attachment 3 in Section Part B).</p> <p><u>On-ground</u></p> <p>On-ground surveys identify the site as woodland with <i>Corymbia citriodora</i> being the dominant species, followed by <i>Eucalyptus</i> and other <i>Corymbia</i> species making up the rest of the canopy species across the site. Non-remnant areas on-site were highly disturbed, containing regrowth from historical clearing. Large areas of the site have relatively young tree canopy regrowth present, with scattered larger mature trees.</p> <p>The GPS Tree Plot (refer to Attachment 3 – Section 4.4.1 in Section Part B) recorded only 15.3% of trees with a DBH over 300 mm to be primary Koala food trees (<i>E. tereticornis</i>), with approximately 31.4% being secondary food tree species (<i>E. crebra</i> and <i>E. siderophloia</i>). No other species within the AKF food tree list as primary or secondary occurred on-site.</p> <p>For the majority of the referral area, non-primary and secondary food tree species made up 85% of the canopy cover, and this primarily included <i>Corymbia citriodora</i>, followed</p>

		<p>by <i>Corymbia intermedia</i>, <i>Corymbia tessellaris</i>, <i>Eucalyptus crebra</i>, <i>Eucalyptus siderophloia</i>, and <i>Acacia disparrima</i>.</p> <p>As the site contains forest or woodland with 2 or more known Koala food tree species in the canopy, the 'Vegetation Composition' attribute is given a score of 2 (High).</p>
Habitat connectivity	0 (Low)	<p>The application area is bordered by the Centenary Highway to the west, Rawlings Road to the north, and South Deebing Creek Road to the east. The Centenary Highway is also south of the site, approximately 200 m away. These major roads, with Koala exclusion fencing, act as significant physical barriers for Koala movement and remove opportunities for safe passage between the site and potential habitat patches to the east and south. Land west of the site is generally cleared land used for grazing and rural residential areas with limited remnant vegetation. The property immediately to the south contains some remnant vegetation (the rest of the Least Concern RE polygon), however the Centenary Highway bounds the south and west of the property and South Deebing Creek Road bounds the east, thereby reducing any connectivity vegetation on this site retains.</p> <p>As mentioned previously, the majority of land covered by the Ripley Valley PDA and adjoining the PDA is slated for development, with many projects within approvals or site preparation phases (refer to Plan 2 in Section Part B). As a result, connectivity values surrounding the project site will only further decrease. While the 1.84 ha patch of remnant vegetation on-site is part of the patch existing on the property to the south, the polygon is fragmented by the Centenary Highway to the south and west, South Deebing Creek Road to the east, and Rawlings Road to the north (see image below). Therefore, this vegetation is not considered a connectivity feature (or part of a corridor connecting habitats) and this site does not augment existing connectivity or movement of Koalas across the landscape.</p> <p>Both mapped watercourses on-site (shown in image below) are considered to represent drainage features, not watercourses. They are both highly modified, with no waterway-associated vegetation present, and the northern mapped water feature constitutes of a constructed dam. Neither are considered to provide an effective riparian corridor for Koala movement due primarily to the lack of riparian vegetation present, and the fragmentation by the highway and surrounding roads. It is noted, however, that the drainage feature does provide limited connectivity values beyond the site boundary. The proposed development layout includes the establishment of Open Space in the areas of both mapped watercourses which will retain vegetation and include rehabilitation activities.</p>

		 <p>The site is not considered to be within a contiguous landscape of ≥ 300 ha, and as such, the 'Habitat Connectivity' attribute is given a score of 0 (Low).</p>
<p>Key existing threats</p>	<p>+1 (Medium)</p>	<p><u>Desktop</u></p> <p>There are a number of obvious threats to the survival of the Koala on and around the project site. Such threats include vehicle strikes and dog attacks, associated with the location of nearby main roads, and the increasing residential development in the adjacent areas. These threats will increase as the Ripley Valley area is further developed, as per State and Local Government planning intent.</p> <p>The Atlas of Living Australia map of Koala records (below) shows three records of Koalas within a 10 km radius of the site, however these are dated in 1972 and 1975, therefore, are not contemporary. Koala Tracker is a crowd sourced National Koala sighting record. Records from the Koala Tracker National Koala Map (below) show three records of live Koala sightings within 5 km of the project site – approximately 3.3 km northeast in September 2012, 4.1 km north in September 2012, and 3.8 km southwest in June 2010. There are two records nearby of sick / injured Koalas, one sick by disease approximately 5.6 km to the northeast in September 2012, and one injured by car approximately 4.2 km southwest in August 2013. One record shows a Koala dead by disease, in March 2010, approximately 5.1 km to the southwest.</p> <p>Atlas of Living Australia Map</p> 

Koala Tracker Map



On-ground

The site is surrounded by busy roads, including highways, which suggests high vehicle usage in the area, which is presumed to increase as development within (and adjacent to) the PDA increases. In addition, there appears to be a significant level of dog ownership on residential lots in the nearby vicinity, which may also increase with increased population in the area. Data provided within the **Ipswich Koala Protection Society (IKPS)** newsletters indicate that dog attacks and vehicle strikes on Koalas are frequent within the surrounding areas of Amberley and Willowbank. As such, the area surrounding the proposed action site is considered to contain a number of existing threats which diminish the value of the habitat on the site. In addition, disease appears to be prevalent in the local Koala population, with many Koalas listed in **IKPS** newsletters as suffering from pneumonia, diseased ovaries and uterus, cystitis, conjunctivitis, and kidney failure. While there is evidence of threats to Koalas within the extended local landscape, there were no records of Koala rescues from Deebling Heights, however, there are also limited records of healthy Koalas in this area. It is anticipated that as the area continues to develop, vehicle strikes could be more prevalent if Koalas are drawn close to the major road networks and residential areas.

As there is evidence of infrequent or irregular Koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for Koala occurrence, the “Key Existing Threats” attribute has been given a score of +1 (Medium).

Recovery value

0 (Low)

The vegetation on the proposed development site is considered unlikely to be important in achieving the Interim Recovery Objectives for the coastal context given its foundation on the ability to protect and conserve large connected areas of Koala habitat. Koala Context Attributes listed under Interim Recovery Objectives in *Table 1* of the Guidelines for coastal areas are to:

1. Protect and conserve large, connected areas of Koala habitat, particularly large connected areas that support Koalas that are:
 - of sufficient size to be genetically robust or operate as a viable sub-population, or;
 - are free of disease or have a low incidence of disease, or;
 - are breeding.

		<p>2. Maintain corridors and connective habitat that allow movement of Koalas between large areas of habitat.</p> <p>The site does not contain any large areas of connected Koala habitat. While there is some remnant vegetation on-site (1.84 ha), which is part of the polygon mapped on the neighbouring property, this polygon is completely isolated and fragmented from other vegetation, by highways and main roads on all sides. Furthermore, there is encroaching urban development on the other side of the roads to the north, east, and south (refer to Plan 2), and cleared rural agricultural grazing properties to the west. The remainder of the proposed site contain paddock with scattered trees. Aerial imagery confirms that most of the land surrounding the site (particularly to the north, east, and west) has been subject to clearing and retains very few scattered trees, resulting in providing low value Koala habitat. The roads and development surrounding the site dramatically limits connectivity and movement opportunities to and from the site. Further, the site does not serve as a corridor due largely to fragmentation by Centenary Highway to the west and south, Rawlings Road to the north, and South Deebing Creek Road to the east.</p> <p>There are two stream order 1 watercourses mapped on-site. These watercourses were confirmed during site investigations to constitute drainage features (under the <i>Water Act 2000</i>) as they did not contain defined bed and banks. There was also no waterway-associated vegetation present. However, the proposed development includes the establishment of approximately 4.2 ha of Open Space, centred around these mapped drainage lines, which will include the retention of native vegetation present, and rehabilitation and planting activities (refer to Plan 1 in Section Part B). The retention and rehabilitation of these Open Spaces has the potential to provide for tenuous connectivity throughout the mostly disturbed broader landscape.</p> <p>The site is located within the Ripley Valley, adjacent to the Ripley Valley PDA. As such, the site is proposed to occur within one of the largest industry growth areas in Australia, and an area that has undergone significant development in recent years. The majority of land surrounding the site has been historically cleared of vegetation values for pastoral purposes, and is now also slated for urban development in light of the Ripley Valley PDA designation. Given this planning intent, it is highly unlikely that the site retains recovery values outlined in the Interim Recovery Objectives.</p> <p>The proposed residential developments and highways and roads surrounding the site significantly limit connectivity and movement opportunities to and from the site, resulting in the site remaining as an isolated patch of remnant and regrowth vegetation. Overall, the site is considered to retain little opportunity to achieve the interim recovery objectives for coastal areas, which is based primarily on maintaining large areas of Koala bushland and connectivity.</p> <p>Give the habitat present on site is not considered to be important for achieving the interim recovery objectives for the relevant context, the “Recovery Value” attribute has been given a score of 0 (Low).</p>
Total	5	As the habitat score is five or more, this site is considered to provide Critical Habitat for the Koala.



Attachment A7

Koala Habitat Assessment (Offset Area)



KOALA OFFSET ASSESSMENT REPORT

PEAK CROSSING (LOT 86 RP892014, 87 RP892014, 88 RP892014 AND 89 RP892014)

PREPARED FOR:

Defence Housing Australia

27th October 2017

KOALA OFFSET ASSESSMENT REPORT

EPBC 2016/7723





KOALA OFFSET ASSESSMENT REPORT

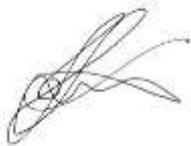
PEAK CROSSING (LOT 86 RP892014, 87 RP892014, 88 RP892014 AND 89 RP892014)

REPORT TITLE	KOALA OFFSET ASSESSMENT REPORT
PROJECT	PEAK CROSSING (LOT 86 RP892014, 87 RP892014, 88 RP892014 AND 89 RP892014)
CLIENT	Defence Housing Australia

The preparation of this report has been in accordance with the project brief provided by Defence Housing Australia and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information within this report is prepared for the exclusive use of Defence Housing Australia to accompany this report for the land described herein and are not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Queensland Trust for Nature accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

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Site Locality Plan

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Ground-truthed Regional Ecosystems and Vegetation Mapping Plan

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Abbreviations

BoM	Bureau of Meteorology
DNRM	Department of Natural Resources and Mines
DEE	Commonwealth Department of the Environment and Energy (Previously DoE)
DSITA	Department of Science, Information Technology, Innovation and the Arts
e.g.	For example
EH	Essential Habitat as defined by the VM Act
EP Reg	<i>Environmental Protection Regulation 2008 (Qld)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
etc.	etcetera
EVNT	Endangered, Vulnerable, Near Threatened as listed under the <i>NC Reg</i>
GTRE	Ground-truthed Regional Ecosystem
ha	Hectares
HSSE	Health, Safety Security and Environment
HVR	High Value Regrowth
i.e.	That is
km	Kilometres
LGA	Local Government Area
LP Act	<i>Land Protection (Pest and Stock Route Management) Act 2002 (Qld)</i>
LP Reg	<i>Land Protection (Pest and Stock Route Management) Regulation 2003 (Qld)</i>
m	Metres
mm	Millimetres
MNES	Matters of National Environmental Significance
NC Act	<i>Nature Conservation Act 1992</i>
NC (Wildlife) Reg	<i>Nature Conservation (Wildlife) Regulation 2006 (Qld)</i>
PMST	Protected Matters Search Tool
RE	Regional Ecosystem
SEQ	South East Queensland
TEC	Threatened Ecological Community
VM Act	<i>Vegetation Management Act 1999</i>
VM Reg	<i>Vegetation Management Regulation 2012</i>
WoNS	Weed of National Significance

Chapter 1: INTRODUCTION

1.1 Background

Queensland Trust for Nature (QTFN) worked with New Ground Environmental Pty Ltd (New Ground) to provide an assessment of the suitability of the site (Lots 86 RP892014, 87 RP892014, 88 RP892014 and 89 RP892014) to provide a koala habitat offset (**APPENDIX A**). The site (379.12 hectares) is situated at 569 Mount Flinders Road, Peak Crossing and is owned by Queensland Trust for Nature, a non-profit organisation.

The study presented herein was focussed on the evaluation of the suitability of the site to host an environmental offset for the Rawlings Road Development for Defence Housing Australia (EPBC 2016/7723) This is as a resolution to the requirement of the Department of Environment and Energy (DEE; previously Department of Environment (DoE)) to mitigate residual impacts of the necessary clearing of koala habitat for the development of 'Rawlings Road' development project (EPBC: 2016/7723).

The ecological context of the koala habitat which is proposed to be cleared as a consequence of the development of Rawlings Road has been documented by studies (Saunders Havill Group 2016) and is used as a technical foundation in the assessment of the suitability of the subject site as an offset.

1.2 Objectives of the Study

The primary objective of this study is to identify and map the site's ecological values with particular consideration to suitable koala habitat. The purpose of this is to gain an understanding of ecological values present on site in relation to the use of the site as a koala offset area. Ultimately, it is intended that this report will contribute towards the documentation Defence Housing Australia will require as part of the actions necessary to fulfil a statutory requirement for the provision of an offset for a Controlled Action (EPBC 2016/7723) under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

1.3 Outline of the Report

This report presents the findings of the desktop review and the field survey, and includes the following components:

- Chapter 1: provides an introduction to the report, including background information and objectives of the study.
- Chapter 2: details site context including a site description and information regarding climate, topography, soils and geography of the site.
- Chapter 3: outlines the methodology used to conduct the initial desktop assessment and subsequent field surveys.
- Chapter 4: presents the results of the desktop review and field survey, and provides a discussion of the findings.
- Chapter 5: incorporates the report conclusions and provides recommendations of the quality of the ecological values of the site in relation to the koala offset requirements.

Chapter 2: Offset site context

2.1 Site Description and Tenure

The site is located on Mount Flinders Road, Peak Crossing, Queensland, approximately 5 km east of Peak Crossing and 20 km south of Ipswich. The site is identified as Lots 86, 87, 88 and 89 on RP892014 and is approximately 379.12 ha in area. The tenure of the site is freehold and the site is included within the Scenic Rim Regional Council local government area (LGA). The site is situated within the Southeast Queensland Bioregion, which is approximately 62,484.2 km² (EHP 2014a). Within this bioregion, the site is located within the Moreton Basin bioregion province, which is approximately 7,849.7 km² (EHP 2014b).

The site has been used for agricultural purposes, specifically grazing, and is undergoing restoration.

2.2 Climate

Climate data from Ipswich (Bureau of Meteorology (BoM) site No.: 040101; 27.61 °S, 152.76 °E) presents annual mean maximum and minimum temperatures of 27.3 °C and 13.9 °C respectively, and an annual mean rainfall of 877.8mm (BoM 2014). On average, the warmest month is January and the coldest month is July. January has mean maximum and minimum temperatures of 32 °C and 20 °C, respectively, and July has mean maximum and minimum temperatures of 21.1 °C and 7 °C, respectively (BoM 2014).

On average, the wettest month is January (mean rainfall of 124.9 mm) and the driest month is August (mean rainfall of 33.6 mm) (BoM 2014).

2.3 Topography, Soils and Geology

The topography of the site is steep on the peaks with undulating and flat areas. The site ranges between approximately 80 m and 210 m Australian height datum. The highest point is at the site's east, at the junction of Lots 86 RP892014 and 87 RP892014 and the lowest point is at the site's north, at the junction of Lots 86 RP892014 and 89 RP892014.

According to the Geological Survey of Queensland 1:100,000 Ipswich Geological Map (DME 2008), the geology of the site consists of:

- Qa- SEQ: Quarternary; Clay, silt, sand, gravel; flood plain alluvium;
- Tit- SEQ: Tertiary; Trachyte (anorthoclase and riebeckite trachyte);
- Jbmk (Koukandowie Formation): Jurassic; Lithofeldspathic labile and sublabile to quartzose sandstone, siltstone, shale, minor coal, ferruginous oolite marker; and
- Jbmg (Gatton Sandstone): Jurassic; Lithic labile and feldspathic labile sandstone.

Based on the Department of Science, Information Technology, Innovation and the Arts (DSITIA) Pre-clearing Broad Vegetation Grounds of Queensland (EHP 2012a), the site is shown to consist of land zones 3, 8 and 9-10.

Landzone 3 is described as *Recent Quaternary alluvial systems, including closed depressions, paleo-estuarine deposits currently under freshwater influence, inland lakes and associated wave built lunettes. Excludes colluvial deposits such as talus slopes and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols; also with Dermosols, Kurosols, Chromosols, Kandosols, Tenosols, Rudosols and Hydrosols; and Organosols in high rainfall areas* (EHP 2012b).

Land zone 8 is described as *Cainozoic igneous rocks, predominantly flood basalts forming extensive plains and occasional low scarps. Also includes hills, cones and plugs on trachytes and rhyolites, and associated interbedded sediments, and talus. Excludes deep soils overlying duricrust (land zone 5). Soils include Vertosols, Ferrosols, and shallow Dermosols* (EHP 2012b).

Land zone 9 is described as *Fine grained sedimentary rocks, generally with little or no deformation and usually forming undulating landscapes. Siltstones, mudstones, shales, calcareous sediments, and labile sandstones*

are typical rock types although minor interbedded volcanics may occur. Includes a diverse range of fine textured soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols (EHP 2012b).

Land zone 10 is described as *Medium to coarse grained sedimentary rocks, with little or no deformation, forming plateaus, benches and scarps. Includes siliceous (quartzose) sandstones, conglomerates and minor interbedded volcanics, and springs associated with these rocks. Excludes overlying Cainozoic sand deposits (land zone 5). Soils are predominantly shallow Rudosols and Tenosols of low fertility, but include sandy surfaced Kandosols, Kurosols, Sodosols and Chromosols (EHP 2012b).*

Chapter 3: METHODOLOGY

3.1 Desktop Review

The sources utilised during the desktop and literature review are detailed below in **TABLE 3.1**.

TABLE 3.1: DESKTOP AND LITERATURE REVIEW SOURCES

DATABASE	COORDINATES OF SEARCH AREA	DATE OF SEARCH	APPENDIX
<i>Environment Protection Biodiversity and Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (DoE 2014)</i>	Latitude: -27.7972 Longitude: 152.7747	2 July 2014	APPENDIX B
<i>Nature Conservation Act 1992 (NC Act) Protected Species Lists Wildlife Online Database (DSITIA 2014)</i>	Latitude: -27.7972 Longitude: 152.7747	2 July 2014	APPENDIX C
Department of Natural Resources and Mines (DNRM) Map of Regulated Vegetation Management Maps (DNRM 2014)	Lot 86 RP892014; Lot 87 RP892014; Lot 88 RP892014; and Lot 89 RP892014	2 July 2014	APPENDIX D
Department of Environment and Heritage Protection (EHP) Map of Referable Wetlands (EHP 2014c)	Lot 86 RP892014; Lot 87 RP892014; Lot 88 RP892014; and Lot 89 RP892014	2 July 2014	APPENDIX E
Queensland Geological Mapping, Ipswich 1:100,000 (DME 2008).	-	12 March 2014	Not presented

Protected Matters (*EPBC Act*) and Wildlife Online (*NC Act*) searches were conducted using a 10 km radial buffer around the central co-ordinates of the property.

3.2 Field Assessment

Field surveys were undertaken by New Ground Ecologists from 3 July – 9 July 2014, using a methodology in accordance with:

- *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 3.2* (Neldner *et al.* 2012); and
- *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual (Version 2.1)* (Eyre *et al.* 2011).

3.2.1 Vegetation Community Surveys

The vegetation community surveys were conducted in accordance with industry best practice standards and employed a methodology generally consistent with the established format detailed within *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland, Version 3.2* (Neldner *et al.* 2012). The survey design emphasised the collection of vegetation community data using tertiary sites, with quaternary sites to provide additional survey resolution and refinements in vegetation community delineation.

Site selection was determined in the field based on aerial photography interpretation (API) of patterns in vegetation composition and in response to variation in vegetation communities encountered during site traverses. Data was collected from two (2) tertiary sites and 31 quaternary sites during the survey. The locations of the vegetation community survey sites are displayed in **APPENDIX F**. The methodology for the tertiary and quaternary surveys is discussed further below.

At each tertiary site, data was collected from a 50 m x 10 m plot which was representative of the surrounding vegetation community. In general accordance with Neldner *et al.* (2012), at a minimum the following data was collected from each tertiary site:

- Date and time;

- Location;
- In-field determination of the remnant status of the vegetation;
- Structural formation class using the modified Specht (1970) classification system (Neldner *et al.* 2012);
- Height range and median height for all vegetation strata;
- Projected foliage cover class (Specht 1970) for all vegetation strata;
- Floristic composition and relative abundance data for all tree and shrub strata;
- Dominant species and life form for the ground stratum;
- Estimated percentage of native biomass in the ground stratum;
- Connectivity to similar or different vegetation communities; and
- Digital photograph and associated direction of capture.

At each quaternary site, data was collected from a plot approximately 25 – 50 m radius of the site location. In general accordance with Neldner *et al.* (2012), at a minimum the following data was collected from each quaternary site:

- Date and time;
- Location;
- In-field determination of the remnant status of the vegetation;
- Structural formation class using the modified Specht (1970) classification system (Neldner *et al.* 2012); and
- Floristic composition and relative abundance data for the predominant species in the T1 and T2 layers.

3.2.2 BioCondition Surveys

BioCondition surveys were undertaken as part of the sites' ecological condition assessment. The intent of the BioCondition surveys is to provide an indication of the current condition of certain vegetation types located within the site. It is expected that the BioCondition sites established during this survey will form the baseline for periodic repeat assessments to provide information on any progressive changes to vegetation condition.

BioCondition surveys were undertaken in accordance with Eyre *et al.* (2011). This methodology employs the use of nested plots (100 m x 50 m, 50 m x 20 m, 50 m x 10 m), a 100 m transect and 1 m x 1 m quadrats to record values for defined ecological attributes. These values are used as indicators to provide a quantitative measure for the performance of ecosystem function within the context of biodiversity conditions. A total of five (5) BioCondition sites were sampled during the survey, the locations of which are presented in **APPENDIX F**. The following data was collected at each site:

- Date and time;
- Location;
- In-field determination of the remnant status and RE type of the vegetation;
- Number of large Eucalypt and non-Eucalypt trees;
- Height range and median height for all vegetation strata in accordance with Eyre *et al.* (2011);
- Canopy cover for woody vegetation strata, ground cover for the ground layer and organic litter cover in accordance with Eyre *et al.* (2011);
- Species richness for all vegetation strata;
- Proportion of dominant canopy species with evidence of recruitment; and
- Total length of coarse woody debris.

3.2.3 Fauna Habitat Assessment

Fauna habitat assessments were undertaken at each tertiary and quaternary survey sites, using a 50 m x 10 m survey plot. A total of 33 formal habitat assessments were undertaken within the site. The locations of the habitat survey sites are presented in **APPENDIX F**. The purpose of the fauna habitat assessment is to assess potential suitable habitat for fauna within the site, with particular attention to koala habitat. At a minimum, the following data was collected from each fauna habitat assessment site:

- Bare ground (estimated % cover);
- Boulders (estimated % cover);
- Fallen bark (estimated % cover);
- Groundcover (estimated % cover);

- Leaf Litter (estimated % cover);
- Embedded rocks (estimated % cover);
- Loose rocks (estimated % cover);
- Shrub layer (estimated % cover);
- Crevices and ledges (abundance);
- Overhangs and caves (abundance);
- Nests (abundance);
- Small logs (abundance);
- Large logs (abundance);
- Logs with hollows (presence & size);
- Termite mounds (abundance);
- Mistletoe (abundance);
- Soil Cracks (presence);
- Water features (type & presence); and
- Other (stags, senescing trees, tree hollows, soil features, etc.) (type & number).

3.2.4 Targeted Threatened Flora and Fauna Surveys

Threatened flora and fauna species are those that are listed under the *EPBC Act* and the *NC Reg.* Targeted flora and fauna searches were undertaken for threatened species identified during the desktop review. Searches were undertaken at tertiary and quaternary vegetation sites, fauna habitat assessment plots and also surrounding areas. Within these areas, search effort was primarily focussed on habitat features that ecologists considered to be of potential value for threatened species, in particular for the koala. Searches for threatened species were also conducted in additional locations based on incidental field observations of potential habitat. At each survey site, specific effort was focused on searching for koalas, and indications of presence of koalas such as koala scats at the base of potential feed and habitat trees and scratch marks on the trunks of potential feed and habitat trees. Threatened species were also recorded opportunistically throughout the entire survey area.

For targeted fauna searches, survey effort was apportioned between the following survey techniques at the discretion of the ecologist:

- Diurnal active search, comprising investigation of potential habitat features (e.g. leaf litter, logs, rocks, peeling bark) and scanning vegetation canopies for fauna and inferential evidence of fauna presence (e.g. scratches, scats, tracks, diggings, shed skins, nests, stick or mud nests and dreys); and
- Diurnal bird survey, with species being identified through either visual observation and/or call recognition.

Any flora specimens and inferential evidence of fauna (i.e. scats) deemed as a potential threatened species were sent to the Queensland Herbarium, or fauna identification (via inferential evidence) experts for species verification.

3.2.5 Exotic Flora and Fauna Surveys

Non-native species were recorded where encountered during the survey (i.e. in survey plots, during targeted searches and opportunistically during site traverses) to produce a cumulative weed list for the site. This included Declared Plants and Animals scheduled under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LP Reg), as well as Weeds of National Significance (WoNS).

3.2.6 Disturbance Surveys

When encountered, evidence of disturbance, severity and an approximate time of occurrence were recorded at each fauna habitat assessment survey site. Disturbance data was also collected opportunistically when deemed appropriate.

3.2.7 Data Collection Protocol

All positional, quantitative, qualitative and photographic data was recorded using a Trimble® Juno handheld computer enabled with Global Positioning System (GPS). The Trimble® units used were installed with a proprietary data capture system that incorporates electronic forms for the recording of specific ecological data.

3.2.8 Survey Limitations

Whilst a range of variation has been assessed throughout all vegetation communities encountered on-site, the entirety of each community has not been investigated at a fine level of detail. For example, cryptic flora species that occur within the region that may only be detectable during their flowering period may not have been observed during the current survey period. Consequently, whilst a diversity of flora species has been recorded, the inventory of flora species compiled from the survey should not be considered an exhaustive list of flora species within the site.

It should also be noted that the fauna component of the field survey was a rapid assessment that provides a 'snapshot' of the species present and detectable at the site at the time of survey. The survey period was undertaken during winter and therefore does not account for the full range of seasonal habitat utilisation by, or detectability of, every fauna species that may utilise the site, nor does it account for the influence of weather during preceding seasons or years upon the presence or detectability of fauna during the survey. In addition, as survey times were restricted to the hours of sunlight, the detectability of koalas through direct observation is substantially minimized, as they are most active in the hours of dawn, dusk and/or night (Crowther *et al.* 2013; DoE 2014).

Chapter 4: RESULTS & DISCUSSION

4.1 Desktop Review – Site Values and Risk Profile

4.1.1 Offset Site Desktop Ecological Designations

Commonwealth Government

The PMST identified various Matters of National Environmental Significance under the *EPBC Act* that may occur on the site (**APPENDIX B**). The results of the PMST are summarised below:

- One (1) wetland of international importance (Moreton Bay);
- Four (4) listed Threatened Ecological Communities;
- A total of 36 threatened species; and
- A total of 12 listed migratory species.

State Government

A review of the Wildlife Online database identified that 21 Endangered, Vulnerable, or Near Threatened species (EVNT) as scheduled under the *Nature Conservation (Wildlife) Regulation 2006 (NC Reg)* have previously been recorded within the 10 km search area. A copy of the Wildlife Online database search results is provided in **APPENDIX C**.

Local Government

The site is located in the Scenic Rim Regional Council LGA, but development is subject to the provisions of the Ipswich City Council Planning Scheme, henceforth referred to as the 'Planning Scheme'.

The site is shown on the Zoning Map 49 of the Planning Scheme and includes both Rural B (Pastoral) and Rural E (Special Land Management) land use themes (**Figure G1; APPENDIX G**). Land use themes provide a broad indication of the type of activities and development envisaged by the IPS 2006. The intent for each of these themes is detailed in Part 10, Division 5 for Rural B (Pastoral) and Division 8 for Rural E (Special Land Management). In summary, the key outcome that is sought for the Rural B (Pastoral) Zone is commercial pastoral activities. However, the key outcomes for the Rural E (Special Land Management) Zone are aligned with sustainable use and conservation.

Under the Planning Scheme, the site is also designated under a number of the Overlays. Provided below is a list of Overlays which will impact the alignment of the proposed Koala Offset Area, as any potential future development of the site would be required to comply with these Overlay provisions:

- OV01 – Bushfire Risk Areas (11.4.4 – Part 11, Division 4, Chapter 4): The majority of the site is within the bushfire risk area with approximately a third of the area from the north of the site to the centre of the site outside of the bushfire risk area (**Figure G2; APPENDIX G**).
- OV04 – Difficult Topography (11.4.6 – Part 11, Division 4, Chapter 6): The site is located on a mosaic of difficult topography ranging from areas less than 15 % to slopes greater than 25 % (**Figure G3; APPENDIX G**).

The Planning Scheme also includes a number of Key Reference Maps, under which the proposed Koala Offset Area is subject to and would be required to comply with. These are:

- KRM Map 1 – Principle Conservation Areas and Integrated Open Space Network: The majority of the site, specifically the areas within the Rural B zonation, is within the Principle Conservation Area.
- KRM Map 5 – Rural Areas Agricultural Land Classes: The entirety of the site lies within Class C2, which is Native Pastures.
- KRM Map 6 – Designated Water Courses: The site does not contain any designated water courses.

4.1.2 Current Planning Protection Mechanisms

Commonwealth Government

Section 43B of the *EPBC Act* provides for the continuation of existing land uses without the requirement for approval under the Act. Historically the site has been used for rural purposes – including grazing – with the land stocked with both cattle and horses up to 2014. Historical and continuing land uses have resulted in vegetation clearing throughout the flatter areas of the site, with the extent of clearing ranging from moderate to extensive. The field investigation also found historical and recent evidence of clearing as a result of logging and thinning, which was observed within the flatter areas of the site and on the moderate to steeper slopes. Additionally, no exclusion fencing was encountered within the site, resulting in stock having access to the entire property.

On the basis of Section 43B of the *EPBC Act* and the historical and continuing land uses associated with the site, it is considered there is provision for ongoing clearing of koala habitat to be lawful under the Act. Specifically, provided that routine management activities and grazing levels do not exceed historical use patterns, it is understood that ongoing clearing of koala habitat associated with historical land uses would be exempt from requiring approval under the *EPBC Act*.

State Government

According to the DNRM Regulated Vegetation Map (DNRM 2014), site contains areas of Category B (remnant vegetation) and Category X (non-remnant vegetation) areas, with the majority of the site being shown as a Category X area (**APPENDIX D**). Whilst the site is predominantly mapped as non-remnant vegetation field investigations identified that the majority these areas actually conform to the criteria for remnant vegetation. Additionally, the BioCondition surveys found that, with the exception of cleared paddocks, the Category X vegetation exhibits a higher BioCondition score than the Category B vegetation (**TABLE 4.3**).

Under the Queensland *VM Act* framework, Category X vegetation is unregulated within the context of State Government planning instruments. It is important to note that whilst much of the Category X vegetation throughout the site qualifies as remnant vegetation, it must be mapped as Category B vegetation by the State in order to be regulated as such under applicable State legislation. Also of relevance to this matter, under the current legislative framework Category X vegetation can only be re-mapped as Category B vegetation if initiated by the landowner.

On the basis of the above, all vegetation within the site that is currently mapped as Category X is exempt from State government regulation and approval requirements. Within a State legislative context this vegetation is able to be cleared for any purpose at the discretion of the landowner.

Local Government

According to the Planning Scheme, the site is located within the Rural Zone, and contains areas designated as Rural B and Rural E. Based on the Planning Scheme, the existing land use within the site would conform to animal husbandry, which is defined as ‘the use of premises for the non-intensive keeping, breeding, grazing and depasturing of animals, if such use does not normally require the importation of feed’. The land use and Planning Scheme zoning are discussed below within the context of Local Government regulation of vegetation clearing.

Within Rural B and Rural E areas animal husbandry is an exempt land use and can therefore be undertaken without the need for Council approval. However, this does not necessarily enable the exempt clearing of vegetation from Local Government regulations. Based on the applicable Planning Scheme provisions, key considerations applicable to the level of protection for koala habitat on site relate to slope and vegetation size (i.e. circumference at 1.2 m above the ground). The Planning Scheme allows for vegetation to be cleared in both the Rural B and E zones on the site without Local Government approval, provided that clearing does not:

- Occur on land with a slope of 15% or more;
- Involve a species that is listed as threatened or near threatened under State or Commonwealth legislation; and
- Involve the removal of trees with a circumference of greater than 50 cm at 1.2 m above the ground.

Within both Rural B and Rural E areas, vegetation that meets any of the above criteria may still be cleared. However, this would require an application be made to, and approved by Local Government.

Planning Protection Mechanisms Summary

Based on a review of the Commonwealth, State and Local planning and environmental regulations applicable to the site, it has been found that koala habitat on site is exempt from clearing regulation at all levels of government to the extent that it complies with the following:

1. Clearing is undertaken for the purposes of facilitating the ongoing historical land use of grazing/animal husbandry. This land use may be intensified to the extent that it is consistent with historical use patterns;
2. Clearing is limited to Category X areas, as shown on the DNRM Regulated Vegetation Map; and
3. Clearing does not:
 - a) Occur on land with a slope of 15% or more;
 - b) Involve removal of a species that is listed as threatened or near threatened under State or Commonwealth legislation; and
 - c) Involve the removal of trees with a circumference of greater than 50 cm at 1.2 m above the ground. Provided that selective clearing is undertaken to ensure compliance with (3c), an analysis of desktop and ground-truthed site values has identified that there are 128.7 ha of koala habitat within the site which are exempt from Commonwealth, State and Local Government clearing regulations.

4.2 Field Survey – Offset Site Values

4.2.1 Vegetation Communities

DNRM’s Regulated Vegetation Map (DNRM 2014) presents the distribution and status of regional ecosystems as gazetted under the Qld *Vegetation Management Act 1999 (VM Act)*. The Vegetation Management Status used in this report is based on DNRM’s assessment of the pre-clearing and remnant extent of a regional ecosystem and is as per the *Vegetation Management Regulation 2012 (VM Reg)*. DNRM’s mapping of the existing remnant REs for the site is demonstrated in **APPENDIX D**.

The *VM Act* defines a community as ‘remnant’ when the vegetation exhibits more than 50% of the undisturbed predominant canopy, averages more than 70% of the vegetation’s undisturbed height and is composed of species characteristic of the undisturbed predominant canopy of the given vegetation community.

The vegetation community surveys identified that the site primarily comprises remnant vegetation which generally correspond to remnant areas mapped by DNRM. However, the field survey identified several inconsistencies with DNRM’s mapping. Several new polygons of Endangered Dominant RE 12.3.3 were identified during the field survey. Non-remnant vegetation within the north eastern corner of Lot 89 RP892014 and the western section of Lot 86 RP892014 contain vegetation that is analogous to RE 12.3.3 and with the correct management measures, has the potential to regenerate to remnant RE 12.3.3, which is an endangered RE under the *VM Act*. **TABLE 4.1** provides a summary of the ground-truthed RE (GTRE) verified during the field survey. **APPENDIX H** presents the field validated amendments to the site’s RE mapping.

TABLE 4.1: GROUND-TRUTHED REGIONAL ECOSYSTEMS PRESENT ON SITE

STATUS [^]	RE	GENERAL DESCRIPTION*
Endangered	12.3.3	<i>Eucalyptus tereticornis</i> woodland on Quaternary alluvium
Least concern	12.3.7	<i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> +/- <i>Melaleuca spp.</i> fringing woodland
Endangered	12.8.24	<i>Corymbia citriodora</i> subsp. <i>variegata</i> open forest on Cainozoic igneous rocks especially trachyte
Least concern	12.9-10.2	<i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus crebra</i> open forest on sedimentary rocks
Of concern	12.9-10.7	<i>Eucalyptus crebra</i> +/- <i>E. tereticornis</i> , <i>Corymbia tessellaris</i> , <i>Angophora spp.</i> , <i>E. melanophloia</i> woodland on sedimentary rocks

* Descriptions taken from EHP (2014d)

[^] *VM Act* Class

4.2.2 Threatened Species Habitat

DNRM’s Essential Habitat mapping under the *VM Act* identified that the site contains essential habitat for one threatened fauna species, the koala. The field survey confirmed that the site contains known habitat for the koala. Koala habitat can be broadly defined as any forest or woodland containing species that are known koala feed trees, or shrubland with emergent food trees (DoE 2014). Koala feed trees are generally defined as trees of the *Corymbia*, *Melaleuca*, *Lophostemon* or *Eucalyptus* genera (DERM 2010). More specifically, within the Ipswich region, Ipswich

City Council has identified the following species as preferred koala food trees to be retained/planted for the koala: *Eucalyptus tereticornis*, *Corymbia citriodora*, *Eucalyptus crebra*, *Eucalyptus grandis*, *Eucalyptus microcorys*, *Eucalyptus moluccana*, *Eucalyptus propinqua*, *Eucalyptus seeana* and *Lophostemon confertus* (ICC 2014a). All REs that were present on the site (RE 12.9-10.2, RE 12.9-10.7 and RE 12.3.3), contain *Eucalyptus tereticornis*, *Corymbia citriodora* and *Eucalyptus crebra* as dominant species within the community. In addition to this, koala scats were located throughout all habitat and vegetation communities within the site, and as a result, the entire site is known koala habitat. **APPENDIX I** presents koala habitat areas and locations of scats recorded across the site.

4.2.3 Threatened Species Records

Threatened Flora

One (1) potential flora species listed as EVNT under the *NC Reg* was recorded on site during the field survey (*Melaleuca irbyana*). *Melaleuca irbyana* is listed as Endangered under the *NC Reg*. Voucher specimens of *Melaleuca irbyana* were sent to the Queensland Herbarium for species verification. A comprehensive inventory of flora species recorded during the survey is provided in **APPENDIX J**.

Threatened Fauna

Evidence of one (1) fauna species listed as EVNT under the *NC Reg* and protected under the *EPBC Act* was recorded on site during the field survey (*Phascolarctos cinereus* – koala). Koala scats were observed consistently across the entire site (**APPENDIX I**). A sample of the koala scats that were found across the site were sent to a scat analysis specialist for species verification. Koala is listed as vulnerable under the *NC Reg* (SE Qld bioregion) and vulnerable under the *EPBC Act* (combined populations of Queensland, New South Wales and the Australian Capital Territory). A comprehensive inventory of fauna species recorded during the survey is provided in **APPENDIX J**.

4.2.4 Weeds and Pest Fauna

During the field survey, five (5) flora species Declared under the *LP Act* and five (5) WoNS species were recorded on site (**TABLE 4.2**). The location of these species is presented in **APPENDIX K**. A cumulative list of non-native flora species recorded on site during the field survey is provided in **APPENDIX J**. A comprehensive inventory of flora species recorded during the survey is provided in **APPENDIX J**.

No pest fauna species were recorded on site during the field survey.

TABLE 4.2: WEEDS PRESENT ON SITE

SCIENTIFIC NAME	COMMON NAME	DECLARED STATUS*	WONS
<i>Asparagus aethiopicus</i> [^]	asparagus fern	Class 3	WoNS
<i>Baccharis halimifolia</i>	groundsel bush	Class 2	-
<i>Lantana camara</i>	lantana	Class 3	WoNS
<i>Lantana moteydensis</i>	creeping lantana	Class 3	-
<i>Opuntia tomentosa</i>	velvety tree pear	Class 2	WoNS
<i>Opuntia stricta</i>	common prickly pear	Class 2	WoNS
<i>Scenecio madagascariensis</i>	fireweed	Class 3	WoNS

* As listed by the *LP Reg*

[^] Species recorded opportunistically throughout the site

4.2.5 Other Environmental Values

Habitat Linkages

On a regional scale, the site is positioned within the Flinders Karawatha corridor, which is the largest remaining continuous stretch of open eucalypt forest in South East Queensland (SEQ) (EHP 2014e). The corridor extends from Karawatha Forest on the southern edge of Brisbane City, along Oxley Creek, through the Greenbank Military Training Area and south along the Teviot Range to Flinders Peak, Mt Joyce and Wyaralong Dam, north-east of Boonah (EHP 2014e). The corridor is approximately 56,350 ha in size, and is recognised as one of SEQ's most

important regional biodiversity corridors, providing habitat and movement opportunities for a range of species that have state, regional and local significance (EHP 2014e). The Queensland Government, in partnership with local government and a number of other stakeholders, has developed the Flinders Karawatha Corridor Management Strategy 2014-2019 (FKC Management Strategy) (EHP 2014e), which is a five-year management plan that identifies actions that maintain and enhance the corridor’s environmental, recreational and cultural heritage values. All participation by the community and landholders in this program is voluntary. The objective of the FKC Management Strategy with regards to biodiversity, is ‘to preserve and enhance remnant, significant and riparian vegetation in viable corridors to enhance biodiversity, and facilitate wildlife movement and gene flow’ (EHP 2014e). The Queensland Government also prepared the Flinders Karawatha Corridor Environmental Values and Land Use Data Report 2013 (EHP 2013), which provides a detailed analysis of the biodiversity values of the corridor. Under this report, remnant vegetation on site is identified as having either state, regional or local biodiversity significance.

On a local scale, review of aerial photography indicates that the site is largely surrounded by bushland, with the exception of some minor agricultural clearing to the north and east, and extensive clearing to the removed west of the site for agricultural and urban purposes. The site is directly adjacent to Flinders-Goolman Conservation Estate which is a conservation park that is over 1,900 ha in area supporting extensive forests and rugged volcanic peaks (ICC 2014b). The Flinders-Goolman Conservation Estate links the site to the Flinders Peak Conservation Park to the east, which in turn is linked to the Mount Perry Conservation Park, Spring Mountain Forest Park and White Rock Conservation Park to the north and ultimately Wyaralong Dam to the south. These conservation areas are all located within the Flinders Karawatha Corridor.

Wetlands and Waterways

The site does not contain any Referable Wetlands as defined under the *Environmental Protection Regulation 2008* (EHP 2014c), or any wetlands as mapped by EHP’s WetlandMaps (EHP 2014fg). The site also does not contain any Designated Water Courses under the Ipswich Planning Scheme 2006 (ICC 2006) (**Figure G6; APPENDIX G**). However, the site does contain numerous first and second order drainage lines, a third order drainage line and a fourth order drainage line (Sandy Creek), which runs along the site’s northern boundary (DNRM 2014) (**APPENDIX E**).

4.2.6 Offset Site Condition

BioCondition surveys are quantitative and repeatable assessment procedures that serve as a vegetation condition assessment tool that describes the functionality of terrestrial ecosystems in terms of biodiversity values at a local scale (Eyre *et al.* 2011). The results of the survey produce a numeric score (0-1) as a condition rating, which describes how the attributes of the vegetation in the survey area differ from the attributes in its reference state, or the BioCondition benchmarks of the relevant RE (Eyre *et al.* 2011). A numeric score of 1 indicates that the condition of the surveyed vegetation matches its reference state. The reference state refers to the natural variability in attributes of an ecosystem relatively unmodified since European settlement, or ‘the best on offer’ (Eyre *et al.* 2011).

A total of five (5) BioCondition sites were surveyed to assess the condition of the regional ecosystems and vegetation communities present within the site (**APPENDIX F**). **TABLE 4.3** below displays the BioCondition score that was attributed to each of the BioCondition site.

TABLE 4.3: BIOCONDITION SCORE

BIOCONDITION SITE	DNRM MAPPING	GTRE MAPPING	BIOCONDITION SCORE
B1	Non-remnant (Category X)	Remnant 12.9-10.7	0.615
B2	Non-remnant (Category X)	Remnant 12.9-10.2	0.665
B3	Non-remnant (Category X)	Non-remnant 12.3.3	0.3
B4	Non-remnant (Category X)	Remnant 12.3.3	0.66
B5	Remnant 12.9-10.2 (Category B)	Remnant 12.9-10.2	0.575

The BioCondition scores indicate that all the ground-truthed RE mapped Remnant surveys sites (which are in the DNRM mapped Category X vegetation) are in good condition. Moreover, the BioCondition surveys found that with the exception of cleared paddocks, the Category X vegetation (B2 = 0.665; **TABLE 4.3**) exhibits a higher BioCondition score than the Category B vegetation (B5 = 0.575; **TABLE 4.3**).

To further assess the ecological value and condition of the site, disturbance surveys were undertaken alongside vegetation and habitat surveys (**APPENDIX F**). Overall the site was in relatively good condition. The primary disturbance type was weed invasion and infestation, which was present in every disturbance survey site. **TABLE 4.4** below presents an overview of the disturbance recorded on site.

TABLE 4.4: DISTURBANCE TYPE AND SEVERITY OF OCCURRENCE ON SITE

SURVEY SITE	DISTURBANCE TYPE	DISTURBANCE INDEX
H1, H6, H9, H10, H13, H14, H18, H19, H21, H23, H24, H25, H26, H28, H29, H30, HT1	Weed invasion	Mild
H2, H4, H7, H8, H27, HT2	Weed invasion	Moderate
H3	Weed invasion	Very high
H5, H11, H12	Weed invasion	High
H15	Weed invasion/ logging	Moderate/Mild
H16	Weed invasion/logging	Mild/Mild
H17	Weed invasion/ logging/ clearing	Moderate/Mild/Very high
H20, H22	Weed invasion/fire	Mild/Mild
H31	Weed invasion/ clearing	Extremely high/ Extremely high

4.3 Review Against Offset Assessment Guide

The following sections have been taken and modified from *Response to Request for Additional Information* and amend following discussions with DEE.

4.3.1 Impact Site Calculations

Step 1: Matter of National Environmental Significance Box

The MNES selected was *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory). This species is scheduled as Vulnerable under the *EPBC Act* and was automatically assigned an Annual Probability of Extinction of 0.2% by the calculator. No other score for this probability provided by the IUCN for the koala was identified.

Step 2 – Relevant Impact Attribute

As the protected matter chosen is a threatened species, ‘Area of Habitat’ was chosen as the relevant attribute. No other attributes were chosen (i.e. Part B of the calculator) as Area of Habitat is considered to encompass the features required by the koala and to be most relevant in determining the offset. The koala habitat clearing extent is **29.7 ha of start quality 5**.

Step 3 – Impact Description Column

A detailed discussion regarding potential impacts to the koala and its habitat is provided in the Saunders Havill Group (2016) report. A discussion regarding residual impacts after proposed avoidance, minimisation and/or mitigation measures are taken into account, is provided in Part 4 (b and c) in the New Ground (2014) report. In summary, the impact that is being offset is the loss of koala habitat.

Step 4 – Quantum of Impact Column

Based on the proposed vegetation clearance footprint for the site (proposed earthworks), it is identified that the proposal would result in the direct removal of 29.7 ha of suitable koala habitat from the site.

The following provides a discussion regarding the quality of the area of habitat.

Vegetation values across the site are limited due to previous clearing for pastoral purposes. Vegetation is mostly regrowth of compromised habitat value. The site includes approximately 1.85 ha of mapped RE 12.9-10.2 Least Concern remnant vegetation. This is described as *Corymbia citriodora subsp. Variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks which is considered habitat for the koala.

Condition

The site has been subject to desktop review and on-site ecological assessments. Flora and fauna field surveys conducted by Senior Ecologists from SHG in January, February, and December of 2016 found the site to be highly modified due to past and present land uses, including vegetation clearing and agricultural grazing practices. Although historically disturbed, the application area contains a small patch of mapped remnant vegetation that is a Least Concern Regional Ecosystem (RE) 12.9-10.2 under the Vegetation Management Act 1999 (VMA), with the majority of the site containing non-remnant vegetation.

Site survey by SHG confirmed the dominant vegetation in the remnant and regrowth areas is mature and semi-mature canopy forming the ecologically dominant layer. Vegetated areas were uniform in density and age structure, with only mild variations occurring in tree species dominance and co-dominance. Generally, these variations coincided with topographical features (ridges, plains, gullies, etc.), soils and geology. As typically found in woodland structures, very few shrub species were recorded with the ground layer dominated by a mix of native and exotic grass species.

The site includes approximately 1.84 ha of mapped Least Concern RE 12.9-10.2. The majority of this remnant polygon exists on the adjacent property to the south, with the portion on Lot 195 effectively forming a small projection. This RE community is described as *Corymbia citriodora subsp. variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks. Site survey confirmed species within this remnant patch to be dominated by *Corymbia citriodora* (Spotted Gum) and consistent with the current Regional Ecosystem mapping.

Site Context - Connectivity

The area surrounding the proposed development site is highly impacted and fragmented. The site to the north of Rawlings Road has been completely cleared, with the commencement of the construction of Sovereign Pocket residential development and a school. There are also numerous surrounding residential developments proposed and under construction, such as Paradise Heights, Paradise Waters, and Ripley McHale, which have all been deemed not a controlled action or received approval under the EPBC Act to proceed, and sites to the south of Centenary Highway, and on both sides of Grampian Drive (south of the subject site) currently within the EPBC Act referrals process. Several more developments are also likely to occur within the next few years, in line with the State and Local Government planning intent for the area.

Site Context – Importance

As demonstrated in Table 35 in Saunders Havill Group (2016), in using the 'Koala Habitat Assessment Tool' the habitats within the proposed site, including the development footprint are considered to contain habitat critical to the survival of the koala in accordance with the Draft EPBC Act Referral Guidelines for the Koala.

Site Context – Threats

As demonstrated in Table 35 in Saunders Havill Group (2016), it was identified that the koalas and koala habitats within the proposed development footprint are currently subject to a moderate level of threat. Key threats include:

- Potential dog attacks;
- Collisions with vehicles;
- Habitat degradation through weed invasion, unauthorized public access and anthropogenic waste; and
- Erosion caused by vehicular access.

Species Stocking Rate

Habitat assessment surveys and scat searches conducted by Saunders Havill Group ecologists (2016) have confirmed that koalas are utilizing various locations throughout the proposed development area. The level of activity within the site was considered a low level of usage.

Step 5 – Information source

The information used to determine the scores and relevant discussions is provided in various sections of this report and other sources cited in the reference section at the end of this document.

4.3.2 Offset Site Calculations



Step 6 – Offset calculator

The *total quantum of impact* column in the *offset calculator* is automatically populated from the *impact calculator*.

Step 7 – Offset description

The proposed offsite offset consists of 53.616 ha of land within Lot 89 on RP892014 (**APPENDIX L**). The offset area is proposed to be managed in accordance with the Offset Area Management Plan (QTFN 2017) which follows the one prepared by NewGround 2014 approved by DEE EPBC reference 2013/7047 and EPBC 2014/7190. The management strategies will aim to protect and improve the value of the offset area. This will be primarily achieved through the protection of the site through offset, rehabilitation of the offset area (weed control) and implementation of other strategies such as restricting human and livestock access within the offset area.

Step 8 – Time horizon

Time over which loss is averted

The value selected for *time over which loss is averted* was the maximum of 20 years for the offset site. The habitats to be retained and rehabilitated for the offset would be managed in accordance with the Offset Area Management Plan (QTFN 2016). This management program will form part of the documentation requirements associated with the proposed ongoing protection of the offset area as a conservation area. This will ensure the ongoing protection and management of the habitats to be retained and rehabilitated.

Time until ecological benefit

The dominant feature regarding ecological benefit within the offset area will be achieved through rehabilitation of the vegetation communities, thereby improving the quality of the habitats provided. It is expected that the ecological benefit of the offset site would be attained within seven years, when the trees have reached a viable size, and therefore the value selected for *time until ecological benefit* was '7'. Protection will also be realized within one year because as soon as the area is gazetted as an offset site it will be protected from vegetation clearing through a Voluntary Declaration under the Vegetation Management Act 1999 and will be subject to a targeted management regime including feral dog eradication programs and ongoing management of weeds.

Step 9 – Start area and quality

Based on the proposed vegetation clearance footprint for the site (29.7 ha), it is identified that 53.616 ha of offset habitat for the koala would be required from the site as an offsite offset area. The start quality of the impact area has been assigned a value of '5' as described by section 4.3.1.

Step 10 – Future area and quality without offset

Risk of loss (%) Without Offset

A figure of 70% has been assigned to this value for the proportion of the proposed offset area that is of <15% slope (46.2 ha), while a risk of loss value of 20% has been assigned to the portion of the offset area that is of >15% slope (7.416 ha). The following lists the key factors of risk of loss of this offset area. For details, please see section 4.1.2.

- The steeper areas of the site are deemed less attractive for intensive agricultural use. Notwithstanding, evidence of logging and grazing were observed in steeper areas of the site;
- The proposed offset area is situated within the Rural E and B zone;
- Sections of the offset area contain large infestation of weeds which contributes to the degradation of native vegetation and restrict natural regeneration of native vegetation; and
- If left as is, without the protection of an offset site, it is likely that degradation of the site will continue.

Step 11 – Future area and quality with offset

Risk of loss (%) With Offset

A figure of 10% has been assigned to this value. As part an offset site, the habitats would be protected from future development and potential risk as listed above and detailed in section 4.1.2. The value of the habitats within the formal offset area would also be protected and enhanced over time as per the approved Offset Area Management Plan (QTFN 2016).

Step 12 – Start quality and future quality without offset

Start Quality

A start quality rating of six (6) was assigned to both <15% slope and >15% slope. Start quality ratings are based on the results of biocondition surveys undertaken by New Ground (section 4.2.6).

Future Quality

A score of five (5) has been assigned to the *future quality* value for the entirety of the proposed offset area. As discussed previously in *risk of loss* and section 4.1.2, in the absence of ecologically focused management and through ongoing agricultural use, the existing habitats are likely to become further degraded. Pressures associated with anthropogenic activities occurring as a result of currently exempt clearing and land uses, would largely go unmitigated in the absence of formal management measures that would otherwise be implemented to protect and enhance the existing habitat values.

Step 13 – Future quality (with offset)

A score of eight (8) has been assigned to this value for the proposed offset area. The actions proposed within the Offset Area Management Plan (QTFN 2016) are likely to restore the value of the vegetation within the offset area to a higher value as a result of vegetation retention, management of livestock, control of site clearing and weed management.

Upon becoming a formal offset area, the management measures outlined within the Offset Area Management Plan (QTFN 2016) would begin to be implemented. The existing habitat values within the offset area would be gradually enhanced overtime through assisted natural regeneration and active weed management. The management of the offset area would further mitigate the impacts and pressures associated with human activity such as prohibiting unauthorised vehicular access and ensuring that any essential management clearing activity was undertaken in line with the environmental conservation management intent for the offset area.

Step 14 – Calculating adjusted gain using confidence in result (%)

Confidence in Result

The confidence in the result with the proposed formal offset area has been assigned 80%. The management of the offset area will be guided by the existing Offset Area Management Plan (EPBC 2017/7723).

A score of 100% was not given as it is accepted that there may be a level of risk regarding achieving the management measures. More specifically, there may be a level of risk that the habitat value of the offset area may not reach a level that is above the value assigned to its current state. This level of risk may be attributed to factors such as:

- Natural events – fire, drought, flooding, severe storm events, pest, disease, latent site conditions.

Step 15 – Net present value (adjusted hectares)

The score of the *net present value* is calculated automatically by the assessment tool.

Step 16 – Percentage of impact offset column

The percentage of impact offset is calculated automatically by the assessment tool.

Total offset = 100%

4.4 Management of the Offset Site

4.4.1 Legal Protection

All direct offset sites will be secured using one of the legally binding mechanisms on Title that are available to ensure the protection of the offset and implementation of the Offset Area Management Plan (QTFN 2016). These legally binding mechanisms are:

- An environmental offset protection area under section of the *Environmental Offsets Act 2014*;
- An area declared as an area of high nature conservation value under section 19F of the VM Act, where it is secured for the purposes of an environmental offset;
- An area declared as a nature refuge under section 46 of the *NC Act*, where it is secured for the purposes of an environmental offset;
- An area declared as a protected area under section 29(1) of the *NC Act*, where it is secured for the purposes

- of an environmental offset; or
- An area secured as a statutory covenant for environmental purposes under the *Land Act 1994* or *Land Title Act 1994*.

The mechanisms adopted to secure offsets will ultimately depend upon the mechanisms available and agreed to by the relevant parties.

In this instance, the offset is proposed to be secured via a Voluntary Declaration as an area of high conservation value under the VM Act. Once this has been registered on the Title, the offset area will be mapped as a Category A area on the Property Map of Assessable Vegetation. A Category A on a PMAV is an "Area subject to compliance notices, offsets and voluntary declarations."

4.4.2 Management Program

The Management Program has been devised by QTFN, which will be associated with registration on title. Below outlines the management outcomes. For further details, please see the QTFN Offset Area Management Plan (2016).

1. a) The areas will be managed, restored and protected until the vegetation becomes mature koala bushland habitat status. The areas will be managed to enhance the presence of characteristic vegetation communities; including:
 - i. Maintenance and enhancement of natural groundcover
 - ii. Stock use for bushfire fuel reduction purposes only
 - iii. Control of weed species
 - iv. Maintenance and enhancement of natural tree and shrub regeneration
 - v. Fire Management
- b) Habitat values associated with the Areas will be maintained or enhanced and protected through management including:
 - i. Retention of habitat trees, including dead and fallen timber,
 - ii. Application of fire management that does not destroy the vegetation
 - iii. Control of pests
2. The areas attain mature koala bushland habitat status, and are mapped as Bushland Habitat on a Bushland Habitat map. This is expected to occur within less than 10-15 years.

4.4.3 Monitoring of Success

Ongoing monitoring is required to ensure the Offset Area Management Plan achieves the outcomes identified. Monitoring activities must link back to the outcomes defined in *Part 2 – Management Plan* (of the Offset Area Management Plan), and be a measurement of how the area is progressing in achieving these outcomes as well as managing the potential threats and risks to the offset area (QTFN 2016).

There are three parts to the monitoring process of the Offset Area, which include:

- Annual weed monitoring
- Bi-annual pest monitoring and management
- Koala abundance and health monitoring at years 0, 5 and 10

For further detail on monitoring requirements and process, please see the Offset Area Management Plan developed by QTFN (2016).

4.5 Offset Delivery Timeline

The offset will be secured via a Voluntary Declaration as an area of high conservation value under the VM Act. The area will become a formal offset site when it is registered on title upon DEE's approval of QTFN's Offset Area Management Plan.

Chapter 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The objective of the proposed koala offset area is to protect and enhance the koala habitat value of the current site. For a site to contain high habitat value for koalas, it is required to incorporate the presence of preferred feed trees, which has been defined by the Ipswich City Council as *Eucalyptus tereticornis*, *Corymbia citriodora*, *Eucalyptus crebra*, *Eucalyptus grandis*, *Eucalyptus microcorys*, *Eucalyptus moluccana*, *Eucalyptus propinqua*, *Eucalyptus seeana* and *Lophostemon confertus* (ICC 2014).

The field surveys confirmed that the site contained vegetation communities, in both Category X and Category B areas, that contain high habitat value for koalas. These vegetation communities include: RE 12.9-10.2, RE 12.9-10.7 and RE 12.3.3 which all comprise *Eucalyptus tereticornis*, *Corymbia citriodora* and *Eucalyptus crebra* as dominant canopy and sub-canopy species. Although no koalas were sighted during the survey period, koala scats were located and recorded across the entire site in both Category B and Category X areas. The scats were situated under *Eucalyptus* and *Corymbia* trees with some of these trees also exhibiting scratch marks along the trunk. Subsequent surveys conducted by the University of Queensland's Wildlife Ecology Group and QTFN Ecologists sighted koalas within the offset area (QTFN 2016)

In addition to the onsite quality of koala habitat, it is vital for the site to be linked to other areas of bushland and corridors to encourage koala movement and gene flow. The site is adjacent to Flinders-Goolman Conservation Estate on the north east and is also located within the Flinders Karawatha corridor, which is the largest remaining contiguous stretch of open eucalypt forest in South East Queensland. Moreover, the site is largely surrounded by bushland and is highly connected via these habitat linkages. To ensure a suitable offset area, it is vital that these areas of bushland and corridors are ecologically viable and linked to facilitate and encourage koala movement and gene flow. As mentioned previously, a factor for the population growth and progression of this species is the presence of other koalas, and having these corridors and habitat linkages that contain preferred feed trees is vital for this reason. As a result, the site makes for ecologically valuable choice as an offset area due to its connectivity with viable bushland and corridors.

Given data recorded during field surveys and the location of the site, it is evident that the site would be a suitable area to offset the loss of koala habitat due to proposed vegetation clearance as a consequence of the proposed development of the Rawlings Road Defence Housing Australia EPBC 20106/7723.

Glossary

Biocondition	A Condition Assessment Framework for Terrestrial Biodiversity in Queensland.
Cryptic flora	Flora species that may be difficult to find due to its ecological lifecycle such as growth stages and flowering period, especially when the perennating organ is underground e.g. ground orchids.
Declared plant or animal	Pest flora or fauna species as defined by the <i>LP Act</i> and listed under the schedules of the <i>LP Reg.</i>
Proposed disturbance footprint	Proposed disturbance footprint on the “66.63ha” on Part 86 and 89 on RP892014
Threatened	Flora or fauna species listed as threatened by the <i>EPBC Act</i> and/or the <i>NC Reg.</i>
Trimble®	The name used to refer to the data capture and GPS positioning device utilised during the reported ecology survey.
site	Lots 86 RP892014, 87 RP892014, 88 RP892014 and 89 RP892014

References

BoM (2014). *Climate statistics for Australian locations: Summary statistics IPSWICH*. Bureau of Meteorology. Australian Government, Canberra. URL http://www.bom.gov.au/climate/averages/tables/cw_040101.shtml. Accessed 21 July 2014.

Crowther, M., D. Lunney, J. Lemon, E. Stalenberg, R. Wheeler, G. Madani, K. Ross and M. Ellis (2013). *Climate-mediated habitat selection in an arboreal folivore*. *Ecography*. 36:001-008.

DERM (2010). *South East Queensland Koala Conservation State Planning Regulatory Provisions*. Department of Environment and Resource Management. Queensland Government, Brisbane.

DME (2008). *Queensland Geological Mapping (polygonised vector) Data: Regional & 1:100 00 Sheet areas (DVD)*. Department of Mines and Energy, Queensland.

DNRM (2014). *Regulated Vegetation Management Map*. Department of Natural Resources and Mines, Brisbane, Qld. <http://www.dnrm.qld.gov.au/forms/land-property/vegetation-map-request> Accessed 2 July 2014.

DoE (2014). *Protected Matters Search Tool*. Department of the Environment, Canberra <http://www.environment.gov.au/epbc/pmst/index.html>. Accessed 2 July 2014.

DoE (2014). *Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) — Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)*. SPRAT Profile. Department of the Environment. Australian Government, Canberra. URL: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=85104. Accessed 22 July 2014.

DSITIA (2014). *Wildlife online*. Department of Science, Information Technology, Innovation and the Arts. Brisbane, Qld. <https://environment.ehp.qld.gov.au/report-request/species-list/> Accessed 2 July 2014

EHP (2012a). *Biodiversity status of pre-clearing regional ecosystems of Queensland, Version 7.0 – SE QLD (GIS Layer)*. Department of Environment and Heritage Protection, Brisbane, Qld.

EHP (2012b). *Land zone definitions*. Department of Environment and Heritage Protection, Brisbane, Qld. http://www.ehp.qld.gov.au/ecosystems/biodiversity/regional-ecosystems/land_zone_definitions.html. Accessed 15 July 2014.

EHP (2013). *Flinders Karawatha Corridor Environmental Values and Land Use Data Report 2013*. Department of Environment and Heritage Protection. Queensland Government, Brisbane.

EHP (2014a). *Southeast Queensland (SEQ) bioregion*, in WetlandInfo. Department of Environment and Heritage Protection. Queensland Government, Brisbane. URL: <http://wetlandinfo.ehp.qld.gov.au/wetlands/facts-maps/bioregion-southeast-queensland-seq/>. Accessed 21 July 2014.

EHP (2014b). *Moreton Basin bioregion province*, in WetlandInfo. Department of Environment and Heritage Protection. Queensland Government, Brisbane. URL: <http://wetlandinfo.ehp.qld.gov.au/wetlands/facts-maps/bioregion-province-moreton-basin/>. Accessed 21 July 2014.

EHP (2014c). *Map of Referable Wetlands*. Department of Environment and Heritage Protection, Brisbane, Qld. <https://www.ehp.qld.gov.au/ecosystems/wetlands/referable-wetlands-maps.html> Accessed 2 July 2014.

EHP (2014d). *Regional ecosystem descriptions*. Department of Environment and Heritage Protection, Brisbane, Qld. <http://www.ehp.qld.gov.au/ecosystems/biodiversity/regional-ecosystems/index.php> Accessed 17 July 2014.

EHP (2014e). *Flinders Karawatha Corridor Management Strategy 2014–2019*. Department of Environment and Heritage Protection. Queensland Government, Brisbane.

EHP (2014f). *Queensland Wetlands 2009 Version 3.0 – Ipswich 9442* in WetlandInfo. Department of Environment and Heritage Protection. Queensland Government, Brisbane.

Eyre, T.J., Kelly, A.L., Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2011). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.1*. Department of Environment and Resource Management (DERM), Biodiversity and Ecosystem Sciences, Brisbane.

ICC (2006). *Ipswich Planning Scheme 2006*. Ipswich City Council, Ipswich.

ICC (2014a). *Conservation – Making a Koala Friendly Backyard*. Ipswich City Council, Ipswich. URL: http://www.ipswich.qld.gov.au/about_ipswich/environment/conservation/. Accessed 22 July 2014.

ICC (2014b). *Parks and Reserves*. Ipswich City Council, Ipswich. URL: http://www.ipswich.qld.gov.au/about_ipswich/parks_reserves_precincts/ Accessed 28 July 2014

Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.2*. Updated August 2012. Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane.

Phillips, S., and Callaghan, D., (2011). *The Spot Assessment Technique: determining the importance of habitat utilisation by Koalas (Phascolarctos cinereus)*. Australian Koala Foundation.

Specht, R.L. 1970, 'Structural Formation Labels' in Neldner et al. (2005). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.1*. Queensland Herbarium, Environmental Protection Agency, Brisbane.

APPENDIX A

Site Locality Plan



APPENDIX B

EPBC Act Protected Matters Search Tool Results





EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 02/07/14 11:57:13

[Summary](#)

[Details](#)

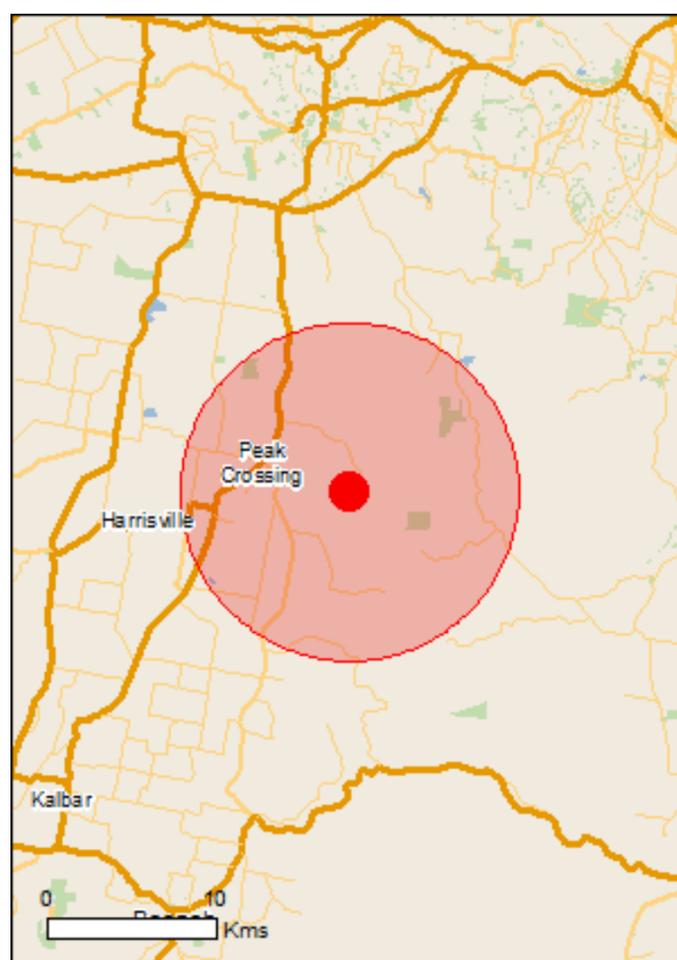
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

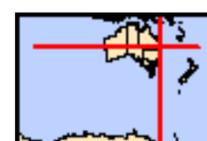
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	36
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	1
State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	36
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR) [\[Resource Information \]](#)

Name	Proximity
Moreton bay	Upstream from Ramsar

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area
Swamp Tea-tree (Melaleuca irbyana) Forest of South-east Queensland	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species

Name	Status	Type of Presence
Lathamus discolor		habitat may occur within area
Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta		
Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix melanogaster		
Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Phyllodes imperialis smithersi		
Pink Underwing Moth [86084]	Endangered	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus		
Northern Quoll [331]	Endangered	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Other		
Cycas ophiolitica		
[55797]	Endangered	Species or species habitat may occur within area
Plants		
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Bertya ernestiana		
a shrub [78349]	Vulnerable	Species or species habitat may occur within area
Bosistoa selwynii		
Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa		
Three-leaved Bosistoa [16091]	Vulnerable	Species or species

Name	Status	Type of Presence
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habitat likely to occur
within area

Name	Status	Type of Presence
Bulbophyllum globuliforme Miniature Moss-orchid, Hoop Pine Orchid [6649]	Vulnerable	Species or species habitat likely to occur within area
Cupaniopsis tomentella Boonah Tuckeroo [3322]	Vulnerable	Species or species habitat likely to occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Notelaea ipsviciensis Cooneana Olive [81858]	Critically Endangered	Species or species habitat may occur within area
Notelaea lloydii Lloyd's Olive [15002]	Vulnerable	Species or species habitat likely to occur within area
Phebalium distans Mt Berryman Phebalium [81869]	Critically Endangered	Species or species habitat may occur within area
Planchonella eerwah Shiny-leaved Condoo, Black Plum, Wild Apple [17340]	Endangered	Species or species habitat likely to occur within area
Plectranthus habrophyllus [64589]	Endangered	Species or species habitat likely to occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area

Reptiles

Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat may occur within area
Delma torquata Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - AMBERLEY - AP90 SMALL ARMS RANGE (PURGA)

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Places on the RNE [\[Resource Information \]](#)

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Flinders Peak - Ivorys Rock Areas	QLD	Registered

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Flinders Peak	QLD
Mount Perry	QLD

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area

Name	Status	Type of Presence within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus		
Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia		
Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Cabomba caroliniana		
Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera		
Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Dolichandra unguis-cati		
Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes		
Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata		Senecio madagascariensis
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		
Parthenium hysterophorus		
Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		

Name	Status	Type of Presence
Species or species habitat likely to occur within area		Species or species
Species or species habitat likely to occur within area		habitat likely to occur within area
Species or species habitat likely to occur within area Fireweed, Madagascar Ragwort, Madagascar		Species or species

Name	Status	Type of Presence
Groundsel [2624]		habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Coordinates

-27.7972 152.7747

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

APPENDIX C

Wildlife Online Database Search Results





Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point

Species: All

Type: All

Status: All

Records: All

Date: All

Latitude: 27.7972

Longitude: 152.7747

Distance: 10

Email: erutherford@newground.com.au

Date submitted: Wednesday 02 Jul 2014 12:09:14

Date extracted: Wednesday 02 Jul 2014 12:10:09

The number of records retrieved = 759

Disclaimer

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	<i>Rhinella marina</i>	cane toad	Y			5
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		4
animals	amphibians	Hylidae	<i>Litoria peronii</i>	emerald spotted treefrog		C		1
animals	amphibians	Hylidae	<i>Litoria dentata</i>	bleating treefrog		C		1
animals	amphibians	Hylidae	<i>Litoria nasuta</i>	striped rocketfrog		C		3
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		4
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		2
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog		C		4
animals	amphibians	Limnodynastidae	<i>Platyplectrum ornatum</i>	ornate burrowing frog		C		2
animals	amphibians	Limnodynastidae	<i>Limnodynastes salmini</i>	salmon striped frog		C		1
animals	amphibians	Limnodynastidae	<i>Adelotus brevis</i>	tusked frog		V		2
animals	amphibians	Limnodynastidae	<i>Limnodynastes peronii</i>	striped marshfrog		C		1
animals	amphibians	Limnodynastidae	<i>Limnodynastes tasmaniensis</i>	spotted grassfrog		C		1
animals	amphibians	Myobatrachidae	<i>Pseudophryne major</i>	great brown broodfrog		C		1/1
animals	amphibians	Myobatrachidae	<i>Uperoleia rugosa</i>	chubby gungan		C		1/1
animals	amphibians	Myobatrachidae	<i>Pseudophryne raveni</i>	copper backed broodfrog		C		2
animals	amphibians	Myobatrachidae	<i>Crinia parinsignifera</i>	beeping froglet		C		2
animals	amphibians	Myobatrachidae	<i>Mixophyes fasciolatus</i>	great barred frog		C		1
animals	birds	Acanthizidae	<i>Sericornis citreogularis</i>	yellow-throated scrubwren		C		1
animals	birds	Acanthizidae	<i>Smicronis brevisrostris</i>	weebill		C		6
animals	birds	Acanthizidae	<i>Acanthiza nana</i>	yellow thornbill		C		1
animals	birds	Acanthizidae	<i>Gerygone mouki</i>	brown gerygone		C		1
animals	birds	Acanthizidae	<i>Acanthiza lineata</i>	striated thornbill		C		1
animals	birds	Acanthizidae	<i>Chthonicola sagittata</i>	speckled warbler		C		6
animals	birds	Acanthizidae	<i>Acanthiza reguloides</i>	buff-rumped thornbill		C		5
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		32
animals	birds	Acanthizidae	<i>Sericornis frontalis</i>	white-browed scrubwren		C		5
animals	birds	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	yellow-rumped thornbill		C		29
animals	birds	Acanthizidae	<i>Acanthiza pusilla</i>	brown thornbill		C		3
animals	birds	Accipitridae	<i>Aquila audax</i>	wedge-tailed eagle		C		20
animals	birds	Accipitridae	<i>Accipiter novaehollandiae</i>	grey goshawk		NT		3
animals	birds	Accipitridae	<i>Accipiter cirrocephalus</i>	collared sparrowhawk		C		3
animals	birds	Accipitridae	<i>Milvus migrans</i>	black kite		C		2
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		2
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		12
animals	birds	Accipitridae	<i>Pandion cristatus</i>	eastern osprey		SL		1
animals	birds	Accipitridae	<i>Circus approximans</i>	swamp harrier		C		9
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		8
animals	birds	Accipitridae	<i>Aviceda subcristata</i>	Pacific baza		C		5
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		3
animals	birds	Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		SL		17
animals	birds	Accipitridae	<i>Hieraaetus morphnoides</i>	little eagle		C		1
animals	birds	Acrocephalidae	<i>Acrocephalus australis</i>	Australian reed-warbler		SL		28
animals	birds	Alaudidae	<i>Mirafra javanica</i>	Horsfield's bushlark		C		9
animals	birds	Alcedinidae	<i>Ceyx azureus</i>	azure kingfisher		C		7
animals	birds	Anatidae	<i>Anas castanea</i>	chestnut teal		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		22
animals	birds	Anatidae	<i>Biziura lobata</i>	musk duck		C		1
animals	birds	Anatidae	<i>Cygnus atratus</i>	black swan		C		27
animals	birds	Anatidae	<i>Anas rhynchos</i>	Australasian shoveler		C		7
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead		C		14
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		79
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck		C		75
animals	birds	Anatidae	<i>Dendrocygna eytoni</i>	plumed whistling-duck		C		16
animals	birds	Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck		C		1
animals	birds	Anatidae	<i>Stictonetta naevosa</i>	freckled duck		NT		1
animals	birds	Anatidae	<i>Nettapus coromandelianus</i>	cotton pygmy-goose		NT		1
animals	birds	Anatidae	<i>Malacorhynchus membranaceus</i>	pink-eared duck		C		6
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		10
animals	birds	Anseranatidae	<i>Anseranas semipalmata</i>	magpie goose		C		3
animals	birds	Apodidae	<i>Apus pacificus</i>	fork-tailed swift		SL		1
animals	birds	Apodidae	<i>Hirundapus caudacutus</i>	white-throated needletail		SL		1
animals	birds	Ardeidae	<i>Egretta sacra</i>	eastern reef egret		SL		1
animals	birds	Ardeidae	<i>Ardea modesta</i>	eastern great egret		SL		25
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		16
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		3
animals	birds	Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian bittern		C	E	2
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen night-heron		C		4
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		50
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		9
animals	birds	Ardeidae	<i>Ardea ibis</i>	cattle egret		SL		47
animals	birds	Artamidae	<i>Artamus cyanopterus</i>	dusky woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		23
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		3
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	piebald butcherbird		C		73
animals	birds	Artamidae	<i>Strepera graculina</i>	piebald currawong		C		17
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		105
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		2
animals	birds	Cacatuidae	<i>Cacatua sanguinea</i>	little corella		C		3
animals	birds	Cacatuidae	<i>Cacatua tenuirostris</i>	long-billed corella	Y	C		1
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		14
animals	birds	Cacatuidae	<i>Calyptorhynchus funereus</i>	yellow-tailed black-cockatoo		C		2
animals	birds	Cacatuidae	<i>Calyptorhynchus lathami</i>	glossy black-cockatoo		V		3
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		72
animals	birds	Cacatuidae	<i>Nymphicus hollandicus</i>	cockatiel		C		30
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		1
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		86
animals	birds	Campephagidae	<i>Lalage sueurii</i>	white-winged triller		C		2
animals	birds	Campephagidae	<i>Coracina maxima</i>	ground cuckoo-shrike		C		1
animals	birds	Campephagidae	<i>Lalage leucomela</i>	varied triller		C		2
animals	birds	Campephagidae	<i>Coracina tenuirostris</i>	cicadabird		SL		11
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		52

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Charadriidae	<i>Erythrogonys cinctus</i>	red-kneed dotterel		C		2
animals	birds	Charadriidae	<i>Elseyornis melanops</i>	black-fronted dotterel		C		7
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		5
animals	birds	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	black-necked stork		NT		12
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		42
animals	birds	Climacteridae	<i>Cormobates leucophaea</i>	white-throated treecreeper		C		1
animals	birds	Climacteridae	<i>Climacteris erythrops</i>	red-browed treecreeper		NT		1
animals	birds	Climacteridae	<i>Cormobates leucophaea metastasis</i>	white-throated treecreeper (southern)		C		2
animals	birds	Columbidae	<i>Columba livia</i>	rock dove	Y			20
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		13
animals	birds	Columbidae	<i>Columba leucomela</i>	white-headed pigeon		C		1
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		78
animals	birds	Columbidae	<i>Phaps chalcoptera</i>	common bronzewing		C		7
animals	birds	Columbidae	<i>Chalcophaps indica</i>	emerald dove		C		1
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		5
animals	birds	Columbidae	<i>Leucosarcia picata</i>	wonga pigeon		C		5
animals	birds	Columbidae	<i>Ptilinopus magnificus</i>	wompoo fruit-dove		C		1
animals	birds	Columbidae	<i>Macropygia amboinensis</i>	brown cuckoo-dove		C		5
animals	birds	Columbidae	<i>Streptopelia chinensis</i>	spotted dove	Y			44
animals	birds	Columbidae	<i>Lopholaimus antarcticus</i>	topknot pigeon		C		2
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		22
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		101
animals	birds	Cuculidae	<i>Chalcites minutillus minutillus</i>	little bronze-cuckoo		C		2
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		13
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		17
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		4
animals	birds	Cuculidae	<i>Cacomantis variolosus</i>	brush cuckoo		C		1
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		11
animals	birds	Cuculidae	<i>Cacomantis pallidus</i>	pallid cuckoo		C		3
animals	birds	Cuculidae	<i>Chalcites lucidus</i>	shining bronze-cuckoo		C		1
animals	birds	Cuculidae	<i>Chalcites basalus</i>	Horsfield's bronze-cuckoo		C		4
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		8
animals	birds	Estrildidae	<i>Taeniopygia guttata</i>	zebra finch		C		53
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		12
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		17
animals	birds	Estrildidae	<i>Neochmia temporalis</i>	red-browed finch		C		1
animals	birds	Eurostopodidae	<i>Eurostopodus mystacalis</i>	white-throated nightjar		C		3
animals	birds	Falconidae	<i>Falco berigora</i>	brown falcon		C		5
animals	birds	Falconidae	<i>Falco peregrinus</i>	peregrine falcon		C		2
animals	birds	Falconidae	<i>Falco cenchroides</i>	Nankeen kestrel		C		72
animals	birds	Falconidae	<i>Falco longipennis</i>	Australian hobby		C		10
animals	birds	Gruidae	<i>Grus rubicunda</i>	brilga		C		1
animals	birds	Halcyonidae	<i>Todiramphus chloris</i>	collared kingfisher		C		1
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		37
animals	birds	Halcyonidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		46
animals	birds	Halcyonidae	<i>Todiramphus pyrrhopygius</i>	red-backed kingfisher		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Halcyonidae	<i>Todiramphus macleayii</i>	forest kingfisher		C		5
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		33
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		48
animals	birds	Hirundinidae	<i>Petrochelidon ariel</i>	fairy martin		C		13
animals	birds	Hirundinidae	<i>Cheramoeca leucosterna</i>	white-backed swallow		C		1
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		13
animals	birds	Jacanidae	<i>Irediparra gallinacea</i>	comb-crested jacana		C		13
animals	birds	Laridae	<i>Chlidonias hybrida</i>	whiskered tern		C		2
animals	birds	Laridae	<i>Gelochelidon nilotica</i>	gull-billed tern		C		1
animals	birds	Laridae	<i>Hydroprogne caspia</i>	Caspian tern		SL		1
animals	birds	Maluridae	<i>Malurus cyaneus</i>	superb fairy-wren		C		53
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		2
animals	birds	Maluridae	<i>Stipiturus malachurus</i>	southern emu-wren		V		1
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		35
animals	birds	Megaluridae	<i>Cincloramphus mathewsi</i>	rufous songlark		C		2
animals	birds	Megaluridae	<i>Megalurus timoriensis</i>	tawny grassbird		C		1
animals	birds	Megaluridae	<i>Cincloramphus cruralis</i>	brown songlark		C		4
animals	birds	Megapodiidae	<i>Alectura lathami</i>	Australian brush-turkey		C		2
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		42
animals	birds	Meliphagidae	<i>Plectorhyncha lanceolata</i>	striped honeyeater		C		16
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		16
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		16
animals	birds	Meliphagidae	<i>Myzomela sanguinolenta</i>	scarlet honeyeater		C		10
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		41
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		14
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		5
animals	birds	Meliphagidae	<i>Caligavis chrysops</i>	yellow-faced honeyeater		C		9
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		18
animals	birds	Meliphagidae	<i>Melithreptus gularis</i>	black-chinned honeyeater		NT		5
animals	birds	Meliphagidae	<i>Melithreptus lunatus</i>	white-naped honeyeater		C		2
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		SL		25
animals	birds	Monarchidae	<i>Symposiarchus trivirgatus</i>	spectacled monarch		SL		2
animals	birds	Monarchidae	<i>Monarcha melanopsis</i>	black-faced monarch		SL		1
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		88
animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		3
animals	birds	Monarchidae	<i>Myiagra inquieta</i>	restless flycatcher		C		8
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		17
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		16
animals	birds	Neosittidae	<i>Daphoenositta chrysoptera</i>	varied sittella		C		5
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		9
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		15
animals	birds	Orthonychidae	<i>Orthonyx temminckii</i>	Australian logrunner		C		2
animals	birds	Pachycephalidae	<i>Colluricincla megarhyncha</i>	little shrike-thrush		C		1
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		21
animals	birds	Pachycephalidae	<i>Pachycephala pectoralis</i>	golden whistler		C		8
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		7

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animals	birds	Pachycephalidae	<i>Falcunculus frontatus</i>	crested shrike-tit		C		1
animals	birds	Paradisaeidae	<i>Ptiloris paradiseus</i>	paradise riflebird		C		1
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		67
animals	birds	Pardalotidae	<i>Pardalotus punctatus</i>	spotted pardalote		C		8
animals	birds	Passeridae	<i>Passer domesticus</i>	house sparrow	Y			3
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		26
animals	birds	Petroicidae	<i>Microeca fascinans</i>	jacky winter		C		3
animals	birds	Petroicidae	<i>Petroica goodenovii</i>	red-capped robin		C		3
animals	birds	Petroicidae	<i>Eopsaltria australis</i>	eastern yellow robin		C		7
animals	birds	Petroicidae	<i>Tregellasia capito</i>	pale-yellow robin		C		1
animals	birds	Petroicidae	<i>Petroica rosea</i>	rose robin		C		7
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sp.</i>					1
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		6
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		2
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		18
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		35
animals	birds	Phasianidae	<i>Coturnix ypsilophora</i>	brown quail		C		30/1
animals	birds	Phasianidae	<i>Excalfactoria chinensis</i>	king quail		C		1
animals	birds	Phasianidae	<i>Coturnix pectoralis</i>	stubble quail		C		3
animals	birds	Pittidae	<i>Pitta versicolor</i>	noisy pitta		C		1
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		9
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		30
animals	birds	Podicipedidae	<i>Poliiocephalus poliocephalus</i>	hoary-headed grebe		C		3
animals	birds	Podicipedidae	<i>Podiceps cristatus</i>	great crested grebe		C		2
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		6
animals	birds	Psittacidae	<i>Platyercus elegans</i>	crimson rosella		C		3
animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		40
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		47
animals	birds	Psittacidae	<i>Psephotus haematonotus</i>	red-rumped parrot		C		1
animals	birds	Psittacidae	<i>Glossopsitta concinna</i>	musk lorikeet		C		5
animals	birds	Psittacidae	<i>Platyercus eximius</i>	eastern rosella		C		11
animals	birds	Psittacidae	<i>Alisterus scapularis</i>	Australian king-parrot		C		11
animals	birds	Psittacidae	<i>Glossopsitta pusilla</i>	little lorikeet		C		7
animals	birds	Psittacidae	<i>Platyercus adscitus</i>	pale-headed rosella		C		86
animals	birds	Psophodidae	<i>Psophodes olivaceus</i>	eastern whipbird		C		7
animals	birds	Ptilonorhynchidae	<i>Ailuroedus crassirostris</i>	green catbird		C		1
animals	birds	Ptilonorhynchidae	<i>Ptilonorhynchus violaceus</i>	satin bowerbird		C		2
animals	birds	Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	spotted bowerbird		C		3
animals	birds	Ptilonorhynchidae	<i>Sericulus chrysocephalus</i>	regent bowerbird		C		4
animals	birds	Rallidae	<i>Fulica atra</i>	Eurasian coot		C		5
animals	birds	Rallidae	<i>Porzana pusilla</i>	Baillon's crane		C		1
animals	birds	Rallidae	<i>Gallinula tenebrosa</i>	dusky moorhen		C		39
animals	birds	Rallidae	<i>Porphyrio porphyrio</i>	purple swamphen		C		29
animals	birds	Rallidae	<i>Gallirallus philippensis</i>	buff-banded rail		C		3
animals	birds	Recurvirostridae	<i>Himantopus himantopus</i>	black-winged stilt		C		20
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		17

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animals	birds	Rhipiduridae	<i>Rhipidura rufifrons</i>	rufous fantail		SL		4
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		91
animals	birds	Rostratulidae	<i>Rostratula australis</i>	Australian painted snipe		V	E	1
animals	birds	Scolopacidae	<i>Limosa lapponica</i>	bar-tailed godwit		SL		1
animals	birds	Scolopacidae	<i>Tringa stagnatilis</i>	marsh sandpiper		SL		1
animals	birds	Scolopacidae	<i>Calidris acuminata</i>	sharp-tailed sandpiper		SL		1
animals	birds	Scolopacidae	<i>Tringa nebularia</i>	common greenshank		SL		2
animals	birds	Scolopacidae	<i>Tringa glareola</i>	wood sandpiper		SL		1
animals	birds	Scolopacidae	<i>Gallinago hardwickii</i>	Latham's snipe		SL		2
animals	birds	Scolopacidae	<i>Numenius minutus</i>	little curlew		SL		1
animals	birds	Strigidae	<i>Ninox strenua</i>	powerful owl		V		4
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		9
animals	birds	Sturnidae	<i>Sturnus vulgaris</i>	common starling	Y			58
animals	birds	Sturnidae	<i>Sturnus tristis</i>	common myna	Y			50
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		33
animals	birds	Threskiornithidae	<i>Plegadis falcinellus</i>	glossy ibis		SL		5
animals	birds	Threskiornithidae	<i>Platalea flavipes</i>	yellow-billed spoonbill		C		14
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		44
animals	birds	Threskiornithidae	<i>Platalea regia</i>	royal spoonbill		C		34
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		13
animals	birds	Turdidae	<i>Zoothera heinei</i>	russet-tailed thrush		C		1
animals	birds	Turnicidae	<i>Turnix varius</i>	painted button-quail		C		1
animals	birds	Turnicidae	<i>Turnix melanogaster</i>	black-breasted button-quail		V	V	1
animals	birds	Tytonidae	<i>Tyto javanica</i>	eastern barn owl		C		1
animals	insects	Hesperiidae	<i>Hesperilla sarnia</i>	swift sedge-skipper				1
animals	insects	Hesperiidae	<i>Toxidia parvulus</i>	banded grass-skipper				1
animals	insects	Hesperiidae	<i>Toxidia peron</i>	dingy skipper				1
animals	insects	Hesperiidae	<i>Neohesperilla xanthomera</i>	yellow grass-skipper				1
animals	insects	Hesperiidae	<i>Netrocoryne repanda repanda</i>	bronze flat (southern subspecies)				1
animals	insects	Hesperiidae	<i>Hesperilla crypsigramma</i>	wide-brand sedge-skipper				4
animals	insects	Lycaenidae	<i>Acrodipsas brisbanensis brisbanensis</i>	bronze ant-blue				3
animals	insects	Lycaenidae	<i>Ogyris zosine zosine</i>	northern purple azure (southern subspecies)				1
animals	insects	Lycaenidae	<i>Ogyris olane ocele</i>	dull-purple azure (coastal subspecies)				1
animals	insects	Lycaenidae	<i>Acrodipsas cuprea</i>	copper ant-blue				1
animals	insects	Lycaenidae	<i>Hypochrysops delicia delicia</i>	moonlight jewel (eastern subspecies)				1
animals	insects	Nymphalidae	<i>Acraea andromacha andromacha</i>	glasswing				2
animals	insects	Nymphalidae	<i>Polyura sempronius sempronius</i>	tailed emperor				1
animals	insects	Nymphalidae	<i>Vanessa kershawi</i>	Australian painted lady				2
animals	insects	Nymphalidae	<i>Melanitis leda bankia</i>	common evening-brown				1
animals	insects	Nymphalidae	<i>Tirumala hamata hamata</i>	blue tiger				1
animals	insects	Nymphalidae	<i>Tisiphone abeona rawnsleyi</i>	varied sword-grass brown (Queensland subspecies)				1
animals	insects	Pieridae	<i>Delias nigrina</i>	black jezebel				1
animals	insects	Pieridae	<i>Eurema hecabe phoebus</i>	large grass-yellow				1

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animals	mammals	Bovidae	<i>Bos taurus</i>	European cattle	Y			1
animals	mammals	Bovidae	<i>Capra hircus</i>	goat	Y			1
animals	mammals	Canidae	<i>Vulpes vulpes</i>	red fox	Y			6
animals	mammals	Canidae	<i>Canis lupus familiaris</i>	dog	Y			1
animals	mammals	Dasyuridae	<i>Sminthopsis murina</i>	common dunnart		C		1
animals	mammals	Dasyuridae	<i>Dasyurus maculatus maculatus</i>	spotted-tailed quoll (southern subspecies)		V	E	1
animals	mammals	Dasyuridae	<i>Antechinus flavipes flavipes</i>	yellow-footed antechinus (south-east Queensland)		C		1
animals	mammals	Dasyuridae	<i>Phascogale tapoatafa</i>	brush-tailed phascogale		C		3
animals	mammals	Dasyuridae	<i>Planigale maculata</i>	common planigale		C		1
animals	mammals	Leporidae	<i>Lepus europaeus</i>	European brown hare	Y			2
animals	mammals	Macropodidae	<i>Macropus rufogriseus</i>	red-necked wallaby		C		8
animals	mammals	Macropodidae	<i>Macropus parryi</i>	whiptail wallaby		C		6
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo		C		6
animals	mammals	Macropodidae	<i>Macropus dorsalis</i>	black-striped wallaby		C		1
animals	mammals	Macropodidae	<i>Petrogale penicillata</i>	brush-tailed rock-wallaby		V	V	26
animals	mammals	Molossidae	<i>Tadarida australis</i>	white-striped freetail bat		C		2
animals	mammals	Muridae	<i>Rattus rattus</i>	black rat	Y			1
animals	mammals	Muridae	<i>Mus musculus</i>	house mouse	Y			1
animals	mammals	Petauridae	<i>Petaurus norfolcensis</i>	squirrel glider		C		2
animals	mammals	Petauridae	<i>Petaurus breviceps</i>	sugar glider		C		7
animals	mammals	Phalangeridae	<i>Trichosurus caninus</i>	short-eared possum		C		1
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		4
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus (southeast Queensland bioregion)</i>	koala (southeast Queensland bioregion)		V	V	264
animals	mammals	Potoroidae	<i>Aepyprymnus rufescens</i>	rufous bettong		C		4
animals	mammals	Pseudocheiridae	<i>Petauroides volans</i>	greater glider		C		3
animals	mammals	Pteropodidae	<i>Pteropus poliocephalus</i>	grey-headed flying-fox		C	V	1
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			1
animals	mammals	Tachyglossidae	<i>Tachyglossus aculeatus</i>	short-beaked echidna		SL		3
animals	ray-finned fishes	Ambassidae	<i>Ambassis agassizii</i>	Agassiz's glassfish				1
animals	ray-finned fishes	Anguillidae	<i>Anguilla reinhardtii</i>	longfin eel				1
animals	ray-finned fishes	Eleotridae	<i>Mogurnda adspersa</i>	southern purplespotted gudgeon				1
animals	ray-finned fishes	Eleotridae	<i>Hypseleotris galii</i>	firetail gudgeon				3
animals	ray-finned fishes	Poeciliidae	<i>Gambusia holbrooki</i>	mosquitofish	Y			3
animals	reptiles	Agamidae	<i>Intellagama lesueurii</i>	eastern water dragon		C		1
animals	reptiles	Agamidae	<i>Pogona barbata</i>	bearded dragon		C		5
animals	reptiles	Agamidae	<i>Diporiphora australis</i>			C		1, 1
animals	reptiles	Boidae	<i>Morelia spilota</i>	carpet python		C		1
animals	reptiles	Chelidae	<i>Chelodina longicollis</i>	eastern snake-necked turtle		C		1
animals	reptiles	Colubridae	<i>Dendrelaphis punctulatus</i>	green tree snake		C		6
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		1
animals	reptiles	Diplodactylidae	<i>Nebulifera robusta</i>	robust velvet gecko		C		1
animals	reptiles	Diplodactylidae	<i>Diplodactylus vittatus</i>	wood gecko		C		1
animals	reptiles	Diplodactylidae	<i>Oedura tryoni</i>	southern spotted velvet gecko		C		1

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animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		1
animals	reptiles	Elapidae	<i>Pseudechis porphyriacus</i>	red-bellied black snake		C		3
animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whip snake		C		1
animals	reptiles	Elapidae	<i>Cryptophis nigrescens</i>	eastern small-eyed snake		C		2
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>			C		1
animals	reptiles	Gekkonidae	<i>Hemidactylus frenatus</i>	house gecko	Y			1
animals	reptiles	Pygopodidae	<i>Delma plebeia</i>	common delma		C		2
animals	reptiles	Scincidae	<i>Lygisaurus foliorum</i>			C		1
animals	reptiles	Scincidae	<i>Cryptoblepharus pulcher pulcher</i>	elegant snake-eyed skink		C		6
animals	reptiles	Scincidae	<i>Carlia vivax</i>			C		2
animals	reptiles	Scincidae	<i>Ctenotus spaldingi</i>			C		1
animals	reptiles	Scincidae	<i>Calyptotis scutirostrum</i>			C		2
animals	reptiles	Scincidae	<i>Lampropholis delicata</i>			C		2
animals	reptiles	Scincidae	<i>Anomalopus verreauxii</i>			C		2/1
animals	reptiles	Typhlopidae	<i>Ramphotyphlops wiedii</i>			C		1
animals	reptiles	Varanidae	<i>Varanus varius</i>	lace monitor		C		3
fungi	club fungi	Basidiomycota	<i>Inocybe</i>			C		3/3
fungi	club fungi	Basidiomycota	<i>Amanita sp. 10b</i>			C		1/1
fungi	sac fungi	Parmeliaceae	<i>Xanthoparmelia subtropica</i>			C		1/1
fungi	sac fungi	Ramalinaceae	<i>Ramalina inflata subsp. perpusilla</i>			C		1/1
fungi	sac fungi	Usneaceae	<i>Usnea dasaea</i>			C		3/3
plants	conifers	Araucariaceae	<i>Araucaria cunninghamii</i>	hoop pine		C		1
plants	ferns	Adiantaceae	<i>Pellaea paradoxa</i>	heart fern		C		1
plants	ferns	Adiantaceae	<i>Adiantum hispidulum</i>			C		1
plants	ferns	Adiantaceae	<i>Cheilanthes distans</i>	bristly cloak fern		C		1
plants	ferns	Adiantaceae	<i>Cheilanthes sieberi</i>			C		2
plants	ferns	Adiantaceae	<i>Adiantum hispidulum var. minus</i>			C		1/1
plants	ferns	Adiantaceae	<i>Pellaea falcata</i>			C		1
plants	ferns	Adiantaceae	<i>Adiantum aethiopicum</i>			C		1
plants	ferns	Aspleniaceae	<i>Asplenium australasicum</i>			C		1
plants	ferns	Blechnaceae	<i>Doodia caudata</i>			C		1
plants	ferns	Blechnaceae	<i>Doodia aspera</i>	prickly rasp fern		C		1
plants	ferns	Davalliaceae	<i>Davallia pyxidata</i>			C		1
plants	ferns	Dennstaedtiaceae	<i>Pteridium esculentum</i>	common bracken		C		1
plants	ferns	Dryopteridaceae	<i>Lastreopsis munita</i>			C		2/1
plants	ferns	Dryopteridaceae	<i>Lastreopsis microsora</i>			C		1
plants	ferns	Marsileaceae	<i>Marsilea mutica</i>	shiny nardoo		C		1
plants	ferns	Polypodiaceae	<i>Platynerium bifurcatum</i>			C		1
plants	ferns	Polypodiaceae	<i>Pyrrosia rupestris</i>	rock felt fern		C		2/1
plants	ferns	Polypodiaceae	<i>Drynaria rigidula</i>			C		1
plants	ferns	Polypodiaceae	<i>Platynerium superbum</i>	staghorn fern		C		1
plants	higher dicots	Acanthaceae	<i>Pseuderanthemum variabile</i>	pastel flower		C		1
plants	higher dicots	Acanthaceae	<i>Brunoniella australis</i>	blue trumpet		C		2/1
plants	higher dicots	Amaranthaceae	<i>Guilleminea densa</i>	small matweed	Y			1/1
plants	higher dicots	Amaranthaceae	<i>Achyranthes aspera</i>			C		2/1
plants	higher dicots	Amaranthaceae	<i>Gomphrena celosioides</i>	gomphrena weed	Y			1

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plants	higher dicots	Amaranthaceae	<i>Deeringia arborescens</i>	climbing deeringia		C		1
plants	higher dicots	Amaranthaceae	<i>Nyssanthes diffusa</i>	barbed-wire weed		C		1
plants	higher dicots	Aphanopetalaceae	<i>Aphanopetalum resinosum</i>	gumvine		C		3/2
plants	higher dicots	Apiaceae	<i>Centella asiatica</i>			C		1
plants	higher dicots	Apiaceae	<i>Cyclospermum leptophyllum</i>		Y			1/1
plants	higher dicots	Apocynaceae	<i>Parsonsia lanceolata</i>	northern silkpod		C		3/2
plants	higher dicots	Apocynaceae	<i>Marsdenia micradenia</i>	gymnema		C		2/2
plants	higher dicots	Apocynaceae	<i>Parsonsia straminea</i>	monkey rope		C		2
plants	higher dicots	Apocynaceae	<i>Alstonia constricta</i>	bitterbark		C		1
plants	higher dicots	Apocynaceae	<i>Secamone elliptica</i>			C		4/3
plants	higher dicots	Apocynaceae	<i>Marsdenia rostrata</i>			C		2/2
plants	higher dicots	Apocynaceae	<i>Marsdenia coronata</i>	slender milkvine		V		6/4
plants	higher dicots	Apocynaceae	<i>Cynanchum bowmanii</i>	bowman's milkvine		C		4/3
plants	higher dicots	Apocynaceae	<i>Alyxia ruscifolia</i>			C		6/4
plants	higher dicots	Apocynaceae	<i>Hoya australis</i>			C		1
plants	higher dicots	Apocynaceae	<i>Gomphocarpus physocarpus</i>	balloon cottonbush	Y			2/1
plants	higher dicots	Apocynaceae	<i>Hoya australis subsp. australis</i>			C		5/5
plants	higher dicots	Apocynaceae	<i>Sarcostemma viminale subsp. brunonianum</i>			C		3/3
plants	higher dicots	Apocynaceae	<i>Sarcostemma viminale subsp. australe</i>			C		1
plants	higher dicots	Araliaceae	<i>Hydrocotyle laxiflora</i>	stinking pennywort		C		1/1
plants	higher dicots	Araliaceae	<i>Trachymene procumbens</i>	creeping wild parsnip		C		4/3
plants	higher dicots	Araliaceae	<i>Polyscias elegans</i>	celery wood		C		1
plants	higher dicots	Araliaceae	<i>Astrotricha latifolia</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Zinnia peruviana</i>	wild zinnia	Y			1/1
plants	higher dicots	Asteraceae	<i>Camptacra barbata</i>			C		1
plants	higher dicots	Asteraceae	<i>Carthamus lanatus</i>	saffron thistle	Y			1/1
plants	higher dicots	Asteraceae	<i>Cichorium intybus</i>	chicory	Y			1/1
plants	higher dicots	Asteraceae	<i>Schkuhria pinnata</i>		Y			1/1
plants	higher dicots	Asteraceae	<i>Calotis lappulacea</i>	yellow burr daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Conyza bonariensis</i>		Y			1
plants	higher dicots	Asteraceae	<i>Podolepis neglecta</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Vittadinia sulcata</i>	native daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Bidens pilosa</i>		Y			1
plants	higher dicots	Asteraceae	<i>Calotis dentex</i>	white burr daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Cassinia laevis</i>			C		1
plants	higher dicots	Asteraceae	<i>Cirsium vulgare</i>	spear thistle	Y			1
plants	higher dicots	Asteraceae	<i>Olearia nernstii</i>	lpswich daisy		C		1
plants	higher dicots	Asteraceae	<i>Cassinia subtropica</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Eclipta platyglossa</i>			C		1
plants	higher dicots	Asteraceae	<i>Glossocardia bidens</i>	native cobbler's pegs		C		1
plants	higher dicots	Asteraceae	<i>Senecio tenuiflorus</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Lagenophora gracilis</i>			C		1
plants	higher dicots	Asteraceae	<i>Xanthium occidentale</i>		Y			1
plants	higher dicots	Asteraceae	<i>Baccharis halimifolia</i>	groundsel bush	Y			1
plants	higher dicots	Asteraceae	<i>Centratherum riparium</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Cyanthillium cinereum</i>			C		2

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plants	higher dicots	Asteraceae	<i>Rhodanthe anthemoides</i>	white paper daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Senecio bathurstianus</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Wedelia spilanthoides</i>			C		1
plants	higher dicots	Asteraceae	<i>Centratherum punctatum</i>		Y			1
plants	higher dicots	Asteraceae	<i>Senecio amygdalifolius</i>			C		1
plants	higher dicots	Asteraceae	<i>Xerochrysum bracteatum</i>	golden everlasting daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Ozothamnus diosmifolius</i>	white dogwood		C		1
plants	higher dicots	Asteraceae	<i>Senecio madagascariensis</i>	fireweed	Y			2/2
plants	higher dicots	Asteraceae	<i>Chrysocephalum apiculatum</i>	yellow buttons		C		2
plants	higher dicots	Asteraceae	<i>Apowollastonia spilanthoides</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Vittadinia dissecta var. hirta</i>			C		1
plants	higher dicots	Asteraceae	<i>Peripleura hispidula var. setosa</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Gynura drymophila var. drymophila</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Gynura drymophila var. glabrifolia</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Acmella grandiflora var. brachyglossa</i>			C		1
plants	higher dicots	Asteraceae	<i>Senecio pinnatifolius var. pinnatifolius</i>			C		3/3
plants	higher dicots	Bignoniaceae	<i>Pandorea pandorana</i>	wonga vine		C		7/4
plants	higher dicots	Bignoniaceae	<i>Pandorea jasminoides</i>			C		1
plants	higher dicots	Boraginaceae	<i>Ehretia membranifolia</i>	weeping koda		C		1/1
plants	higher dicots	Cactaceae	<i>Opuntia tomentosa</i>	velvety tree pear	Y			1
plants	higher dicots	Caesalpiniaceae	<i>Barklya syringifolia</i>	golden shower tree		C		1/1
plants	higher dicots	Campanulaceae	<i>Wahlenbergia gracilis</i>	sprawling bluebell		C		2/1
plants	higher dicots	Campanulaceae	<i>Wahlenbergia communis</i>	tufted bluebell		C		1
plants	higher dicots	Campanulaceae	<i>Lobelia purpurascens</i>	white root		C		1
plants	higher dicots	Campanulaceae	<i>Lobelia stenophylla</i>			C		1/1
plants	higher dicots	Campanulaceae	<i>Lobelia concolor</i>			C		1
plants	higher dicots	Capparaceae	<i>Capparis arborea</i>	brush caper berry		C		1
plants	higher dicots	Casuarinaceae	<i>Allocasuarina littoralis</i>			C		1
plants	higher dicots	Casuarinaceae	<i>Allocasuarina torulosa</i>			C		1
plants	higher dicots	Celastraceae	<i>Siphonodon australis</i>	ivorywood		C		1
plants	higher dicots	Celastraceae	<i>Maytenus bilocularis</i>			C		2
plants	higher dicots	Celastraceae	<i>Denhamia silvestris</i>			C		1/1
plants	higher dicots	Celastraceae	<i>Celastrus subspicata</i>	large-leaved staffvine		C		2/1
plants	higher dicots	Chenopodiaceae	<i>Dysphania carinata</i>			C		1/1
plants	higher dicots	Chenopodiaceae	<i>Maireana microphylla</i>			C		2/1
plants	higher dicots	Chenopodiaceae	<i>Einadia hastata</i>			C		1
plants	higher dicots	Clusiaceae	<i>Hypericum gramineum</i>			C		1
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides</i>			C		2
plants	higher dicots	Convolvulaceae	<i>Dichondra sp. (Inglewood J.M.Dalby 86/93)</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Dichondra repens</i>	kidney weed		C		3/2
plants	higher dicots	Convolvulaceae	<i>Ipomoea plebeia</i>	bellvine		C		1/1
plants	higher dicots	Cornaceae	<i>Alangium villosum</i>					1
plants	higher dicots	Crassulaceae	<i>Crassula sieberiana</i>			C		1
plants	higher dicots	Crassulaceae	<i>Bryophyllum delagoense</i>		Y			1
plants	higher dicots	Cucurbitaceae	<i>Sicyos australis</i>	star cucumber		C		1/1
plants	higher dicots	Cucurbitaceae	<i>Diplocyclos palmatus</i>			C		1

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plants	higher dicots	Cucurbitaceae	<i>Diplocyclos palmatus</i> subsp. <i>palmatus</i>			C		1/1
plants	higher dicots	Ebenaceae	<i>Diospyros australis</i>	black plum		C		1
plants	higher dicots	Ebenaceae	<i>Diospyros geminata</i>	scaly ebony		C		1
plants	higher dicots	Elaeocarpaceae	<i>Elaeocarpus obovatus</i>	blueberry ash		C		2/1
plants	higher dicots	Ericaceae	<i>Melichrus urceolatus</i>	honey gorse		C		1
plants	higher dicots	Euphorbiaceae	<i>Alchornea ilicifolia</i>	native holly		C		1
plants	higher dicots	Euphorbiaceae	<i>Mallotus philippensis</i>	red kamala		C		1
plants	higher dicots	Euphorbiaceae	<i>Homalanthus stillingiifolius</i>			C		1/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>			C		3/3
plants	higher dicots	Euphorbiaceae	<i>Croton phebalioides</i>	narrow-leaved croton		C		1/1
plants	higher dicots	Euphorbiaceae	<i>Acalypha capillipes</i>	small-leaved acalypha		C		1/1
plants	higher dicots	Euphorbiaceae	<i>Baloghia inophylla</i>	scrub bloodwood		C		1
plants	higher dicots	Euphorbiaceae	<i>Acalypha eremorum</i>	soft acalypha		C		2/2
plants	higher dicots	Euphorbiaceae	<i>Tragia novae-hollandiae</i>	stinging-vine		C		1/1
plants	higher dicots	Fabaceae	<i>Glycine</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Tephrosia</i> sp. (The Grampians L.H.Bird AQ565381)			C		5/5
plants	higher dicots	Fabaceae	<i>Hovea longipes</i>	brush hovea		C		4/4
plants	higher dicots	Fabaceae	<i>Derris involuta</i>	native derris		C		1
plants	higher dicots	Fabaceae	<i>Hovea planifolia</i>			C		2/2
plants	higher dicots	Fabaceae	<i>Lablab purpureus</i>	lablab	Y			1/1
plants	higher dicots	Fabaceae	<i>Lespedeza juncea</i>					2
plants	higher dicots	Fabaceae	<i>Desmodium varians</i>	slender tick trefoil		C		1/1
plants	higher dicots	Fabaceae	<i>Crotalaria montana</i>			C		1
plants	higher dicots	Fabaceae	<i>Indigofera baileyi</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Indigofera hirsuta</i>	hairy indigo		C		1/1
plants	higher dicots	Fabaceae	<i>Indigofera linnaei</i>	Birdsville indigo		C		1
plants	higher dicots	Fabaceae	<i>Jacksonia scoparia</i>			C		1
plants	higher dicots	Fabaceae	<i>Desmodium triflorum</i>		Y			2/1
plants	higher dicots	Fabaceae	<i>Flemingia parviflora</i>	flemingia		C		1
plants	higher dicots	Fabaceae	<i>Crotalaria grahamiana</i>		Y			2/2
plants	higher dicots	Fabaceae	<i>Desmodium brachypodium</i>	large ticktrefoil		C		1/1
plants	higher dicots	Fabaceae	<i>Erythrina vespertilio</i>			C		1
plants	higher dicots	Fabaceae	<i>Hardenbergia violacea</i>			C		2
plants	higher dicots	Fabaceae	<i>Swainsona brachycarpa</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Swainsona galegifolia</i>	smooth Darling pea		C		1/1
plants	higher dicots	Fabaceae	<i>Austrostenisia blackii</i>	bloodvine		C		1
plants	higher dicots	Fabaceae	<i>Desmodium rhytidophyllum</i>			C		3/1
plants	higher dicots	Fabaceae	<i>Macroptilium lathyroides</i>		Y			1
plants	higher dicots	Fabaceae	<i>Neonotonia wightii</i> var. <i>wightii</i>		Y			1/1
plants	higher dicots	Fabaceae	<i>Glycine</i> sp. (Marburg K.A.Williams 83006)			C		2/2
plants	higher dicots	Flacourtiaceae	<i>Casearia multinervosa</i>	casearia		C		1/1
plants	higher dicots	Goodeniaceae	<i>Goodenia hederacea</i>			C		1
plants	higher dicots	Goodeniaceae	<i>Goodenia rotundifolia</i>			C		1
plants	higher dicots	Gyrostemonaceae	<i>Codonocarpus attenuatus</i>			C		1
plants	higher dicots	Lamiaceae	<i>Gmelina leichhardtii</i>	white beech		C		1
plants	higher dicots	Lamiaceae	<i>Ajuga australis</i>	Australian bugle		C		1/1

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plants	higher dicots	Lamiaceae	<i>Mentha diemenica</i>	native mint		C		3/3
plants	higher dicots	Lamiaceae	<i>Mentha satureioides</i>	native pennyroyal		C		1
plants	higher dicots	Lamiaceae	<i>Plectranthus habrophyllus</i>			E	E	2/2
plants	higher dicots	Lamiaceae	<i>Anisomeles malabarica</i>			C		1/1
plants	higher dicots	Lamiaceae	<i>Plectranthus graveolens</i>	flea bush		C		4/3
plants	higher dicots	Lamiaceae	<i>Plectranthus parviflorus</i>			C		1
plants	higher dicots	Lythraceae	<i>Punica granatum</i>	pomegranate	Y			1/1
plants	higher dicots	Malvaceae	<i>Gossypium barbadense</i>		Y			3/3
plants	higher dicots	Malvaceae	<i>Sida hackettiana</i>			C		1
plants	higher dicots	Malvaceae	<i>Sida rhombifolia</i>		Y			1
plants	higher dicots	Malvaceae	<i>Abutilon oxycarpum</i>			C		1
plants	higher dicots	Malvaceae	<i>Hibiscus heterophyllus</i>			C		1
plants	higher dicots	Meliaceae	<i>Owenia venosa</i>	crow's apple		C		1/1
plants	higher dicots	Meliaceae	<i>Melia azedarach</i>	white cedar		C		1
plants	higher dicots	Meliaceae	<i>Turraea pubescens</i>	native honeysuckle		C		1/1
plants	higher dicots	Menyanthaceae	<i>Nymphoides indica</i>	water snowflake		C		1
plants	higher dicots	Mimosaceae	<i>Acacia salicina</i>	doolan		C		3/2
plants	higher dicots	Mimosaceae	<i>Acacia concurrens</i>			C		2
plants	higher dicots	Mimosaceae	<i>Acacia aulacocarpa</i>			C		2
plants	higher dicots	Mimosaceae	<i>Acacia melanoxylon</i>	blackwood		C		1
plants	higher dicots	Mimosaceae	<i>Acacia obtusifolia</i>			C		2/1
plants	higher dicots	Mimosaceae	<i>Vachellia farnesiana</i>		Y			1/1
plants	higher dicots	Mimosaceae	<i>Pararchidendron pruinosum</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia blakei subsp. blakei</i>			C		2/2
plants	higher dicots	Mimosaceae	<i>Acacia irrorata subsp. irrorata</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Neptunia gracilis forma gracilis</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia maidenii</i>	Maiden's wattle		C		2
plants	higher dicots	Mimosaceae	<i>Acacia falcata</i>	sickle wattle		C		1
plants	higher dicots	Mimosaceae	<i>Acacia fimbriata</i>	Brisbane golden wattle		C		3/2
plants	higher dicots	Mimosaceae	<i>Acacia viscidula</i>			C		1/1
plants	higher dicots	Moraceae	<i>Ficus platypoda</i>			C		2
plants	higher dicots	Moraceae	<i>Trophis scandens</i>			C		1
plants	higher dicots	Moraceae	<i>Ficus opposita</i>			C		1
plants	higher dicots	Moraceae	<i>Ficus coronata</i>	creek sandpaper fig		C		1
plants	higher dicots	Moraceae	<i>Ficus obliqua</i>			C		2
plants	higher dicots	Moraceae	<i>Ficus virens</i>			C		1
plants	higher dicots	Myrsinaceae	<i>Myrsine variabilis</i>			C		3/2
plants	higher dicots	Myrtaceae	<i>Melaleuca irbyana</i>			E		6/3
plants	higher dicots	Myrtaceae	<i>Sannantha collina</i>			C		2/2
plants	higher dicots	Myrtaceae	<i>Rhodamnia dumicola</i>	rib-fruited malletwood		C		1/1
plants	higher dicots	Myrtaceae	<i>Angophora leiocarpa</i>	rusty gum		C		2
plants	higher dicots	Myrtaceae	<i>Corymbia citriodora</i>	spotted gum		C		1
plants	higher dicots	Myrtaceae	<i>Corymbia intermedia</i>	pink bloodwood		C		1
plants	higher dicots	Myrtaceae	<i>Corymbia tessellaris</i>	Moreton Bay ash		C		3
plants	higher dicots	Myrtaceae	<i>Angophora subvelutina</i>			C		2
plants	higher dicots	Myrtaceae	<i>Corymbia clarksoniana</i>			C		1

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plants	higher dicots	Myrtaceae	<i>Eucalyptus acmenoides</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus microcorys</i>			C		1
plants	higher dicots	Myrtaceae	<i>Lophostemon confertus</i>	brush box		C		1
plants	higher dicots	Myrtaceae	<i>Leptospermum variabile</i>			C		8/8
plants	higher dicots	Myrtaceae	<i>Lophostemon suaveolens</i>	swamp box		C		2
plants	higher dicots	Myrtaceae	<i>Melaleuca comboynensis</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus melanophloia</i>			C		3
plants	higher dicots	Myrtaceae	<i>Eucalyptus tereticornis</i>			C		3
plants	higher dicots	Myrtaceae	<i>Eucalyptus major</i>	mountain grey gum		C		1
plants	higher dicots	Myrtaceae	<i>Leptospermum microcarpum</i>	small-fruited tea-tree		C		2/1
plants	higher dicots	Myrtaceae	<i>Leptospermum polygalifolium</i>	tantoon		C		1
plants	higher dicots	Myrtaceae	<i>Triplarina volcanica subsp. volcanica</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus tereticornis subsp. basaltica</i>			C		2/2
plants	higher dicots	Myrtaceae	<i>Angophora costata</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus crebra</i>	narrow-leaved red ironbark		C		3
plants	higher dicots	Nyctaginaceae	<i>Boerhavia dominii</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Olea paniculata</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Notelaea longifolia forma glabra</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Jasminum dianthifolium</i>			C		1
plants	higher dicots	Oleaceae	<i>Notelaea microcarpa</i>			C		1
plants	higher dicots	Oleaceae	<i>Notelaea microcarpa var. microcarpa</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Notelaea lloydii</i>	Lloyd's native olive		V	V	3/3
plants	higher dicots	Onagraceae	<i>Ludwigia peploides subsp. montevidensis</i>			C		3/2
plants	higher dicots	Onagraceae	<i>Ludwigia octovalvis</i>	willow primrose		C		1
plants	higher dicots	Oxalidaceae	<i>Oxalis corniculata</i>		Y			1
plants	higher dicots	Oxalidaceae	<i>Oxalis</i>			C		1/1
plants	higher dicots	Passifloraceae	<i>Passiflora suberosa</i>	corky passion flower	Y			1
plants	higher dicots	Passifloraceae	<i>Passiflora</i>			C		1
plants	higher dicots	Passifloraceae	<i>Passiflora aurantia var. aurantia</i>			C		2/2
plants	higher dicots	Pentapetaceae	<i>Melhania oblongifolia</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus mitchellii</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Cleistanthus cunninghamii</i>	omega		C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus virgatus</i>			C		1
plants	higher dicots	Phyllanthaceae	<i>Bridelia exaltata</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus gunnii</i>			C		2/1
plants	higher dicots	Picrodendraceae	<i>Petalostigma pubescens</i>	quinine tree		C		1
plants	higher dicots	Pittosporaceae	<i>Pittosporum angustifolium</i>			C		1/1
plants	higher dicots	Plantaginaceae	<i>Veronica plebeia</i>	trailing speedwell		C		2/2
plants	higher dicots	Plantaginaceae	<i>Plantago debilis</i>	shade plantain		C		1/1
plants	higher dicots	Plantaginaceae	<i>Scoparia dulcis</i>	Scoparia	Y			1
plants	higher dicots	Plumbaginaceae	<i>Plumbago zeylanica</i>	native plumbago		C		1
plants	higher dicots	Polygalaceae	<i>Polygala virgata</i>		Y			1/1
plants	higher dicots	Polygonaceae	<i>Persicaria lapathifolia</i>	pale knotweed		C		1/1
plants	higher dicots	Polygonaceae	<i>Muehlenbeckia rhyticarya</i>			C		2/2
plants	higher dicots	Polygonaceae	<i>Persicaria orientalis</i>	princes feathers		C		1/1
plants	higher dicots	Polygonaceae	<i>Polygonum plebeium</i>	small knotweed		C		1/1

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plants	higher dicots	Portulacaceae	<i>Calandrinia pickeringii</i>			C		1/1
plants	higher dicots	Portulacaceae	<i>Grahamia australiana</i>			C		1/1
plants	higher dicots	Portulacaceae	<i>Portulaca pilosa</i>		Y			1
plants	higher dicots	Putranjivaceae	<i>Drypetes deplanchei</i>	grey boxwood		C		2/1
plants	higher dicots	Rhamnaceae	<i>Pomaderris queenslandica</i>			C		1/1
plants	higher dicots	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		2
plants	higher dicots	Rosaceae	<i>Rubus parvifolius</i>	pink-flowered native raspberry		C		1
plants	higher dicots	Rubiaceae	<i>Psychotria daphnoides</i>			C		2/1
plants	higher dicots	Rubiaceae	<i>Spermacoce brachystema</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Spermacoce multicaulis</i>			C		1
plants	higher dicots	Rubiaceae	<i>Gynochthodes canthoides</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Psychotria loniceroides</i>	hairy psychotria		C		1
plants	higher dicots	Rubiaceae	<i>Cyclophyllum coprosmoides</i>			C		1
plants	higher dicots	Rubiaceae	<i>Psydrax odorata forma buxifolia</i>			C		3/1
plants	higher dicots	Rubiaceae	<i>Psydrax odorata subsp. australiana</i>			C		2/2
plants	higher dicots	Rubiaceae	<i>Everistia vacciniifolia var. nervosa</i>			C		1
plants	higher dicots	Rubiaceae	<i>Pavetta australiensis</i>			C		1
plants	higher dicots	Rubiaceae	<i>Galium leptogonium</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Pomax umbellata</i>			C		1
plants	higher dicots	Rubiaceae	<i>Psydrax odorata</i>			C		1
plants	higher dicots	Rutaceae	<i>Citrus x limon</i>		Y			1
plants	higher dicots	Rutaceae	<i>Zieria smithii</i>			C		1
plants	higher dicots	Rutaceae	<i>Zieria scopulus</i>			C		6/6
plants	higher dicots	Rutaceae	<i>Acronychia laevis</i>	glossy acronychia		C		2/1
plants	higher dicots	Rutaceae	<i>Flindersia collina</i>	broad-leaved leopard tree		C		1
plants	higher dicots	Rutaceae	<i>Coatesia paniculata</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Sarcomelicope simplicifolia</i>			C		1
plants	higher dicots	Rutaceae	<i>Sarcomelicope simplicifolia subsp. simplicifolia</i>	yellow aspen		C		1/1
plants	higher dicots	Santalaceae	<i>Exocarpos cupressiformis</i>	native cherry		C		1
plants	higher dicots	Sapindaceae	<i>Alectryon diversifolius</i>	scrub boonaree		C		1/1
plants	higher dicots	Sapindaceae	<i>Dodonaea viscosa</i>			C		1
plants	higher dicots	Sapindaceae	<i>Guioa semiglauca</i>	guioa		C		1
plants	higher dicots	Sapindaceae	<i>Harpullia pendula</i>			C		1
plants	higher dicots	Sapindaceae	<i>Jagera pseudorhus</i>			C		1
plants	higher dicots	Sapindaceae	<i>Atalaya salicifolia</i>			C		1
plants	higher dicots	Sapindaceae	<i>Alectryon tomentosus</i>			C		1
plants	higher dicots	Sapindaceae	<i>Dodonaea triangularis</i>			C		1/1
plants	higher dicots	Sapindaceae	<i>Cupaniopsis tomentella</i>	Boonah tuckeroo		V	V	4/3
plants	higher dicots	Sapotaceae	<i>Planchonella pubescens</i>			C		1
plants	higher dicots	Sapotaceae	<i>Planchonella australis</i>			C		1/1
plants	higher dicots	Sapotaceae	<i>Planchonella eerwah</i>			E	E	8/7
plants	higher dicots	Sapotaceae	<i>Planchonella cotinifolia</i>			C		1
plants	higher dicots	Scrophulariaceae	<i>Myoporum acuminatum</i>	coastal boobialla		C		1/1
plants	higher dicots	Scrophulariaceae	<i>Eremophila debilis</i>	winter apple		C		1
plants	higher dicots	Solanaceae	<i>Solanum nigrum</i>		Y			1
plants	higher dicots	Solanaceae	<i>Solanum linnaeanum</i>	apple of Sodom	Y			1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Solanaceae	<i>Solanum stelligerum</i>	devil's needles		C		1
plants	higher dicots	Sparrmanniaceae	<i>Grewia latifolia</i>	dysentery plant		C		1/1
plants	higher dicots	Stackhousiaceae	<i>Stackhousia muricata</i>			C		1
plants	higher dicots	Sterculiaceae	<i>Brachychiton discolor</i>			C		1
plants	higher dicots	Surianaceae	<i>Guilfoylia monostylis</i>	guilfoylia		C		1/1
plants	higher dicots	Ulmaceae	<i>Aphananthe philippinensis</i>			C		1
plants	higher dicots	Ulmaceae	<i>Trema tomentosa</i>			C		1
plants	higher dicots	Urticaceae	<i>Dendrocnide photinophylla</i>	shiny-leaved stinging tree		C		1
plants	higher dicots	Urticaceae	<i>Dendrocnide excelsa</i>	giant stinging tree		C		1
plants	higher dicots	Verbenaceae	<i>Verbena rigida</i>		Y			1
plants	higher dicots	Verbenaceae	<i>Lantana montevidensis</i>	creeping lantana	Y			2/1
plants	higher dicots	Verbenaceae	<i>Glandularia aristigera</i>		Y			1
plants	higher dicots	Verbenaceae	<i>Lantana camara</i>	lantana	Y			2
plants	higher dicots	Violaceae	<i>Hybanthus stellarioides</i>			C		1
plants	higher dicots	Violaceae	<i>Hybanthus enneaspermus</i>			C		1
plants	higher dicots	Violaceae	<i>Hybanthus monopetalus</i>			C		1
plants	higher dicots	Viscaceae	<i>Notothixos incanus</i>			C		3/2
plants	higher dicots	Vitaceae	<i>Cayratia clematidea</i>	slender grape		C		1
plants	higher dicots	Vitaceae	<i>Tetrastigma nitens</i>	shining grape		C		1
plants	higher dicots	Vitaceae	<i>Cayratia saponaria</i>			C		1/1
plants	higher dicots	Vitaceae	<i>Cissus antarctica</i>			C		1
plants	higher dicots	Vitaceae	<i>Clematicissus opaca</i>			C		1
plants	higher dicots	Vitaceae	<i>Cayratia acris</i>	hairy grape		C		2/1
plants	lower dicots	Annonaceae	<i>Melodorum leichhardtii</i>			C		1
plants	lower dicots	Annonaceae	<i>Polyalthia nitidissima</i>	polyalthia		C		1/1
plants	lower dicots	Aristolochiaceae	<i>Aristolochia meridionalis subsp. meridionalis</i>			C		1/1
plants	lower dicots	Ceratophyllaceae	<i>Ceratophyllum demersum</i>	hornwort		C		1/1
plants	lower dicots	Lauraceae	<i>Cassytha filiformis</i>	dodder laurel		C		2/2
plants	lower dicots	Menispermaceae	<i>Tinospora smilacina</i>	snakevine		C		1
plants	lower dicots	Menispermaceae	<i>Legnephora moorei</i>			C		1
plants	lower dicots	Menispermaceae	<i>Pleogyne australis</i>	wiry grape		C		1
plants	lower dicots	Nymphaeaceae	<i>Nymphaea gigantea</i>			C		3/3
plants	lower dicots	Piperaceae	<i>Peperomia blanda var. floribunda</i>			C		1
plants	lower dicots	Ranunculaceae	<i>Clematis glycinoides</i>			C		1
plants	monocots	Araceae	<i>Typhonium brownii</i>	black arum lily		C		1/1
plants	monocots	Araceae	<i>Gymnostachys anceps</i>	settler's flax		C		3/2
plants	monocots	Commelinaceae	<i>Commelina diffusa</i>	wandering jew		C		2
plants	monocots	Cyperaceae	<i>Bolboschoenus fluviatilis</i>			C		1
plants	monocots	Cyperaceae	<i>Schoenoplectus tabernaemontani</i>			C		1/1
plants	monocots	Cyperaceae	<i>Carex appressa</i>			C		1
plants	monocots	Cyperaceae	<i>Cyperus fulvus</i>			C		1/1
plants	monocots	Cyperaceae	<i>Carex breviculmis</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus difformis</i>	rice sedge		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus scariosus</i>			C		1
plants	monocots	Cyperaceae	<i>Fimbristylis dichotoma</i>	common fringe-rush		C		1
plants	monocots	Cyperaceae	<i>Fimbristylis ferruginea</i>			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Cyperaceae	<i>Bolboschoenus caldwellii</i>			C		1/1
plants	monocots	Cyperaceae	<i>Schoenoplectus subulatus</i>			C		1/1
plants	monocots	Dioscoreaceae	<i>Dioscorea transversa</i>	native yam		C		1
plants	monocots	Hemerocallidaceae	<i>Dianella</i>			C		1
plants	monocots	Hemerocallidaceae	<i>Dianella caerulea</i> var. <i>assera</i>			C		1/1
plants	monocots	Hemerocallidaceae	<i>Dianella brevipedunculata</i>			C		2/1
plants	monocots	Hemerocallidaceae	<i>Geitonoplesium cymosum</i>	scrambling lily		C		2
plants	monocots	Hemerocallidaceae	<i>Dianella revoluta</i>			C		1
plants	monocots	Hydrocharitaceae	<i>Hydrilla verticillata</i>	hydrilla		C		1/1
plants	monocots	Hydrocharitaceae	<i>Ottelia ovalifolia</i>	swamp lily		C		1/1
plants	monocots	Hydrocharitaceae	<i>Hydrocharis dubia</i>	frogbit	Y			3/3
plants	monocots	Hypoxidaceae	<i>Hypoxis hygrometrica</i> var. <i>villosisepala</i>			C		1/1
plants	monocots	Juncaceae	<i>Juncus usitatus</i>			C		3/2
plants	monocots	Laxmanniaceae	<i>Cordyline rubra</i>	red-fruited palm lily		C		1
plants	monocots	Laxmanniaceae	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra confertifolia</i> subsp. <i>pallida</i>			C		1/1
plants	monocots	Laxmanniaceae	<i>Arthropodium paniculatum</i>			C		1/1
plants	monocots	Laxmanniaceae	<i>Eustrephus latifolius</i>	wombat berry		C		1
plants	monocots	Laxmanniaceae	<i>Cordyline petiolaris</i>	large-leaved palm lily		C		2/1
plants	monocots	Laxmanniaceae	<i>Lomandra longifolia</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra filiformis</i>			C		1
plants	monocots	Orchidaceae	<i>Dendrobium monophyllum</i>			C		1
plants	monocots	Orchidaceae	<i>Bulbophyllum minutissimum</i>	grain-of-wheat orchid		C		3/2
plants	monocots	Orchidaceae	<i>Dendrobium speciosum</i>			C		1
plants	monocots	Orchidaceae	<i>Pterostylis nutans</i>			C		1/1
plants	monocots	Orchidaceae	<i>Dendrobium kingianum</i> subsp. <i>kingianum</i>			C		1
plants	monocots	Orchidaceae	<i>Cymbidium suave</i>			C		1
plants	monocots	Orchidaceae	<i>Dockrillia linguiformis</i>	tongue orchid		C		3
plants	monocots	Orchidaceae	<i>Pterostylis ophioglossa</i>			C		1/1
plants	monocots	Orchidaceae	<i>Dendrobium gracilicaule</i>	slender orchid		C		1
plants	monocots	Orchidaceae	<i>Liparis swenssonii</i>	rock orchid		C		1/1
plants	monocots	Poaceae	<i>Aristida lignosa</i>			C		1/1
plants	monocots	Poaceae	<i>Megathyrsus maximus</i> var. <i>pubiglumis</i>		Y			1
plants	monocots	Poaceae	<i>Chloris divaricata</i> var. <i>divaricata</i>	slender chloris		C		1
plants	monocots	Poaceae	<i>Poa sieberiana</i> var. <i>sieberiana</i>			C		1/1
plants	monocots	Poaceae	<i>Capillipedium spicigerum</i>	spicytop		C		1
plants	monocots	Poaceae	<i>Polypogon monspeliensis</i>	annual beardgrass	Y			1/1
plants	monocots	Poaceae	<i>Chloris gayana</i>	rhodes grass	Y			1
plants	monocots	Poaceae	<i>Melinis repens</i>	red natal grass	Y			1
plants	monocots	Poaceae	<i>Panicum effusum</i>			C		1
plants	monocots	Poaceae	<i>Bothriochloa decipiens</i> var. <i>decipiens</i>			C		1
plants	monocots	Poaceae	<i>Chloris truncata</i>			C		1
plants	monocots	Poaceae	<i>Cynodon dactylon</i>		Y			1
plants	monocots	Poaceae	<i>Themeda triandra</i>	kangaroo grass		C		2
plants	monocots	Poaceae	<i>Austrostipa rudis</i>			C		1/1
plants	monocots	Poaceae	<i>Eriochloa procera</i>	slender cupgrass		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Eragrostis brownii</i>	Brown's lovegrass		C		1
plants	monocots	Poaceae	<i>Paspalum dilatatum</i>	paspalum	Y			1
plants	monocots	Poaceae	<i>Paspalum distichum</i>	water couch		C		1
plants	monocots	Poaceae	<i>Aristida gracilipes</i>			C		2
plants	monocots	Poaceae	<i>Imperata cylindrica</i>	blady grass		C		2
plants	monocots	Poaceae	<i>Paspalidium distans</i>	shotgrass		C		1
plants	monocots	Poaceae	<i>Axonopus fissifolius</i>		Y			1
plants	monocots	Poaceae	<i>Cenchrus caliculatus</i>	hillside burrgrass		C		4/4
plants	monocots	Poaceae	<i>Cymbopogon refractus</i>	barbed-wire grass		C		1
plants	monocots	Poaceae	<i>Panicum decompositum</i>			C		1
plants	monocots	Poaceae	<i>Eremochloa bimaclata</i>	poverty grass		C		1
plants	monocots	Poaceae	<i>Heteropogon contortus</i>	black speargrass		C		2
plants	monocots	Poaceae	<i>Alloteropsis semialata</i>	cockatoo grass		C		1/1
plants	monocots	Poaceae	<i>Chrysopogon sylvaticus</i>			C		1
plants	monocots	Poaceae	<i>Enteropogon unispiceus</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium criniforme</i>			C		1/1
plants	monocots	Pontederiaceae	<i>Eichhornia crassipes</i>	water hyacinth	Y			1
plants	monocots	Ripogonaceae	<i>Ripogonum brevifolium</i>	small-leaved supplejack		C		3/2
plants	monocots	Smilacaceae	<i>Smilax australis</i>	barbed-wire vine		C		1
plants	monocots	Typhaceae	<i>Typha orientalis</i>	broad-leaved cumbungi		C		1
plants	monocots	Xanthorrhoeaceae	<i>Xanthorrhoea latifolia subsp. latifolia</i>			C		1/1
plants	monocots	Zingiberaceae	<i>Alpinia caerulea</i>	wild ginger		C		1
plants	mosses	Bryophyte	<i>Bryophyte</i>			C		6/6
plants	mosses	Funariaceae	<i>Funaria hygrometrica</i>			C		1/1
plants	mosses	Orthotrichaceae	<i>Macromitrium</i>			C		1/1
plants	mosses	Polytrichaceae	<i>Dawsonia longiseta</i>			C		1/1
plants	mosses	Sematophyllaceae	<i>Sematophyllum subhumile</i>			C		1/1
plants	whisk ferns	Psilotaceae	<i>Psilotum nudum</i>	skeleton fork fern		C		2/1
plants		Pylaisiadelphaceae	<i>Wijkia</i>			C		2/2

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

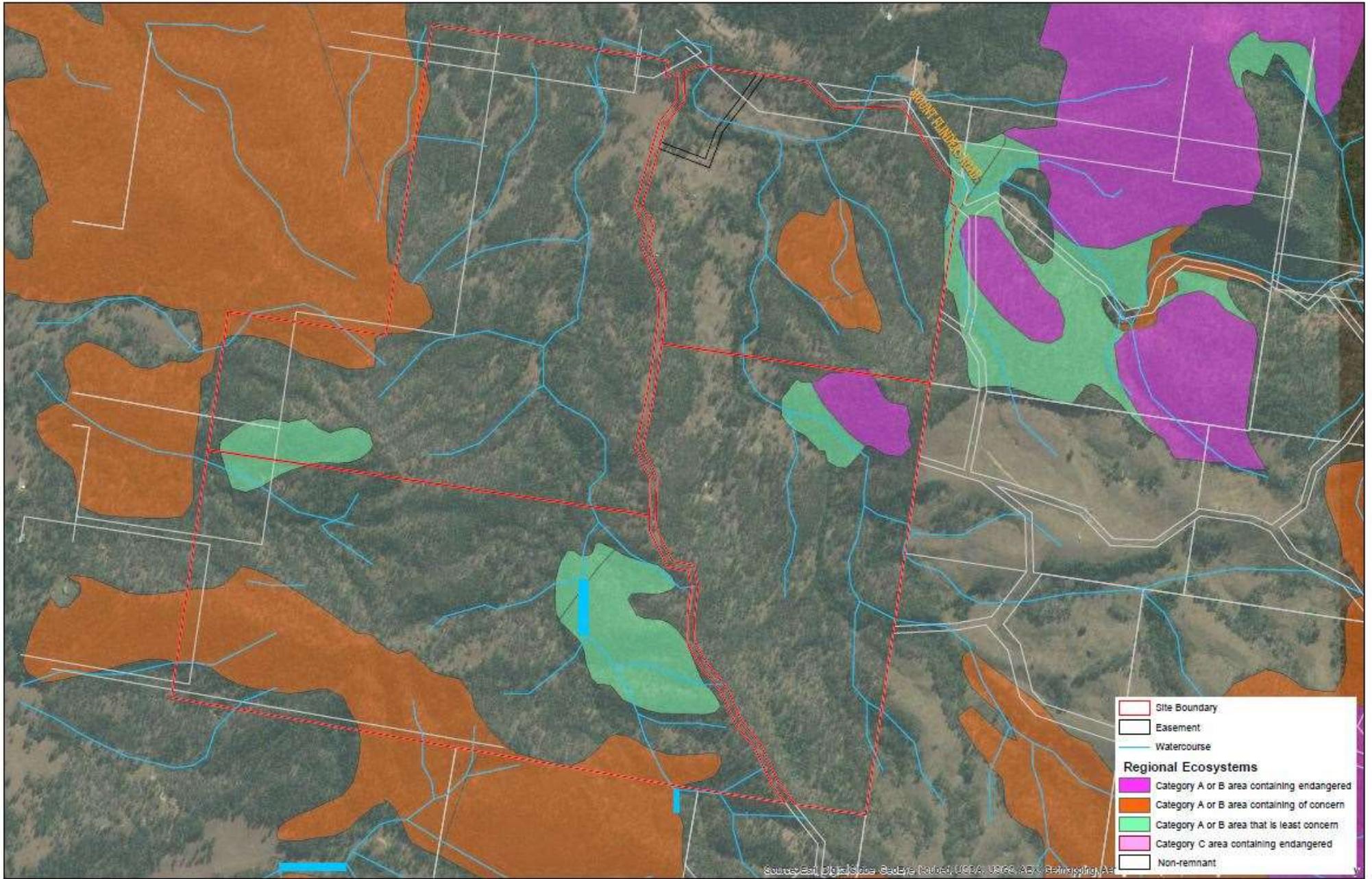
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.

APPENDIX D

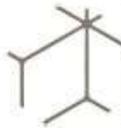
DNRM Vegetation Communities Plan



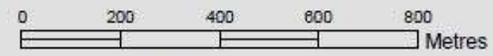


Sources: Esri, DigitalGlobe, GeoEye, IGN, USDA, USDA, Aero, Earthstar, Aer

- Site Boundary
- Easement
- Watercourse
- Regional Ecosystems**
- Category A or B area containing endangered
- Category A or B area containing of concern
- Category A or B area that is least concern
- Category C area containing endangered
- Non-remnant



APPENDIX D: DNRM VEGETATION COMMUNITIES PLAN



A3 Scale 1:10,000



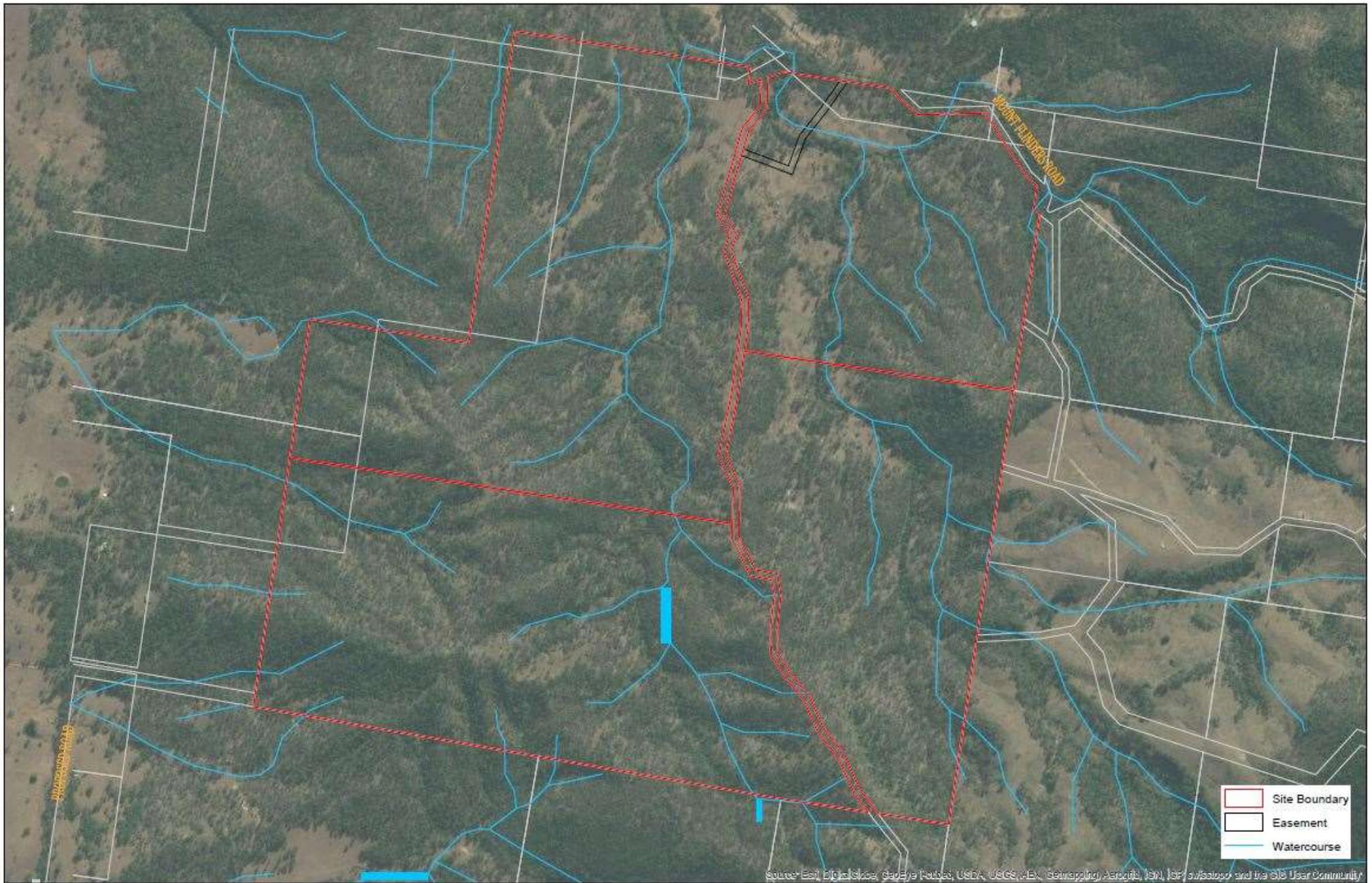
File: 2198-KDAR-01-AD
Date: 28/07/2014

Source:
Cadastral Boundaries: State of Queensland (Department of Natural Resources and Mines) 2012
Roads: Geoscience Australia 2011
Milecoast: VMA QLD Regional Watercourses Version 2.1 Department of Environment and Heritage Protection 2010
Roads: Geoscience Australia 2012
Vegetation management regional ecosystem and remnant map - version 8.0 Department of Natural Resources and Mines 2014

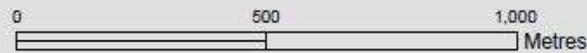


APPENDIX E

DEHP Map of Referable Wetlands



APPENDIX E: DEHP REFERABLE WETLANDS AND WATERWAYS MAP

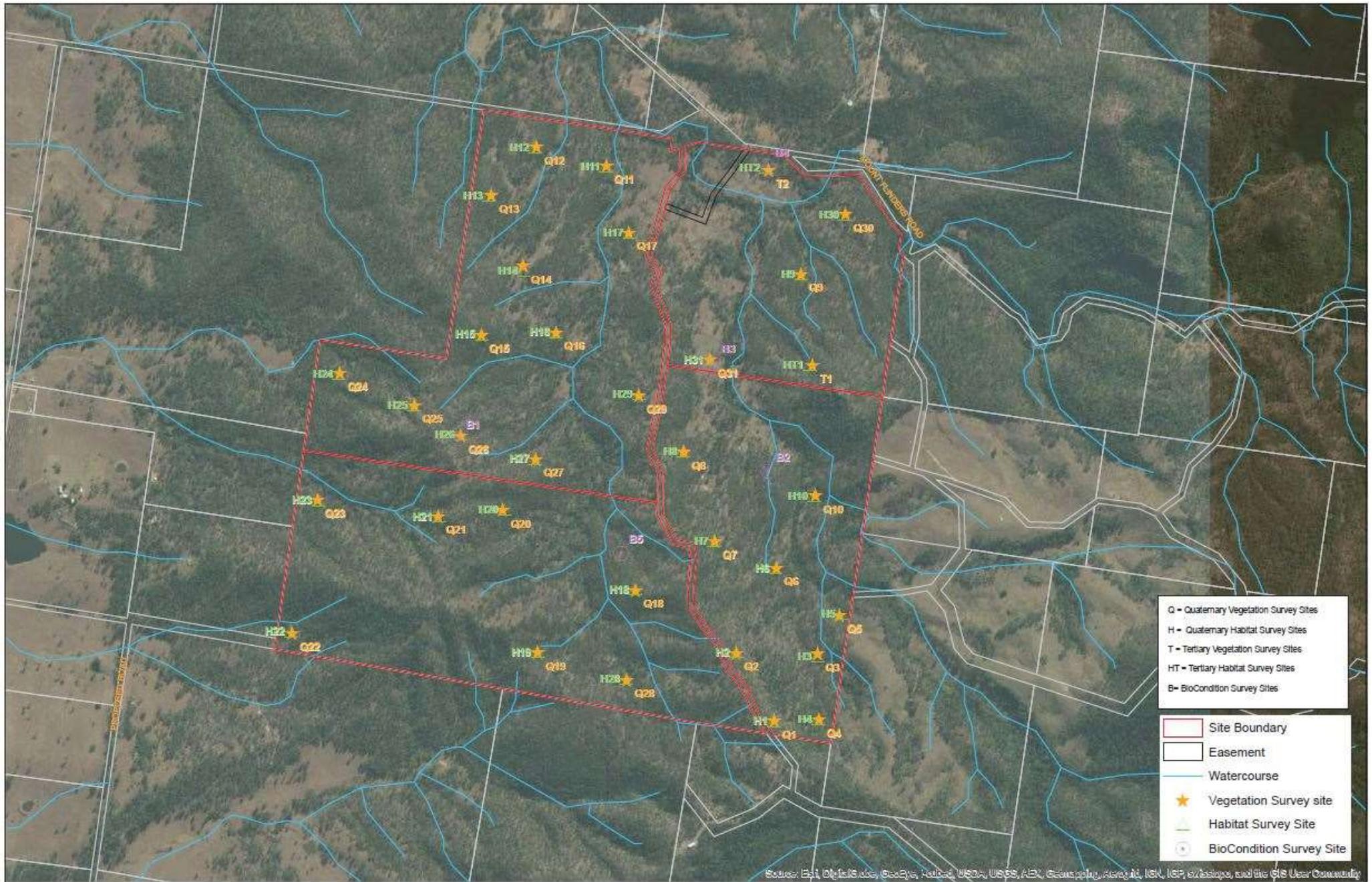


A3 Scale 1:10,000

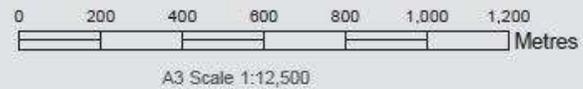
APPENDIX F

Site Survey Plan





APPENDIX F: SITE SURVEY PLAN



APPENDIX G

Desktop Figures





FIGURE G1- RELEVANT EXTRACT FROM IPSWICH PLANNING SCHEME 2006 ZONING MAP (Z49)

Source: (ICC, 2006)

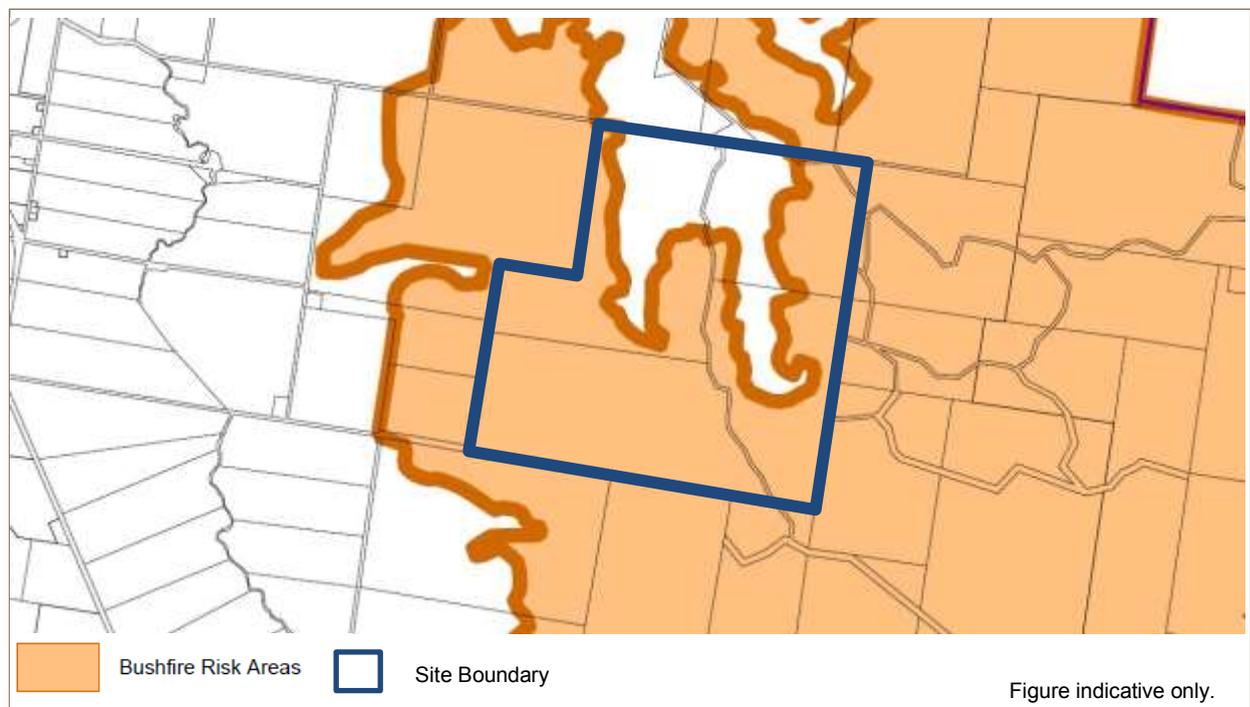


FIGURE G2- RELEVANT EXTRACT FROM IPSWICH PLANNING SCHEME 2006 BUSHFIRE RISK AREAS OVERLAY MAP (OV1)

Source: (ICC, 2006)



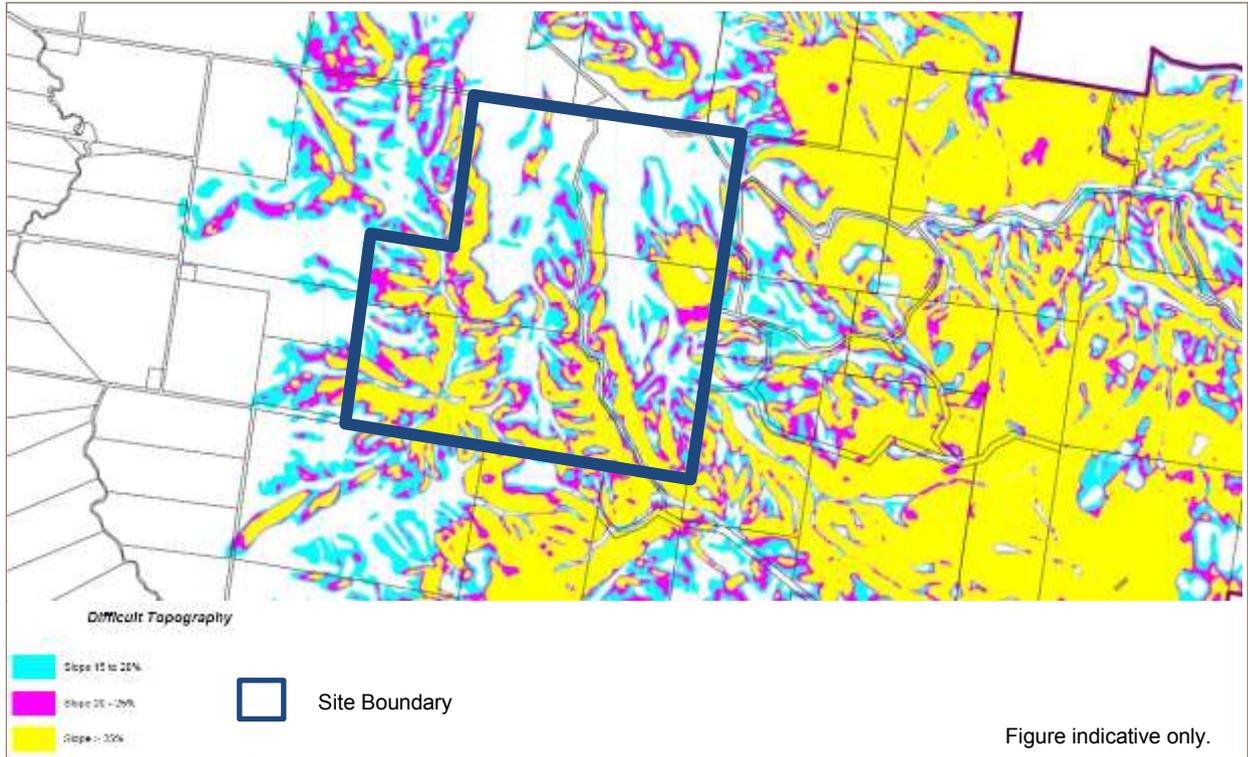


FIGURE G3- RELEVANT EXTRACT FROM IPSWICH PLANNING SCHEME 2006 DIFFICULT TOPOGRAPHY OVERLAY MAP (OV4)

Source: (ICC, 2006)

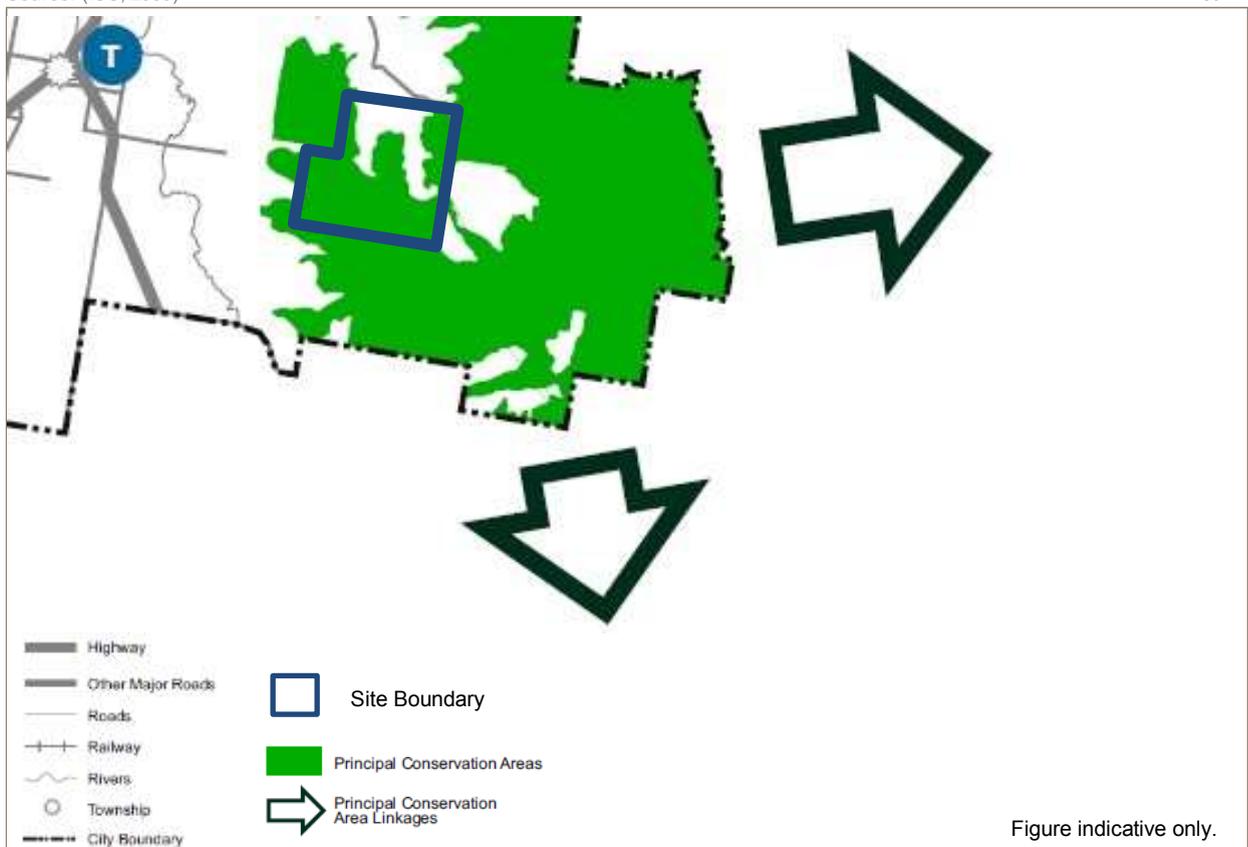


FIGURE G4- RELEVANT EXTRACT FROM IPSWICH PLANNING SCHEME 2006 PRINCIPLE CONSERVATION AREAS & INTEGRATED OPEN SPACE NETWORK (KRM MAP 1)

Source: (ICC, 2006)

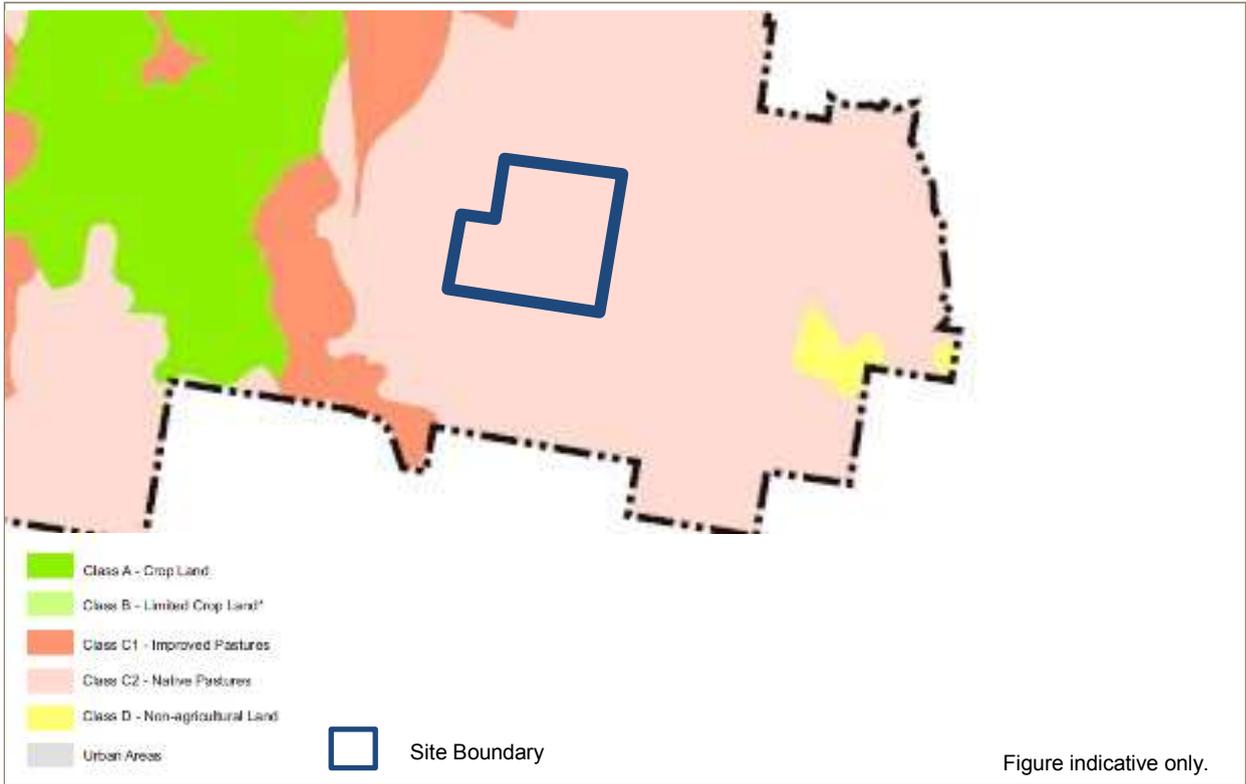


FIGURE G5- RELEVANT EXTRACT FROM IPSWICH PLANNING SCHEME 2006 RURAL AREAS AGRICULTURAL LAND CLASSES (KRM MAP 5)

Source: (ICC, 2006)

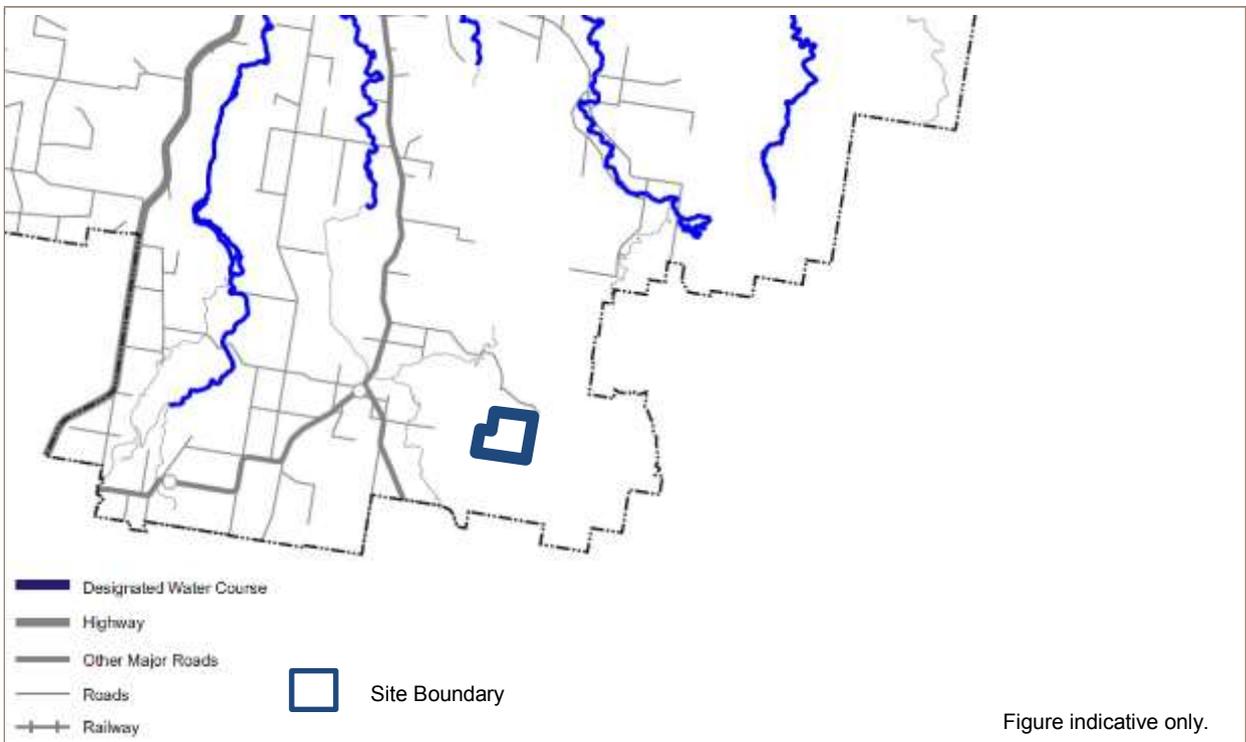


FIGURE G6- RELEVANT EXTRACT FROM IPSWICH PLANNING SCHEME 2006 DESIGNATED WATER COURSES (KRM MAP 6)

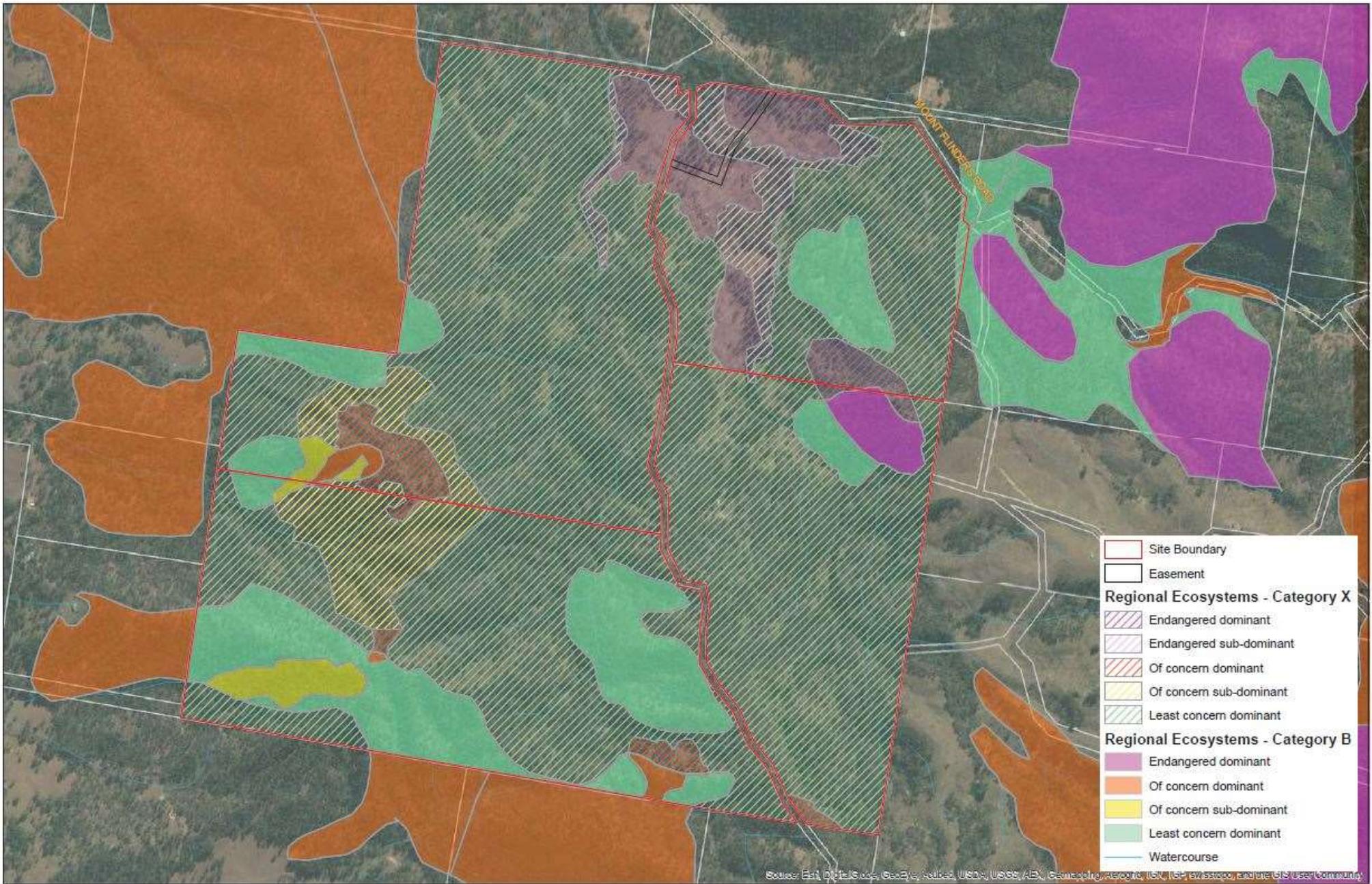
Source: (ICC, 2006)





APPENDIX H

Ground-truthed Regional Ecosystems and Vegetation Mapping Plan



APPENDIX H: GROUND-TRUTHED REGIONAL ECOSYSTEMS AND VEGETATION MAPPING PLAN



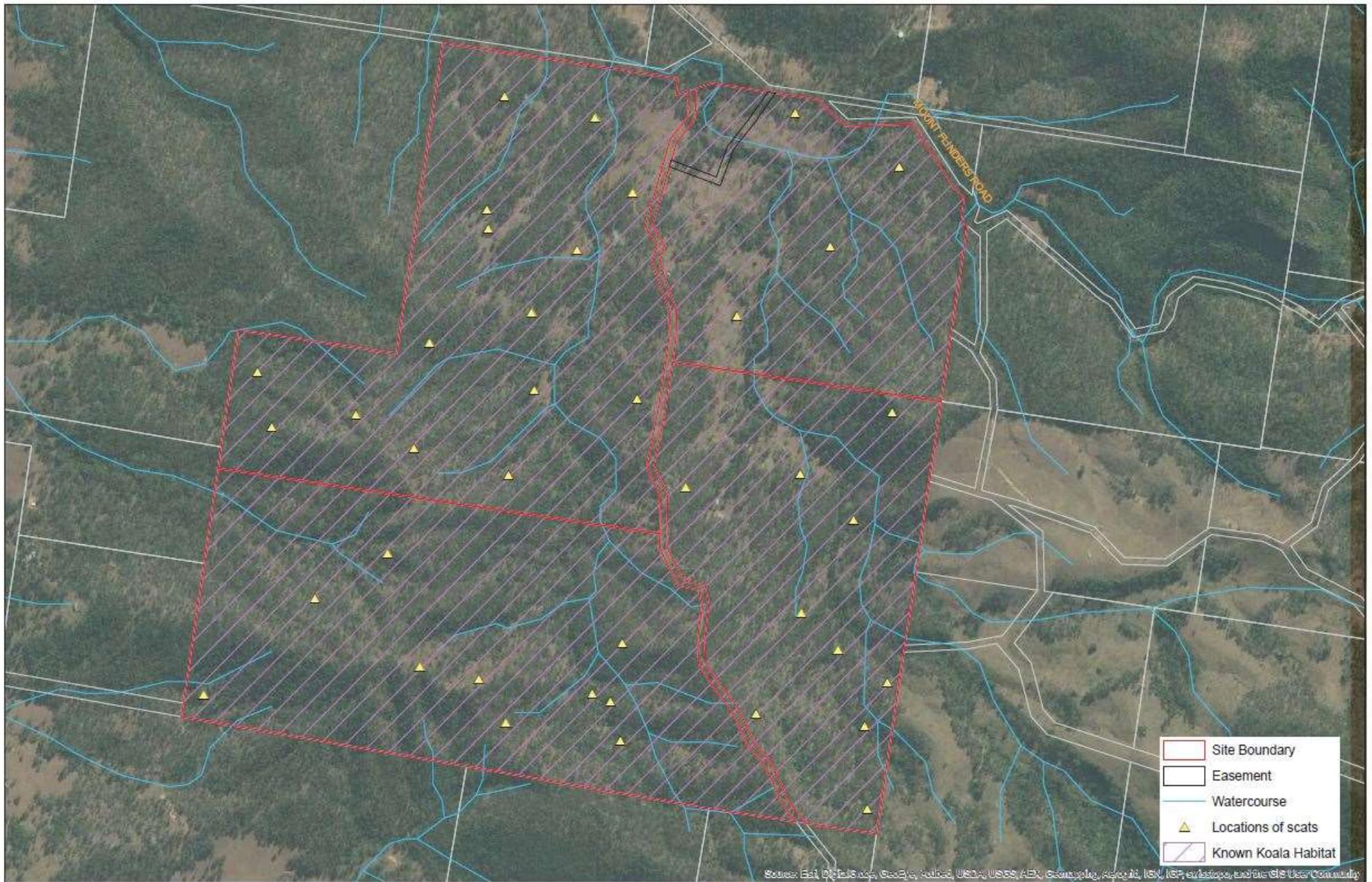
File: 2166-KOAR-R-01-APP
Date: 29/07/2014

Source:
Cadastral Boundaries: State of Queensland (Department of Natural Resources and Mines) 2012
Roads: Queensland Australia 2011
Watercourse: VMA GLO Rgmsm Watercourses Version 2.1 Department of Environment and Heritage Protection 2012
Regional Ecosystems - Category X: NewSouth 2014
Regional Ecosystems - Category B: Vegetation management regional accession and harvest map - version 6.0 Department of Natural Resources and Mines 2014

APPENDIX I

Koala Habitat Area Plan

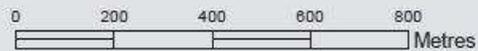




Source: Esri, DigitalGlobe, GeoEye, IGN, USDA, USGS, AeroGRID, IGN, ISU, ISI, Earthstar, and the GIS User Community



APPENDIX I: KOALA HABITAT AREA PLAN



A3 Scale 1:10,000



File: 2166-KOAL-R-01-A1
Date: 28/07/2014

Source:
Cadastral Boundaries: State of Queensland (Department of Natural Resources and Mines) 2012
Roads: Geoscience Australia 2011
Watercourses: VMA QLD Regional Watercourses Version 2.1 Department of Environment and Heritage Protection 2012
Roads: Geoscience Australia 2012
Locations of scats: NewGround 2014



APPENDIX J

Inventory of Flora and Fauna Species Recorded on Site

TABLE J1 FLORA SPECIES RECORDED DURING NEW GROUND FIELD SURVEY

SCIENTIFIC NAME	COMMON NAME
<i>Acacia disparrima</i>	-
<i>Acacia falcata</i>	sickle wattle
<i>Acacia fimbriata</i>	Brisbane wattle
<i>Acacia maidenii</i>	maiden's wattle
<i>Acacia salicina</i>	doolan
<i>Ageratina riparia*</i>	mistflower
<i>Ageratum houstonianum*</i>	blue billygoat weed
<i>Allocasuarina littoralis</i>	-
<i>Allocasuarina luehmannii</i>	bull oak
<i>Alphitonia excelsa</i>	soap tree
<i>Alyxia ruscifolia</i>	chainfruit
<i>Angophora subvelutina</i>	-
<i>Araucaria cunninghamii</i>	hoop pine
<i>Aristida queenslandica</i>	-
<i>Asparagus aethiopicus</i> ^{*D3, WoNS}	asparagus fern
<i>Baccharis halimifolia</i> ^{*D2}	groundsel bush
<i>Bothriochloa bladhii</i>	-
<i>Bothriochloa decipiens</i>	-
<i>Brachychiton populneus</i>	kurrajong
<i>Breynia oblongifolia</i>	-
<i>Brunoniella australis</i>	blue trumpet
<i>Calotis lappulacea</i>	yellow burr daisy
<i>Capillipedium parviflorum</i>	scented top
<i>Cassytha pubescens</i>	downy devil's twine
<i>Centella asiatica</i>	-
<i>Cheilanthes distans</i>	bristly cloak fern
<i>Cheilanthes sieberi</i>	-
<i>Chrysocephalum apiculatum</i>	yellow buttons
<i>Cirsium vulgare*</i>	spear thistle
<i>Conyza sumatrensis*</i>	tall fleabane
<i>Corymbia citriodora</i>	spotted gum
<i>Corymbia tessellaris</i>	-
<i>Cyanthillium cinereum</i>	-
<i>Cymbidium canaliculatum</i>	-
<i>Cymbopogon refractus</i>	barbed-wire grass
<i>Cyperus gracilis</i>	-
<i>Daviesia ulicifolia</i>	native gorse
<i>Desmodium rhytidophyllum</i>	-
<i>Dianella</i> sp. (infertile)	-
<i>Dichondra repens</i>	kidney weed
<i>Dodonaea viscosa</i>	-
<i>Einadia hastata</i>	-
<i>Emilia sonchifolia*</i>	-

TABLE J1 FLORA SPECIES RECORDED DURING NEW GROUND FIELD SURVEY

SCIENTIFIC NAME	COMMON NAME
<i>Eremophila debilis</i>	winter apple
<i>Erythrina vespertilio</i>	-
<i>Eucalyptus crebra</i>	narrow-leaved ironbark
<i>Eucalyptus tereticornis</i>	forest red gum
<i>Eucalyptus melanophloia</i>	silver-leaved ironbark
<i>Eustrephus latifolius</i>	wombat berry
<i>Exocarpos cupressiformis</i>	native cherry
<i>Ficus coronata</i>	creek sandpaper fig
<i>Ficus opposita</i>	-
<i>Fimbristylis nutans</i>	-
<i>Flemingia parviflora</i>	-
<i>Glossocardia bidens</i>	native cobbler's pegs
<i>Gomphocarpus physocarpus*</i>	balloon cottonbush
<i>Gomphrena celosoides*</i>	gomphrena weed
<i>Grewia latifolia</i>	dysentery plant
<i>Gymnostachys anceps</i>	settler's flax
<i>Hardenbergia violacea</i>	-
<i>Heteropogon contortus</i>	black speargrass
<i>Imperata cylindrica</i>	blady grass
<i>Jacksonia scoparia</i>	-
<i>Jagera pseudorhus</i>	foam bark
<i>Lantana camara</i> ^{*D3, WoNS}	lantana
<i>Lantana montevidensis</i> ^{*D3}	-
<i>Lobelia purpurascens</i>	white root
<i>Lomandra longifolia</i>	-
<i>Lomandra multiflora</i>	-
<i>Lophostemon confertus</i>	brush box
<i>Maclura cochinchinensis</i>	cockspur thorn
<i>Macroptilium lathyroides*</i>	-
<i>Mallotus philippensis</i>	red kamala
<i>Melaleuca bracteata</i>	-
<i>Melaleuca irbyana</i> ^{*E}	swamp tea-tree
<i>Melinis repens*</i>	red natal grass
<i>Oplismenus aemulus</i>	creeping shade grass
<i>Opuntia stricta</i> ^{*D2, WoNS}	common prickly pear
<i>Opuntia tomentosa</i> ^{*D2, WoNS}	velvety tree pear
<i>Passiflora suberosa*</i>	corky passion flower
<i>Petalostigma pubescens</i>	quinine tree
<i>Pittosporum angustifolium</i>	-
<i>Portulaca pilosa*</i>	-
<i>Pterocaulon redolens</i>	-
<i>Senecio madagascariensis</i> ^{*D2, WoNS}	fireweed
<i>Sida rhombifolia*</i>	-

TABLE J1 FLORA SPECIES RECORDED DURING NEW GROUND FIELD SURVEY

SCIENTIFIC NAME	COMMON NAME
<i>Sigesbeckia orientalis</i> *	Indian weed
<i>Smilax australis</i>	barbed-wire vine
<i>Solanum seaforthianum</i> *	Brazilian nightshade
<i>Sporobolus creber</i>	-
<i>Tephrosia glomeruliflora</i> *	-
<i>Trema tomentosa</i>	poison peach

E - Endangered as listed under the *Nature Conservation (Wildlife) Regulation 2006* (Qld) .

* - Introduced species.

D3 - Class 3 Declared plant listed under the *Land Protection (Pest and Stock Route Management) Regulation (2003)*.

D2 - Class 2 Declared plant listed under the *Land Protection (Pest and Stock Route Management) Regulation (2003)*.

WoNS – Weed of National Significance.

^ Subject to Qld herbarium species verification.

TABLE J2 FAUNA SPECIES RECORDED DURING THE NEW GROUND FIELD SURVEY

SCIENTIFIC NAME	COMMON NAME
BIRDS	
<i>Anas superciliosa</i>	pacific black duck
<i>Climacteris picumnus</i>	brown treecreeper
<i>Climacteris rufus</i>	rufous treecreeper
<i>Corvus coronoides</i>	Australian raven
<i>Corvus orru</i>	torresian crow
<i>Cracticus tibicen</i>	Australian magpie
<i>Dacelo novaeguineae</i>	laughing kookaburra
<i>Dicrurus bracteatus</i>	spangled drongo
<i>Eolophys roeicapilla</i>	galah
<i>Geopelia humeralis</i>	bar shouldered dove
<i>Lalage sueurii</i>	white winged triller
<i>Malurus cyaneus</i>	superb fairywren
<i>Manorina melanocephala</i>	noisy miner
<i>Manorina melanophrys</i>	bell miner
<i>Pachycephala pectoralis</i>	golden whistler
<i>Pardalotus striatus</i>	striated pardalote
<i>Petroica boodang</i>	scarlet robin
<i>Platycercus adscitus</i>	pale-headed rosella
<i>Podargus strigoides</i>	tawny frogmouth
<i>Psophodes olivaceus</i>	eastern whipbird
<i>Rhipidura albiscapa</i>	grey fantail
<i>Rhipidura leucophrys</i>	willie wagtail
<i>Sericornis citreogularis</i>	yellow-throated scrubwren
<i>Stepera graculina</i>	pieb currawong
<i>Trichoglossus haematodus</i>	rainbow lorikeet
<i>Vanellus miles</i>	masked lapwing
Mammals	
<i>Bos taurus*</i>	cow
<i>Equus caballus*</i>	horse
<i>Trachyglossus aculeatus</i>	echidna
<i>Wallabia bicolor</i>	swamp wallaby

* - Introduced species

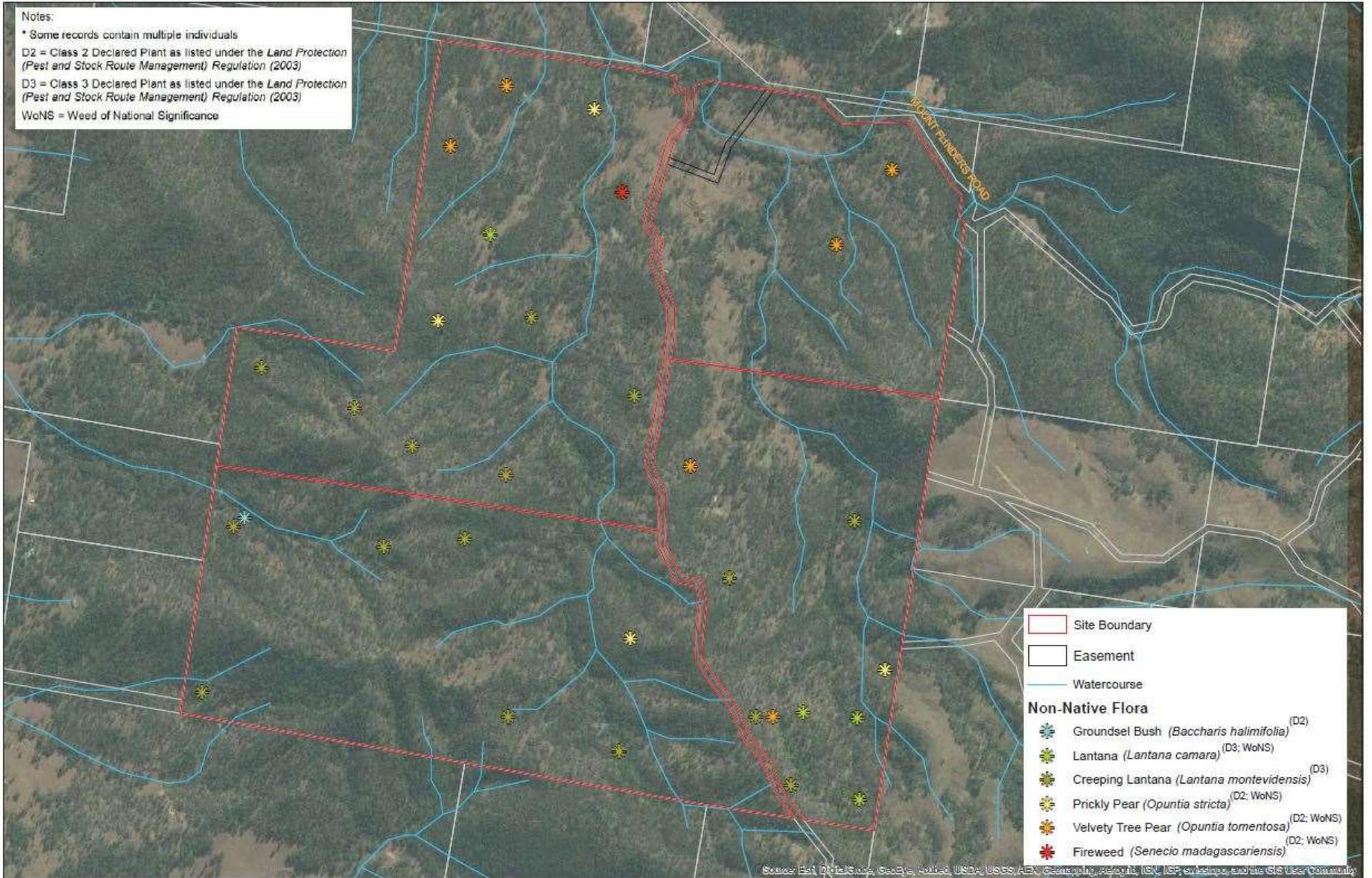


APPENDIX K

Disturbance Observations Plan

Notes:

* Some records contain multiple individuals
D2 = Class 2 Declared Plant as listed under the *Land Protection (Pest and Stock Route Management) Regulation (2003)*
D3 = Class 3 Declared Plant as listed under the *Land Protection (Pest and Stock Route Management) Regulation (2003)*
WoNS = Weed of National Significance



Site Boundary
Easement
Watercourse

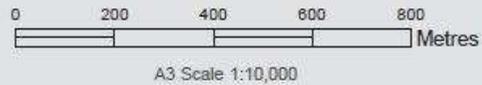
Non-Native Flora

- Groundsel Bush (*Baccharis halimifolia*) (D2)
- Lantana (*Lantana camara*) (D3; WoNS)
- Creeping Lantana (*Lantana montevidensis*) (D3)
- Prickly Pear (*Opuntia stricta*) (D2; WoNS)
- Velvet Tree Pear (*Opuntia tomentosa*) (D2; WoNS)
- Fireweed (*Senecio madagascariensis*)

Source: Esri, DigitalGlobe, GeoEye, AeroGRID, USDA, CNES, IGN, SPP, Swire, and the GIS User Community



APPENDIX K: DISTURBANCE OBSERVATIONS PLAN



File: 2166-KOAR-R-01-AK
Date: 28/07/2014

Source:
Cadastral Boundaries: State of Queensland (Department of Natural Resources and Mines) 2012
Roads: Geoscience Australia 2011
Watercourse: VMA QLD Rangeland Watercourse Version 2.1 Department of Environment and Heritage Protection 2012
Roads: Geoscience Australia 2012
Non-Native Flora: NewGround 2014



APPENDIX L

Proposed Offset Area Plan

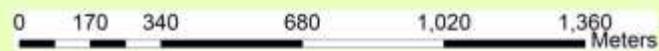


Legend

- EPBC 2016_7723
- EPBC 2014/7190
- EPBC20137047



Defence Housing Offset Area



Author: T. Fitzgerald, QTFN
 Date: 25/1/16
 Source: Cadastral boundaries
 Data supplied by QSpatial
<http://topospatial.information.qld.gov.au/metadata/qspatial/index.page>
ACCURACY STATEMENT
 Due to varying sources of data, spatial locations may not coincide when overlaid.



Attachment A8

Koala Habitat Offset Management Plan

PREPARED FOR:

Defence Housing Australia

OFFSET AREA MANAGEMENT PLAN

EPBC 2016/7723

27th October 2017





REPORT TITLE	OFFSET AREA MANAGEMENT PLAN
PROJECT	LOTS 86 and 89 ON RP892014 MT FLINDERS RD, PEAK CROSSING QLD
CLIENT	Defence Housing Australia

The preparation of this report has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information within this report is prepared for the exclusive use of Defence Housing Australia to accompany this report for the land described herein and is not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Queensland Trust for Nature accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

PREPARED BY	FELICITY SHAPLAND
POSITION	ENVIRONMENTAL OFFICER
SIGNED	
DATE	27/10/2017

REVIEWED BY	NERIDA BRADLEY
POSITION	GENERAL MANAGER
SIGNED	
DATE	27/10/2017



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OFFSET AREA MANAGEMENT PLAN

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Chapter 1: INTRODUCTION

1.1 Overview

The purpose of this management plan is to identify the management objectives, actions and outcomes necessary to fulfil a statutory requirement, pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) (**EPBC Act**), for the provision of a koala (*Phascolarctos cinereus*) habitat offset. The subject offset is to contribute to the mitigation of impacts associated with the development of the 'Rawlings Road'. This management plan is focussed on the protection and enhancement of the koala habitat values associated with the offset site, which occurs within Lot 89 on RP892014 (**APPENDIX A**).

The structure of this management plan has been informed by the project-specific requirements of the Department of Environment (DEE), namely the subject development approval conditions as well as technical guidelines including the *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DEE, 2014) ('Koala Referral Guideline') and the *EPBC Act Environmental Offsets Policy* (DEE, 2012). Given that the offset is to be legally secured under a Voluntary Declaration as an area of High Conservation Value (under section 19F of the *Vegetation Management Act 1999*) relevant Queensland Government requirements as described by the *Vegetation Management Act 1999*, *Environmental Offsets Act 2014* and *Environmental Offsets Regulation 2014* are also reflected by this management plan in its content.

An initial survey for the suitability of Koala Crossing to be used as offset was conducted by New Ground. The report identified a number of requirements for the Offset Area which included baseline surveys for koala density, vegetation, weeds and feral animals. All baseline surveys have been conducted as part of the ongoing management off the Offset, and these have been included into this Offset Management Plan for EPBC2016/7723.

1.2 Objectives of Report

The primary objective of this Offset Area Management Plan report is to provide a land management guidance tool which directs adaptive management actions such that a demonstrable increase in koala habitat quality is achieved throughout the offset site.

1.3 Outline of the Report

This report includes the following components:

- Chapter 1: provides an introduction to the report, including a description of the offset site (Departmental reference details) and the technical context around the offset proposition.
- Chapter 2: presents management objectives, actions, performance indicators and reporting requirements for each management measure required to achieve an improvement of koala habitat quality within the offset area over time.
- Chapter 3: report conclusions.

1.4 Offset Proposition Summary

The offset proposition summary details presented by Tables 1.1 and 1.2 have been arranged in general accordance with the proforma set out in the Queensland Department of Natural Resources and Mines (2012) Offset Area Management Plan template. The offset proposition is to be legally secured within 6 months of commencement of works at the impact site.

TABLE 1.1: DEPARTMENTAL REFERENCE DETAILS

DETAILS FOR APPLICATION THAT TRIGGERS OFFSET	
Departmental Reference Number and Case Name:	EPBC 2016/7723
Offset reference number (if applicable):	N/A
Tenure: Freehold	Primary Local Government Area : Scenic Rim Regional Council
OFFSET TRIGGERS AND VALUES	
Offset Trigger	Values requiring to be offset
<input type="checkbox"/> Regional ment Code <input type="checkbox"/> Part P <input type="checkbox"/> Part S <input type="checkbox"/> Part Xa <input type="checkbox"/> Part Xb <input type="checkbox"/> Material Change of Use / Reconfiguration of a lot Policies (Table F1) <input type="checkbox"/> EPBC Act	<input type="checkbox"/> Assessable vegetation adjacent to a wetland, significant wetland <input type="checkbox"/> Assessable vegetation adjacent to a watercourse <input type="checkbox"/> Connectivity <input type="checkbox"/> Endangered regional ecosystem <input type="checkbox"/> Of concern regional ecosystem <input type="checkbox"/> Threshold regional ecosystem <input type="checkbox"/> Critically limited regional ecosystem <input type="checkbox"/> Essential habitat <input type="checkbox"/> Habitat for koalas in SEQ <input type="checkbox"/> Values within a highly vegetated bioregion <input type="checkbox"/> Threatened Ecological Community

TABLE 1.2: OFFSET AREA DETAILS

LANDHOLDER DETAILS	
Register Owner/s on Title:	Molly Robson, Adrian Volders and Graham Marshall as Trustees for Queensland Trust for Nature
Lessee:	
Business/Company name:	Queensland Trust for Nature
ABN/ACN:	ABN 66 583 550 652
Phone number:	1800 23 77 24
Mobile phone:	s11C(1)
Facsimile number:	info@qtn.org.au
Contact person (if required):	Felicity Shapland
Email:	felicity@qtn.org.au
Postal Address:	GPO Box 162, Brisbane, Qld, 4001
PROPERTY DETAILS	
Property name:	"Koala Crossing"
Real property description (lot on Plan/s):	Lot 86 and 89 on RP892014
Tenure: Freehold	Primary Local Government Area: Scenic Rim Regional Council
Planning Scheme Zone: Rural B and Rural E	Property area (ha): The total area of Lot 89 RP892014 is 118.42 ha. The offset area/site accounts for 53.616 ha of this total (APPENDIX A). The portion of the subject lots that is not part of the offset area is referred to as the 'balance area' (64.804).



OFFSET AREA MANAGEMENT PLAN

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Landzone / geology	<p>Based on the Department of Science, Information Technology, Innovation and the Arts (DSITIA) Pre-clearing Broad Vegetation Grounds of Queensland (EHP, 2012a), the site is shown to consist of land zones 3, 8 and 9-10. The offset area occurs within an area designated as land zones 9-10 (New Ground, 2014).</p> <p>Landzone 9 is described as fine grained sedimentary rocks, generally with little or no deformation and usually forming undulating landscapes. Siltstones, mudstones, shales, calcareous sediments, and labile sandstones are typical rock types although minor interbedded volcanics may occur (EHP, 2012b).</p> <p>Landzone 10 is described as medium to coarse grained sedimentary rocks, with little or no deformation, forming plateaus, benches and scarps. Includes siliceous (quartzose) sandstones, conglomerates and minor interbedded volcanics, and springs associated with these rocks (EHP, 2012b).</p>
Soils	<p>Landzone 9 – Includes a diverse range of fine textured soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols (EHP 2012b).</p> <p>Landzone 10 – Soils are predominantly shallow Rudosols and Tenosols of low fertility, but include sandy surfaced Kandosols, Kurosols, Sodosols and Chromosols (EHP 2012b).</p>
Pre-clear regional ecosystem (V.)	12.9-10.2/12.9-10.7; 12.9-10.2/12.9-10.7/12.9-10.17;
Existing vegetation in offset area	Regional Ecosystems 12.9-10.2 and 12.9-10.7
Estimated age of vegetation	Areas of remnant vegetation are approximately 40 years. Areas of regrowth/regenerating vegetation are approximately 12 years (QTFN, 2015)
Is there a PMAV currently over all or part of the property?	No

LEGALLY BINDING MECHANISM

Voluntary Declaration (Vegetation Management Act 1999) Reference Number:	Covenant (Land Act 1994/ Land Title Act 1994) Reference Number:
Nature Refuge (Nature Conservation Act 1992) Reference Number:	Other Reference Number:

1.5 Suitability of offset and nature of impact site

The offset area to which this management plan relates, as presented by **APPENDIX A**, was determined to be suitable for the implementation of a targeted land management approach which is to result in a net gain in koala habitat quality and legal protection of existing koala habitat from incompatible land uses.

Description of Offset Area

As part of the assessment of suitability of the site for koala offset, an ecological assessment was conducted by New Ground (2014) for the entire property including lot 89.

This is documented in the *Koala Offset Assessment Report* (New Ground 2014). Field surveys were undertaken by New Ground Ecologists from 3 July – 9 July 2014 (New Ground, 2014) and included tertiary and quaternary vegetation surveys, fauna habitat assessment surveys, targeted threatened flora and fauna surveys (including active searches for evidence of koala), exotic flora and fauna surveys, disturbance surveys and biocondition surveys in accordance with Eyre et al. (2011). Koala density surveys were conducted by UQ's Wildlife Ecology Group and QTFN Ecologists to determine the population and site use (UQ, 2015) (**APPENDIX B**).

In summary, the field surveys confirmed that the site contained vegetation communities that contain high habitat value for koalas. The offset area is predominately vegetated by RE 12.9-10.2, RE 12.9-10.7 and RE 12.9-10.17 which comprise *Eucalyptus tereticornis*, *Corymbia citriodora* and *Eucalyptus crebra* (preferred koala feed trees as per ICC (2004)) as dominant canopy and sub-canopy species. Koala shelter trees such as *Lophostemon confertus* are also associated with this vegetation community. The koala density surveys revealed a healthy population of between 10 and 15 koalas using the site, with evidence of koala scats located throughout the entire site and with an indication of high levels of activity (UQ, 2015).

In addition to the onsite quality of koala habitat, the offset site is connected to adjacent areas of koala habitat and corridors. Specifically, the site is adjacent to Flinders-Goolman Conservation Estate on the north east and is located within the Flinders Karawatha corridor, which is the largest remaining continuous stretch of open eucalypt forest in South East Queensland. The offset area provides an opportunity to enhance the protection status and koala habitat quality of a portion of the Flinders Karawatha corridor via the management measures outlined within this plan.

Despite the evidence of site value to koala, a series of threats were noted through the New Ground (2014) study. These included:

- x Risk of future clearing due to site planning zonation (as 'Rural B' and 'Rural E') and associated permissible land uses/exempt clearing;
- x Weed incursions (and associated threat to existing koala habitat as well as impacts to succession);
- x Historic clearing/logging;
- x Fire; and
- x Feral animals. It is noted that no records of feral animals were collected during the study. However, given that there are records of both foxes (*Vulpes vulpes*) and wild dogs (*Canis familiaris*) in the site's locality it is assumed that these pests represent a major threat to koalas that occur in the offset area. Subsequent monitoring by QTFN ecologists has confirmed the presence of wild dogs and foxes.

The management actions described in Chapter 2 of this report seek to enhance koala habitat quality via the reduction of the level of threat associated with the threatening processes listed above as well as additional threats cited by the *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DEE, 2014).

Chapter 2: Management Plan

The management regime proposed for the offset area is to enhance the level of protection afforded to existing koala habitat through exclusion of land management practices that are incompatible to achieving a net gain in koala habitat quality. Further, key threatening processes which could interfere with the recovery of koala as described by the *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DEE, 2014) are to be actively managed to result in a net gain in koala habitat quality in time as articulated by the *EPBC Act Environmental Offsets Policy* (DEE, 2012) and demonstrated via the *Offsets Assessment Guide* (DEE, 2012).

The sub-headings that comprise this chapter are based on the koala habitat attributes listed by the koala habitat assessment tool as well as the threats to koala recovery listed by the Referral Guidelines (DEE, 2014). Management objective(s), actions, key performance indicators, corrective measures and monitoring/reporting obligations have been tabulated for each koala habitat attribute and threat to recovery. The strategic intent of the management measures presented is to reduce/control risk to koala recovery. Further, it is expected that the concurrent management of each threat/habitat attribute will result in an increase to koala habitat quality within the offset area through the ten (10) year active management period. Post the active management period, that is, at the anticipated end of this management plan, it is the intention of the landowner to secure the amalgamated parcels of land which this offset forms a portion, as a Nature Refuge. The management plan that will be associated with the Nature Refuge will be based on this management plan, thus ensuring the ongoing management of the properties in a manner that supports the desired outcomes. In the event that the offset area is not secured as a Nature Refuge at the cessation of the active management period, the landholder will approach the Department of Environment (DEE) to propose an alternative measure.

2.1 Koala Occurrence

Koala occurrence is a primary koala habitat attribute detailed within the koala habitat assessment tool of the Referral Guidelines (DEE, 2014) and is noted as a key attribute to defining the importance of the habitat where koala occurs. The koala density survey conducted in 2015 confirms this (UQ, 2015). As such, an overarching objective for the offset area (to be achieved through the implementation of the OAMP) is to ensure the maintenance of the koala occurrence score over the long term.

It is anticipated that through the management of site's existing threats and improvement to the koala habitat, the level of utilisation by koala within the offset area will increase over time. To measure the overall efficacy of the management measures proposed within the OAMP, dedicated koala density surveys will be undertaken. Details of how the koala occurrence attribute will be addressed as part of the OAMP is present below in **TABLE 2.1**.



TABLE 2.1: OCCURRENCE OF KOALA WITHIN OFFSET AREA

Attribute	Koala Occurrence
Outcome	x Increase koala density within offset area.
Actions	<ul style="list-style-type: none"> x Baseline koala density survey completed June 2015 using Koala Rapid Assessment Method (Woosnam-Merchez et al. 2012) and SAT and line transect surveys (Phillips and Callaghan, 2011; Dique et al. 2003) x Replicated koala density surveys undertaken within the offset area at years 5 and 10 from the date when the offset is legally secured. x Koala density surveys to be undertaken by a suitably qualified environmental scientist¹
Performance Indicators	<ul style="list-style-type: none"> x Baseline koala density/occurrence survey undertaken and documented. x Koala density/occurrence surveys (years 5 and 10) records an increase in koala density/activity within the offset area. x Offset area is legally secured for conservation purposes.
Monitoring	<ul style="list-style-type: none"> x Baseline assessment of koala density undertaken June 2015 x Outside of the formal koala density survey event, opportunistic koala sightings to be recorded (location and date) within the Offset Area Assessment Report
Reporting	<ul style="list-style-type: none"> x Results of pre-survey methodology review is to be documented within Offset Area Assessment Report. x Details of expert that undertook the review and the survey study team are also to be included. x The koala density survey results will be incorporated within the relevant Offset Area Assessment Report (years 0, 5 and 10). x Opportunistic koala sightings to be incorporated into the Offset Area Assessment Report. x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey. x All Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au
Corrective Action	x Should koala density be found to significantly reduce (as defined by the applied survey method or koala expert) between survey events; a supplementary assessment will be implemented to review the likely cause of the reduced occurrence of koala within the offset area. The outcomes of the review inform adaptation of the management approach.
Term	x Duration of the active management period (10 years).
Responsibility	x Landholder

¹ For the purposes of this management plan, 'suitably qualified environmental scientist' is defined as an environmental practitioner with an environmental science-related degree and two years relevant professional experience at minimum.

TABLE 2.1: OCCURRENCE OF KOALA WITHIN OFFSET AREA

2.2 Vegetation Composition

Based on the koala habitat assessment tool of the Referral Guidelines (DEE, 2014), the entire offset area supports vegetation that ‘*Has forest or woodland with 2 or more known koala food tree species in the canopy*’. Accordingly, for ‘vegetation composition’, the offset area is considered to have a score of 2. The offset area therefore achieves the maximum possible score for this attribute. Given that it is not possible to implement strategies that will improve the score for the Vegetation Composition attribute, management actions will focus on ensuring that the attribute score is maintained over the longer term, as well as strategies to enhance koala habitat values at a finer resolution than contemplated by the referral guidelines. These are detailed below in **TABLE 2.2**.

TABLE 2.2: VEGETATION COMPOSITION

Attribute	Vegetation Composition
Outcomes	<ul style="list-style-type: none"> x Vegetation composition maintains a ‘high’ score value in relation to habitat that is critical to the survival of the koala. x No significant increase in weed cover for species that could adversely affect the structural composition of vegetation within the offset area in relation to koala habitat value (i.e. weed species that are shrubs, trees or vines). x Retain and enhance the structure and floristic diversity of canopy vegetation. x Retain and enhance the structure and floristic diversity of middle and understorey vegetation. x Ongoing retention and recruitment of koala food trees. x Permanently remove existing threat of habitat degradation associated with clearing, development or other incompatible land uses. x Domestic livestock excluded from offset area (unless controlled grazing required for fire risk management)
Actions	<ul style="list-style-type: none"> x Monitoring of canopy composition with respect to koala food tree species; adaptive management if required. Monitoring to include representative surveys of all applicable (koala habitat) vegetation communities within the offset area. For example, tertiary-level vegetation surveys in accordance with Neldner <i>et al</i> (2012). x Monitoring of weed infestations; adaptive management of shrub, tree and vine weed species if required. x Flora surveys to be undertaken by a suitably qualified environmental scientist. x To remove the risk of habitat degradation associated with clearing, development or other incompatible land uses, the entire 53.616 ha area will be managed for conservation purposes. x Given that the subject property boundary is currently fenced in koala-permeable fencing, livestock will be excluded from the offset area through at least one of the following mechanisms:



TABLE 2.2: VEGETATION COMPOSITION

	<ul style="list-style-type: none"> » Livestock will not be kept on the property » Koala-friendly fencing will be erected along the northern boundary of the offset area to exclude livestock grazing outside of the offset area yet within the subject property in accordance with a relevant guideline such as <i>Note G4 – Wildlife Friendly Fencing and Netting</i> (Land for Wildlife, nd). <p>x Domestic livestock will only be introduced in the event that a fire risk professional (e.g. representative of Queensland Rural Fire Service) and a suitably qualified environmental scientist deem that conditions are not suitable for an ecological burn and that grazing is appropriate to manage a high level of fire risk. In this event, a maximum of 12 head of domestic livestock may be introduced for no more than a three (3) consecutive week period. Level of risk (and any need to repeat this grazing cycle) is to be re-assessed by the aforementioned professionals following the grazing event.</p> <p>x Vegetation clearing will not be undertaken within the offset area under any circumstances, except the following:</p> <ul style="list-style-type: none"> » Where necessary for the removal of weeds; » To establish and maintain fencing around the boundary of the offset area; » To establish and maintain firebreaks and fire trails in accordance with an Offset Area Bushfire Management Plan that has been prepared by a suitably qualified professional (minimum two years professional experience in bushfire risk management planning); and » To remove or reduce imminent risk of serious personal injury or damage to infrastructure posed by the vegetation, and only to the extent necessary to mitigate the risk. This action to be undertaken in accordance with the relevant legislative requirements in place at the time of clearing, including the use of registered fauna spotters.
Performance Indicators	<p>x Vegetation composition retains structural attributes of forest or woodland, and maintains koala food tree species diversity recorded by baseline survey.</p> <p>x Weed cover (shrub, tree and vine species) DEEs not exceed baseline levels by more than 10%.</p> <p>x Offset area is legally secured as an area of High Conservation Value under section 19F of the <i>Vegetation Management Act 1999</i></p>
Monitoring	<p>x Baseline assessment of koala food tree species richness conducted March 2015</p> <p>x Baseline assessment of offset area weed infestation levels (shrub, tree and vine species) conducted March 2015</p> <p>x Weed assessments and monitoring to be undertaken annually, during spring or summer to optimise detection.</p>
Reporting	<p>x Monitoring results to be recorded in Offset Area Assessment Report.</p> <p>x The location, extent and associated purpose for any vegetation clearing undertaken within the offset area will be detailed within the Offset Area Assessment Report.</p> <p>x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of</p>



TABLE 2.2: VEGETATION COMPOSITION

	<p>the completion of the initial baseline survey.</p> <p>x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au</p>
Corrective Action	<p>x Supplementary planting/assisted natural regeneration of koala food trees to be undertaken where koala food tree species diversity is recorded to have declined from baseline levels.</p> <p>x Weed control to be undertaken in accordance with accepted best practice principles (e.g. currently South East Queensland Ecological Restoration Framework) to reduce weed cover to baseline levels (or better).</p> <p>x If livestock-proof fencing is breached: <ul style="list-style-type: none"> » Within 7 days: Livestock will be removed from offset area and temporary fencing measures put in place to ensure livestock are excluded and permanent fence repairs can be completed; and » Within 28 days: Repairs to fencing undertaken to achieve a koala-friendly livestock-proof standard. </p>
Term	<p>x Baseline monitoring for koala food tree species richness undertaken July 2015.</p> <p>x Subsequent koala food tree species richness monitoring to be undertaken every 5 years for the life of the offset area.</p> <p>x Baseline monitoring for weed cover (shrub, tree and vine species) undertaken March 2015.</p> <p>x Subsequent weed assessments and monitoring to be undertaken annually during the active management period.</p>
Responsibility	<p>x Landowner</p>

2.3 Habitat Connectivity

Based on the Koala habitat assessment tool of the koala referral guidelines (DEE, 2014), the entire offset area conforms to 'Area is part of a contiguous landscape ≥ 500 ha'. Accordingly, for 'habitat connectivity', the offset area is considered to have a score of 2. The offset area therefore achieves the maximum possible score for this attribute. Given that it is not possible to implement strategies that will improve the score for the 'habitat connectivity' attribute, management actions will focus on ensuring that the attribute score is maintained as well as strategies to enhance koala habitat values at a finer resolution than contemplated by the referral guidelines. These are detailed below in **TABLE 2.3**.

TABLE 2.3: HABITAT CONNECTIVITY

Attribute	Habitat Connectivity
Outcomes	<ul style="list-style-type: none"> x Maintain contiguous landscapes to allow koalas to establish new territories, facilitate gene flow and respond to environmental changes. x Permanently remove existing threat of habitat degradation associated with clearing, development or other incompatible land uses. x Contribute to koala movement and dispersal through the Flinders Karawatha corridor through the establishment of a protected habitat corridor (minimum 700 m width).
Actions	<ul style="list-style-type: none"> x To remove the risk of habitat degradation associated with clearing, development or other incompatible land uses, the entire 53.616 ha offset area will be managed for conservation purposes. x Vegetation clearing will not be undertaken within the offset area under any circumstances, except the following: <ul style="list-style-type: none"> » Where necessary for the removal of weeds; » To establish and maintain fencing around the boundary of the offset area in accordance with relevant legislation; » To establish and maintain firebreaks and fire trails in accordance with an Offset Area Bushfire Management Plan that has been prepared by a suitably qualified professional and relevant legislation; and » To remove or reduce imminent risk of serious personal injury or damage to infrastructure posed by the vegetation, and only to the extent necessary to mitigate the risk. This action to be undertaken in accordance with the relevant legislative requirements in place at the time of clearing including the use of registered fauna spotters. x The subject property boundary is currently fenced in koala-permeable fencing. Any new or replacement fencing is to be 'fauna-friendly' in accordance with a relevant guideline such as <i>Note G4 – Wildlife Friendly Fencing and Netting</i> (Land for Wildlife, nd).
Performance Indicators	<ul style="list-style-type: none"> x Offset area is legally secured as an area of High Conservation Value under section 19F of the <i>Vegetation Management Act 1999</i>
Monitoring	<ul style="list-style-type: none"> x Firebreaks and fire control lines and fence lines to be inspected at a minimum quarterly frequency or after major storm events. x Fencing within and adjoining the offset area will be inspected monthly
Reporting	<ul style="list-style-type: none"> x The location, extent and associated purpose for any vegetation clearing undertaken within the offset area will be detailed within the annual Offset Area Assessment Report. x Any change to site connectivity is to be detailed within the Offset Area Assessment Report. x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey. x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to

TABLE 2.3: HABITAT CONNECTIVITY

	PostApproval@environment.gov.au
Corrective Action	x Any fencing within or adjoining the offset area is koala permeable, and any fencing installed or replaced within the offset area is to be fauna-friendly in design as per a relevant guideline such as Wildlife Friendly Fencing Project (2014) or Land for Wildlife (nd).
Term	x Offset area to be legally secured within six (6) months of the commencement of works at the impact site.
Responsibility	x Landowner

2.4 Key Existing Threats

It is expected that the koala occurring within the offset area will be exposed to a number of the key threatening processes that are acknowledged to have the potential to disrupt the recovery of the species and/or have the potential to cause a decline in the listed population. The proposed offset management plan is cognisant of existing threats and aims to mitigate their impact through the tailored management of the offset area. In addition to the threats outlined by the Referral Guidelines (DEE, 2014) it is acknowledged that predation by non-native fauna is a key potential impact to the offset area and has the potential to impact the sites values in terms of providing secure habitat for koala. As such, the focus of predator management has been expanded for the purposes of the OAMP to also include the control and management of feral cats and foxes. **TABLE 2.4** to **TABLE 2.11** details each of the key threats that are applicable to the offset area and present clear and measurable actions that aim to negate or significantly reduce their impact.

2.4.1 Predator Attack

TABLE 2.4: THREAT TO KOALA FROM DOGS

Attribute / Threat	Dog attack
Outcome	Reduction of risk of koala mortality or injury by dog attack within the offset area through reduction in wild dog abundance
Actions	<ul style="list-style-type: none"> x An initial survey to establish a baseline of wild dog abundance within the offset area was conducted for the entire property in June 2015 with subsequent monitoring occurring every six months. The survey method used for the initial abundance survey is informed using best practice methodology and applicable guidelines available at the time of survey (e.g. DEE, 2007 and Mitchell and Balogh, 2007). x Baseline predator abundance survey was undertaken by a suitably qualified person (e.g. pest animal control professional or ecologist with at least two years relevant professional experience). x Offset area wide wild dog control program was undertaken following the monitoring period in June 2015. Where practicable and to increase the effectiveness of a control program the landholder will seek to coordinate control programs with comparable activities being undertaken by neighbouring landholders.

TABLE 2.4: THREAT TO KOALA FROM DOGS

	<ul style="list-style-type: none"> x Post the initial control event, presence/absence surveys for wild dogs are to be undertaken each two months by the landholder. x Post initial control event, abundance surveys for wild dogs to be undertaken bi-annually by a suitably qualified person (e.g. pest animal control professional or ecologist with at least two years relevant professional experience). x Where post control surveys indicate there has been a recurrence of wild dogs within the offset area, control measures will be actioned using methods (controlled shooting or baiting) determined by a pest control professional in consideration of monitoring results. x Any injured koala found on site will be sent to a veterinary clinic/wildlife rescue facility for rehabilitation. x Installation of appropriate hazard warning signage indicating the offset area is subject to dog control for the purpose of managing the offset site for the benefit of koala.
Performance Indicators	<ul style="list-style-type: none"> x Data collected from the initial control action to indicate the successful reduction of wild dog density (based on control method data e.g. bait take rates, successful kills from shooting). x No records of feral dog abundance within the site. x No records of injury and/or death to koala relating to dog attacks recorded from within the offset area.
Monitoring	<ul style="list-style-type: none"> x Offset area-wide traverse by the landholder each two months to record the presence/absence of signs of wild dogs (including scats). The monitoring will take place along a set route utilising the existing network of tracks within the offsets area (e.g. fire control lines) to allow for replication of the monitoring events. x Bi-annual abundance surveys to be undertaken by a suitably qualified environmental scientist or pest animal control professional with at least two years relevant professional experience. x Opportunistic monitoring of and koala/dog interactions in the form of injured and/or koala mortality records
Reporting	<ul style="list-style-type: none"> x Wild dog abundance baseline survey results will be incorporated within the initial Offset Area Assessment Report. x Results of all presence/absence surveys will be reported upon on an annual basis as a component on the Annual Offset Areas Assessment Report. x All records of koala injury or death resulting from a dog attack are to be reported within the annual Offset Areas Assessment Report. x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey. x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au
Corrective Action	<ul style="list-style-type: none"> x Should the efficacy of the initial and ongoing wild dog control measure not result in a reduction of wild dog numbers (based on initial baseline survey), alternative and/or additional control measures will be implemented and the efficacy evidenced through the ongoing monthly/quarterly monitoring survey results. x Any incidence of koala injury/mortality resulting from a dog attack will initiate supplementary monitoring and control measures in addition to the scheduled monthly and quarterly monitoring.

TABLE 2.4: THREAT TO KOALA FROM DOGS

	<ul style="list-style-type: none"> x Any required adaptation to wild dog management measures in response to failure to meet the objectives of the OAMP are to be approved by a suitably qualified environmental scientist or a pest animal control professional with at least two years relevant professional experience.
Term	Duration of the active management period (10 years)

TABLE 2.5: THREAT TO KOALA FROM FERAL CATS AND FOXES

Attribute / Threat	Feral Cat and Fox attack
Outcome	Reduction of risk of koala mortality or injury by feral cat and/or fox attack within the offset area through reduction in feral cat and fox abundance
Actions	<ul style="list-style-type: none"> x Initial survey to establish a baseline of feral cats and fox abundance within the offset area was conducted for the entire property in June 2015, with subsequent monitoring occurring every six months. The survey method used for the initial abundance survey is informed using best practice methodology and applicable guidelines available at the time of survey (e.g. DEE, 2007 and Mitchell and Balogh, 2007). x Offset areas feral cat and fox control program to be undertaken with the aim of removing all feral cats and foxes from the offset area. The specific control method will be informed by the results of the initial fox abundance survey. Where practicable and to increase the effectiveness of a control program the landholder will seek to coordinate control programs with comparable activities being undertaken by neighbouring landholders. x Post initial control, presence/absence surveys for fox and feral cat are to be undertaken by the landholder every two months. x Post initial control, bi-annual abundance surveys for fox and feral cat to be undertaken by a suitably qualified person (pest animal professional or environmental scientist with at least two years professional experience). x Where post control surveys indicate there has been a recurrence of feral cats and/or foxes within the offset area a control measure will be actioned using an appropriate control method (shooting, trapping or toxic baits). x Any injured koala found on site will be sent to a veterinary clinic/wildlife rescue facility for rehabilitation. x Installation of appropriate public warning signage indicating the offset area is subject to feral cat and fox control for the purpose of managing the offset site for the benefit of koala.
Performance Indicators	<ul style="list-style-type: none"> x Data collected following the initial control action to indicate the successful reduction in feral cat and /or fox abundance from baseline level (indicators may include control method uptake e.g. trap rates, bait take rates, successful kills from shooting). x No increase in feral cat and/or fox abundance within the site (based on post control action abundance surveys results). x No records of injury and/or death to koala relating to feral cat and/or fox attacks recorded from within the offset area.
Monitoring	<ul style="list-style-type: none"> x Offset area-wide traverse by the landholder every two months to record the presence/absence of feral cats and foxes. The monitoring will take place along a set route to allow for replication of the monitoring events. x Bi-annual abundance surveys to be undertaken by a suitably qualified person (pest animal professional or environmental scientist with at least

TABLE 2.5: THREAT TO KOALA FROM FERAL CATS AND FOXES

	<p>two years relevant professional experience).</p> <p>x Opportunistic monitoring of and koala/fox/cat interactions in the form injured killed koala records.</p>
Reporting	<p>x Method and results pertaining to initial offset area-wide baseline abundance survey to be documented within initial annual Offset Area Assessment Report.</p> <p>x Results of all presence/absence surveys to be reported upon as a component on the annual Offset Areas Assessment Report.</p> <p>x All records of koala injury or death resulting from feral cat and/or fox attack are to be reported within the relevant annual Offset Areas Assessment Report.</p> <p>x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey.</p> <p>x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au</p>
Corrective Action	<p>x Should the efficacy of the initial and ongoing fox and feral cat control measure not result in a reduction of fox or feral cat numbers (based on initial baseline survey) alternative and/or additional control measures will be implemented and the efficacy evidenced through the ongoing monthly/quarterly monitoring surveys.</p> <p>x Any incidence of koala injury/mortality resulting from a feral cat or fox attack will initiate supplementary monitoring and adaptation of control measures in addition to the scheduled monthly and quarterly monitoring.</p> <p>x Any required adaptation to feral cat and fox management measures in response to failure to meet the objectives of the OAMP are to be approved by a suitably qualified pest animal control professional or environmental scientist.</p>
Term	Duration of the active management period (10 years).

2.4.2 Vehicle Strike

TABLE 2.6: THREAT TO KOALA FROM VEHICLE STRIKE

Threat	Vehicle strike
Outcome	x Contribute to the reduction of risk of injury or death to koala in relation to vehicle strike both within the offset area and on adjacent roads.
Actions	<p>x Signs were installed on the property boundary adjacent to unnamed public road that bisects offset area to alert traffic of the koala offset area and the presence of koalas in the local area.</p> <p>x Signs were installed on the property boundary adjacent to the unnamed public road along the frontage to Lot 89 RP892014 to alert east bound traffic of the presence of koalas in the local area.</p>



TABLE 2.6: THREAT TO KOALA FROM VEHICLE STRIKE

	<ul style="list-style-type: none"> x Signs were installed on the property boundary adjacent to Mount Flinders Road along the frontage to Lot 86 RP892014 to alert west-bound traffic of the presence of koalas in the local area. x Implementation of a slow speed requirement (40km/h) for vehicles traversing the offset area. x Signs were installed indicating a slow speed area at the main entry points to the offset area.
Performance Indicators	No koala mortalities from vehicle strike within the offset area
Monitoring	Any observed koala injury/mortality on roads/tracks within the offset area or roads that front Lots 86, 87, 88 or 89 RP892014 to be recorded.
Reporting	<ul style="list-style-type: none"> x Incident to be reported to: <ul style="list-style-type: none"> » Local Government authority (e.g. currently Beaudesert Regional Council); and » Relevant State Government department (e.g. currently the Department of Environment and Heritage Protection). x Incident to be recorded in Offset Area Assessment Report. x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey. x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au
Corrective Action	<ul style="list-style-type: none"> x Injured animals to be transported to a vet, or suitably qualified and experienced wildlife carer as soon as possible. x Capture and method of transport for injured animals will be in accordance with accepted best practice principles at time of incident. For details, refer to: <ul style="list-style-type: none"> » Relevant Local or State Government websites (e.g. currently Beaudesert Regional Council and the Department of Environment and Heritage Protection); » Non-profit koala organisations (e.g. Australian Koala Foundation).
Term	Duration of the active management period (10 years).
Responsibility	Landowner.

2.4.3 Barriers to Dispersal

TABLE 2.7: THREAT TO KOALA VIA BARRIERS TO DISPERSAL

Threat	Barriers to dispersal
<p>Outcomes</p>	<ul style="list-style-type: none"> x Maintain and improve contiguous landscapes to allow koalas to establish new territories, facilitate gene flow and respond to environmental changes. x Retain and enhance the structure and floristic diversity of canopy vegetation. x Retain and enhance the structure and floristic diversity of middle and understorey vegetation. x Ongoing retention and recruitment of koala food trees. x Permanently remove existing threat of habitat degradation associated with clearing, development or other incompatible land uses. x Contribute to koala movement and dispersal through the Flinders Karawatha through the establishment of a protected habitat corridor (minimum 700 m width).
<p>Actions</p>	<ul style="list-style-type: none"> x To remove the risk of habitat degradation associated with clearing, development or other incompatible land uses, the entire 53.616 ha offset area will be legally secured as an area of High Conservation Value under section 19F of the <i>Vegetation Management Act 1999</i> x Given that the subject property boundary is currently fenced in koala-permeable fencing, livestock will be excluded from the offset area through at least one of the following mechanisms: <ul style="list-style-type: none"> » Livestock will not be kept within balance areas of Lots 89 RP892014; or » Koala-friendly fencing will be erected along the southern boundary of the offset area to exclude livestock grazing outside of the offset area yet within the subject property in accordance with a relevant guideline such as Note G4 – Wildlife Friendly Fencing and Netting (Land for Wildlife, nd). x Domestic livestock will be only be introduced in the event that a fire risk professional (e.g. representative of Queensland Rural Fire Service) and a suitably qualified environmental scientist deem that conditions are not suitable for an ecological burn and that grazing is appropriate to manage a high level of fire risk. In this event, a maximum of 12 head of domestic livestock may be introduced for no more than a three (3) consecutive week period. Level of risk (and any need to repeat this grazing cycle) is to be re-assessed by the aforementioned professionals following the grazing event. x Any fencing installed or replaced within the offset area is to be fauna-friendly in design as per a relevant guideline such as Wildlife Friendly Fencing Project (2014) or Land for Wildlife (nd). x Vegetation clearing will not be undertaken within the offset area under any circumstances, except the following: <ul style="list-style-type: none"> » Where necessary for the removal of weeds; » To establish and maintain fencing around the boundary of the offset area; or » To establish and maintain firebreaks and fire trails in accordance with an Offset Area Bushfire Management Plan that has been prepared by a suitably qualified professional. » To remove or reduce imminent risk of serious personal injury or damage to infrastructure posed by the vegetation, and only to the extent necessary to mitigate the risk. » Any clearing will include the use of registered fauna spotters.

TABLE 2.7: THREAT TO KOALA VIA BARRIERS TO DISPERSAL

Performance Indicators	Offset area is legally secured as an area of High Conservation Value under section 19F of the <i>Vegetation Management Act 1999</i>
Monitoring	<ul style="list-style-type: none"> x Offset area fencing to be monitored on a monthly basis. x Firebreaks and fire control lines to be inspected at a minimum quarterly frequency and after major storm events
Reporting	<ul style="list-style-type: none"> x The location, extent and associated purpose for any vegetation clearing or damage through natural disaster within the offset area will be detailed within the Offset Area Assessment Report. x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey. x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au
Corrective Action	<ul style="list-style-type: none"> x If livestock are kept on the balance of the property and livestock-proof fencing is breached: <ul style="list-style-type: none"> » Within 7 days: Livestock will be removed from offset area and temporary fencing measures put in place to ensure livestock are excluded until permanent fence repairs can be completed » Within 28 days: Repairs to fencing undertaken to achieve koala-friendly livestock-proof standard
Term	x Offset area to be legally secured within six (6) months of the commencement of works at the impact site.
Responsibility	Landowner

2.4.4 Degradation of habitat critical to the survival through hydrological change

TABLE 2.8: THREAT TO KOALA HABITAT THROUGH HYDROLOGICAL CHANGE

Attribute/ Threat	Degradation of habitat critical to the survival of the koala through hydrological change
Outcome	To ensure the koala habitat within the offset area is maintained and the potential carrying capacity of the area is not reduced due to anthropogenic hydrological change.
Actions	<p>If any actions are proposed that may significantly impact the current (at time of offset area being legally secured) hydrological regime and therefore potentially impact koala habitat within the offset area then the following actions will be required:</p> <ul style="list-style-type: none"> x Presentation of proposed hydrological change to DEE, detailing the potential impact to koala habitat within the offset area. This will include specialist reports detailing the nature of the hydrological change and the expected impact to the offset areas vegetation communities. x Only DEE approved hydrological change will be permitted within the offset area.
Performance Indicators	The overall performance indicator resulting from the stated actions will be no significant impact to koala habitat as a result of hydrological change within the site.
Monitoring	Where DEE approved hydrological change has occurred within the offset area, monitoring of the impact to the sites vegetation communities will be a component of an annual site assessment.

TABLE 2.8: THREAT TO KOALA HABITAT THROUGH HYDROLOGICAL CHANGE

Reporting	<ul style="list-style-type: none"> x The Offset Area Assessment Report will present details relating to requested hydrological change requests made to DEE. x Assessment of vegetation in relation to potential impacts resulting from hydrological change will be presented within the Annual Offset Area Assessment Report. <p>All Offset Area Assessment Reports are to be held by the offset area landholder and made available for inspection by DEE upon request</p>
Corrective Action	<p>Only DEE-approved actions which could potentially significantly impact the hydrological status quo within the offset area are permissible. Should it be determined that there is an impact to koala habitat from hydrological change (as evidenced through annual vegetation assessments) then corrective actions, as determined by a suitably qualified professional within affected areas will occur.</p>
Term	<p>Duration of the active management period (10 years)</p>

2.4.5 Fire

TABLE 2.9: THREAT TO KOALA THROUGH FIRE

Threat	Fire
Outcomes	<ul style="list-style-type: none"> x Minimise the risk of high-intensity fire within the offset area. x Minimise the risk of koala mortality within the offset area due to prescribed burning.
Actions	<ul style="list-style-type: none"> x A suitably qualified professional has prepared an Offset Area Bushfire Management Plan, detailing: current vegetation condition and fire risk, locations of current and required firebreaks and fire control lines, current fuel loads, recommended actions and timeframes for maintenance of bushfire risk within the context of the adapted Regional Ecosystem Description Database guidelines (refer below) and biodiversity outcomes sought for the offset area (APPENDIX C). x With the exception of prescribed burning, which will only be undertaken for the purposes of biodiversity enhancement, the offset area is to be managed to avoid the occurrence of fire by: <ul style="list-style-type: none"> » Maintaining fire control lines relative to the offset area; and » Co-locating fire control lines with existing tracks and fence lines on the property where possible. x Existing fencing, firebreaks and fire control lines are to be kept clear of encroaching vegetation to a width as defined by the Offset Area Bushfire management Plan and in accordance with relevant legislation (e.g. <i>Sustainable Planning Act 2009</i>). x Vegetation within the offset area will be managed in accordance with the following specifications, which are adapted from the Regional Ecosystem Description Database fire management guidelines for the three vegetation types that occur within the offset area (RE 12.9-10.2, RE 12.9-10.7 and RE 12.8.24) (Queensland Herbarium, 2014): <ul style="list-style-type: none"> » SEASON: Summer to winter » INTENSITY: Low to moderate



TABLE 2.9: THREAT TO KOALA THROUGH FIRE

	<ul style="list-style-type: none"> » INTERVAL: 4-25 years » STRATEGY: 40-60% mosaic burn. Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved » ISSUES: The fire regime will maintain a mosaic of grassy and shrubby understoreys. Ground litter and fallen timber habitats will be maintained by burning only with sufficient soil moisture. Burning will produce fine scale mosaics of unburnt areas. Variability in season and fire intensity will occur, as well as spot ignition in cooler or moister periods to encourage mosaics. <p>x The following parameters will be adhered to throughout the planning and implementation of any prescribed burning:</p> <ul style="list-style-type: none"> » Undertake pre-burn survey to identify areas of high koala activity; » No prescribed burning will be undertaken when female koalas are likely to be carrying dependent young (Note: this management action will take precedence over the fire management guidelines outlined above); » Prescribed burning will be only carried out during appropriate weather conditions (e.g. low temperature, low wind) and good soil moisture conditions; » Post-fire practices will be implemented to mitigate the risk of uncontrolled fire damage (e.g. extinguishing burning of large trees); and » Minimise the extent of burning so that the risk of injury or mortality to koalas is reduced, the risk of canopy scorch is lowered, whilst other biodiversity benefits to other species are achieved. <p>x Prescribed burning will be undertaken in consultation with, and under the guidance of the Queensland Rural Fire Brigade.</p> <p>x Domestic livestock will be only be introduced in the event that a fire risk professional (e.g. representative of Queensland Rural Fire Service) and a suitably qualified environmental scientist deem that conditions are not suitable for an ecological burn and that grazing is appropriate to manage a high level of fire risk. In this event, a maximum of 12 head of domestic livestock may be introduced for no more than a three (3) consecutive week period. Level of risk (and any need to repeat this grazing cycle) is to be re-assessed by the aforementioned professionals following the grazing event.</p>
Performance Indicators	Fuel levels and burning regime maintained in accordance with Offset Area Bushfire Management Plan
Monitoring	To be informed by an Offset Area Bushfire Management Plan
Reporting	<p>x Offset Area Bushfire Management Plan will be prepared within 6 months of the offset area being legally secured.</p> <p>x Monitoring results and maintenance log will be detailed within the Offset Area Assessment Report.</p> <p>x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey.</p> <p>x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au</p>
Corrective Action	<p>x If a wildfire occurs, the following actions will be taken by the landowner to remedy the situation:</p> <ul style="list-style-type: none"> » Inspect fencing, undertake any repairs required to ensure livestock-proof standard » Inspect fire control lines, undertake any maintenance required to achieve compliance with Offset Area Bushfire Management Plan

TABLE 2.9: THREAT TO KOALA THROUGH FIRE

	» Removed all livestock from offset area within 7 days of commencing remedial action
	» Engage suitably qualified professional to assess offset area and update Offset Area Bushfire Management Plan
Term	Offset Area Bushfire Management Plan to be enacted within 6 months of the offset area being legally secured.
Responsibility	Landowner

2.4.6 Facilitating the introduction of spread of disease or pathogens

TABLE 2.10: THREAT TO KOALA AND KOALA HABITAT FROM DISEASE AND PATHOGENS

Attribute/ Threat	Facilitating the introduction or spread of disease or pathogens
Outcomes	<ul style="list-style-type: none"> x Reduce risk of the spread of koala and vegetation diseases within the offset area and adjacent areas of koala habitat. x Third party contractors do not enter site carrying pathogens.
Actions	<ul style="list-style-type: none"> x Baseline offset area condition survey is to include assessment for signs of <i>Phytophthora cinnamomi</i> and Myrtle Rust were undertaken in March 2015 with no evidence of either disease. x To reduce the risk of introducing Chlamydia and Koala retrovirus into the resident population; uncontrolled translocation of koala is not permitted within the offset area. x Vegetation management activities which include tree lopping/felling, weed removal, tree planting (including nursery suppliers) are deemed to be high risk in the context of introducing pathogens that may potentially impact koala habitat. As such, any person engaged to undertake these activities must satisfy the landholder that they have undertaken all reasonable steps to prevent the introduction of a pathogen/disease to the site (e.g. vehicle and equipment washdown prior to site entry).
Performance Indicators	<p><u>Facilitating spread of disease in resident koala populations</u></p> <ul style="list-style-type: none"> x In the event that regulator approved translocation of koala is proposed onto the site, the animal(s) is to be assessed by a veterinarian prior to introduction. <p><u>Facilitating spread of pathogens in koala habitat</u></p> <ul style="list-style-type: none"> x Incidence of koala feed trees exhibiting disease DEEs not increase within the offset areas, based on comparison to baseline vegetation health assessment.
Monitoring	<ul style="list-style-type: none"> x Incidence of koalas exhibiting disease to be recorded if encountered during any monitoring events within the offset area.
Reporting	<ul style="list-style-type: none"> x Baseline data concerning observations around koala and koala habitat diseases and pathogens is to be documented within initial annual Offset Area Assessment Report. x Confirmation of translocation activity within the offset area is to be included within Offset Area Assessment Reports.

TABLE 2.10: THREAT TO KOALA AND KOALA HABITAT FROM DISEASE AND PATHOGENS

	<ul style="list-style-type: none"> x Incidence of koalas exhibiting symptoms of disease to be reported within Offset Area Assessment Report. x All Offset Area Assessment Reports are to be submitted to DEE on an annual basis within three months of the anniversary of the completion of the initial baseline survey. x All annual Offset Area Assessment Reports and any records of non-compliance are to be submitted to DEE via email to PostApproval@environment.gov.au
Corrective Action	<p>Should there be an increase in trees exhibiting disease symptoms and/or evidence of vegetation dieback (as noted during annual offset area assessments) the following corrective actions will take place</p> <ul style="list-style-type: none"> x Review of the efficacy of current biosecurity measures; x Review of plant stock/management services suppliers (if applicable) should it be suspected plant pathogens have been introduced via external sources.
Term	Duration of the active management period (10 years).
Responsibility	Landholder

2.5 Recovery Value

The ‘recovery value’ attribute detailed in the Koala habitat assessment tool of Referral Guidelines (DEE, 2014) is based on the following interim recovery objectives:

“Protect and conserve large, connected areas of koala habitat, particularly large, connected areas that support koalas that are:

- x genetically diverse/distinct; or
- x free of disease or have a very low incidence of disease; or
- x breeding (i.e. presence of back young or juveniles).” (DEE, 2013).

The entire offset area (as well as balance areas of the site and the broader locality) forms part of the Flinders-Karawatha Corridor, which is the largest remaining continuous stretch of open eucalypt forest in south-east Queensland. The corridor extends from the 1,200 ha Karawatha Forest on the southern edge of Brisbane City, along Oxley Creek, through the Greenbank Military Training Area and south along the Teviot Range to Flinders Peak, Mt Joyce and Wyaralong Dam, north-east of Boonah.

The Queensland State Government recognises that the Flinders-Karawatha Corridor is one of south-east Queensland’s most important biodiversity corridors, providing habitat and movement opportunities for a range of species that are of state, regional and local significance (including the koala) (DEHP, 2014). The Flinders Karawatha Corridor Management Strategy identifies that private landholders manage the majority of land within the corridor, and states that a priority of the strategy is to enhance and maintain the capacity of landholders to engage in local actions to achieve positive environmental outcomes (DEHP, 2014).

Based on the site being located within the Flinders-Karawatha corridor, it is considered that the offset area is strongly aligned with the interim recovery outcomes for the koala, as outlined within the Referral Guidelines (DEE, 2014). Protection and enhancement of the ‘recovery value’ of the site as it relates to its position within the Flinders-Karawatha corridor will be achieved by implementing management strategies that remove the threat of habitat loss within the offset area by legally securing a



conservation land use of the offset area, which also contributes to achieving the biodiversity outcomes sought by the Flinders Karawatha Corridor Management Strategy (DEHP, 2014). These management strategies are detailed below in **TABLE 2.11**.

TABLE 2.11: MANAGEMENT STRATEGIES AND OUTCOMES FOR RECOVERY VALUE

Attribute	Recovery value
Outcomes	<ul style="list-style-type: none"> x Maintain contiguous landscapes to allow koalas to establish new territories, facilitate gene flow and respond to environmental changes. x Permanently remove existing threat of habitat degradation associated with clearing, development or other incompatible land uses. x Contribute to koala movement and dispersal through the Flinders Karawatha through the establishment of a habitat corridor (minimum 700 m width). x Protect and conserve large, connected areas of koala habitat, particularly large, connected areas that support koalas that are: <ul style="list-style-type: none"> » genetically diverse/distinct; or » free of disease or have a very low incidence of disease; or » breeding (i.e. presence of back young or juveniles).
Actions	<ul style="list-style-type: none"> x To remove the risk of habitat degradation associated with clearing, development or other incompatible land uses, the entire offset area will be managed for conservation purposes. x Vegetation clearing will not be undertaken within the offset area under any circumstances, except the following: <ul style="list-style-type: none"> » Where necessary for the removal of weeds; » To establish and maintain fencing around the boundary of the offset area; and » To establish and maintain firebreaks and fire trails in accordance with an Offset Area Bushfire Management Plan that has been prepared by a suitably qualified professional. » Will include the use of registered fauna spotters x Any fencing installed within the offset area is to be fauna-friendly in design (Wildlife Friendly Fencing Project, 2014). x To remove or reduce imminent risk of serious personal injury or damage to infrastructure posed by the vegetation, and only to the extent
Performance Indicators	Offset area is legally secured as an area of High Conservation Value under section 19F of the <i>Vegetation Management Act 1999</i>
Monitoring	Firebreaks and fire trails to be inspected at a minimum frequency of annually, and after major storm events.
Reporting	The location, extent and associated purpose for any vegetation clearing undertaken within the offset area will be detailed within the annual Offset Area Assessment Report and will be accordance with the relevant legislative requirements at the time of proposed vegetation clearance.
Corrective Action	Not applicable.
Term	Offset area to be legally secured within six (6) months of the commencement of works at the impact site.
Responsibility	Landowner

Chapter 3: CONCLUSION

Adherence to this management plan will result in a demonstrable increase in koala habitat quality within the offset area. Further, the data set that will be compiled via monitoring works throughout the active management period will form a technically rigorous platform to inform adaptation of the management actions presented herein such that management objectives may be realised. It is noted that, while the active management period is ten (10) years in duration, land management initiatives across the offset site will be tailored toward meeting the objectives of this management plan following the active management period.

In conclusion, this management plan is focussed on attaining defined management objectives within the offset area. This approach allows for an adaptive style of management within the offset area which manages risk of non-conformance as a result of unforeseen events such as failure of a given action to perform as intended or force majeure happenings.

Chapter 4: Consent

4.1 Administering authority

SIGNED by the Queensland Department of Natural Resources and Mines to indicate approval of the offset area management plan.

Name:.....

Signature:.....

Witness name:.....

Signature:.....

Date.....

4.2 Landholder

The landowner agrees:

1. Any non-compliance with the requirements of this offset area management plan shall constitute a breach of the terms and conditions of the legally binding mechanism entered into.
2. To notify the State in writing of an Event, or the likelihood of the occurrence of an Event. Event means any agreement or understanding entered into or accepted by and or circumstance permitted or suffered by the landholder which effects a change of ownership, control or use of the offset area, the exercise of power of sale under any Mortgage, the granting of a Mortgage, the appointment of a receiver, the death of a landholder or any other circumstance which may allow or permit a person, other than the Landholder to own, control or use the offset area. In notifying the State of an Event, the landholder will notify the State of the nature of the change, or potential change of ownership, control or use result from the Event, and the name and address of any person who may own, control or use the offset area as a result of the Event.
3. That if, at the time of execution of this offset area management plan, there exists a Property Map of Assessable Vegetation (PMAV) over the offset area or a part of it, the landholder hereby agrees, where the management plan area is identified as Category X on the PMAV, to the replacement of the PMAV by the State to reflect the offset area as Category A.
4. To take all necessary steps as may be required to accomplish the obligations contained in this offset area management plan.

The landowner acknowledges:

5. That before the State will agree to the release this offset area management plan the State must be satisfied that the objectives and activities contained in the offset area management plan have been achieved.

The landowner notes:

6. All reports, notices or requests for amendment in relation to this offset area management plan must be in writing and delivered to the administering authority at the following address:

DEE
 GPO Box 787
 Canberra ACT 2601
 Australia
 Switchboard +61 2 6274 1111

References

DEHP (2014) *Flinders Karawatha Corridor Management Strategy 2014–2019 A five year plan*. Department of Environment and Heritage, Qld.

Dique, D. S., de Villiers, D. L., & Preece, H. J. (2003) Evaluation of line-transect sampling for estimating koala abundance in the Pine Rivers Shire, south-east Queensland, *Wildlife Research*, 30: 127-133.

ICC (2014). *Conservation – Making a Koala Friendly Backyard*. Ipswich City Council, Ipswich. URL: http://www.ipswich.qld.gov.au/about_ipswich/environment/conservation/. Accessed 22 July 2014.

Phillips, S. and Callaghan, J. (2011). The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus*. *Australian Zoologist* 35(3), 774-780.

DoE (2007). Australian Pest Animal Strategy-A national strategy for the management of vertebrate pest animals in Australia, Australian Government and Natural Resource Management Ministerial Council, Canberra.

DoE (2012) *EPBC Act Environmental Offsets Policy*. Department of the Environment, ACT.

DoE (2012b) *Environmental Offsets Guide* Department of the Environment, ACT.

DoE (2014) *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)*. Department of the Environment, ACT.

Land for Wildlife (nd). *Note G4 – Wildlife Friendly Fencing and Netting*. Land for Wildlife, Queensland.

Mitchell B, Balogh S (2007a) 'Monitoring techniques for vertebrate pests: wild dogs.' (NSW Department of Primary Industries, Bureau of Rural Sciences: Orange).

Mitchell B, Balogh S (2007b) 'Monitoring techniques for vertebrate pests: feral cats.' (NSW Department of Primary Industries, Bureau of Rural Sciences: Orange).

Mitchell B, Balogh S (2007c) 'Monitoring techniques for vertebrate pests: foxes.' (NSW Department of Primary Industries, Bureau of Rural Sciences: Orange).

Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 3.2. Updated August 2012. Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane.

New Ground (2014). Koala Offset Assessment Report, Peak Crossing (Lots 86 RP892014, 87 RP892014, 88 RP892014 and 89 RP892014). New Ground Environmental, Robina Qld.

UQ (2015) Koala density survey of Koala Crossing, Compiled by Dr Bill Ellis and Dr Sean Fitzgibbon.

Wildlife Friendly Fencing Project (2014). *Friendly Fencing (guidelines)* - http://www.wildlifefriendlyfencing.com/WFF/Friendly_Fencing.html . Accessed 5 November 2014.

Woosnam-Merchez, O., Cristescu, R., Dique, D., Ellis, W., Beeton, R., Simmonds, J. and Carrick, F. (2012) What faecal pellet surveys can and can't reveal about the ecology of koalas *Phascolarctos cinereus*. *Australian Zoologist* 36: 192-200.

APPENDIX A

Proposed Offset Area Plan & Offset Area





Legend

-  EPBC 2016_7723
-  EPBC 2014/7190
-  EPBC20137047



Defence Housing Offset Area



Author: T. Pritchard, QTFN
 Date: 20/1/18
 Source: Cadastre Boundaries.
 Data supplied by: Geoportal
<http://131.104.10.10/geoportal/infocentre.jsp?gov.au/ntb/epbc/infocentre/index.page>
ACCURACY STATEMENT
 Due to varying features of data, spatial locations may not coincide when overlaid.

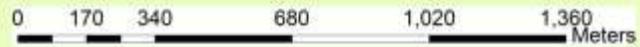


Legend

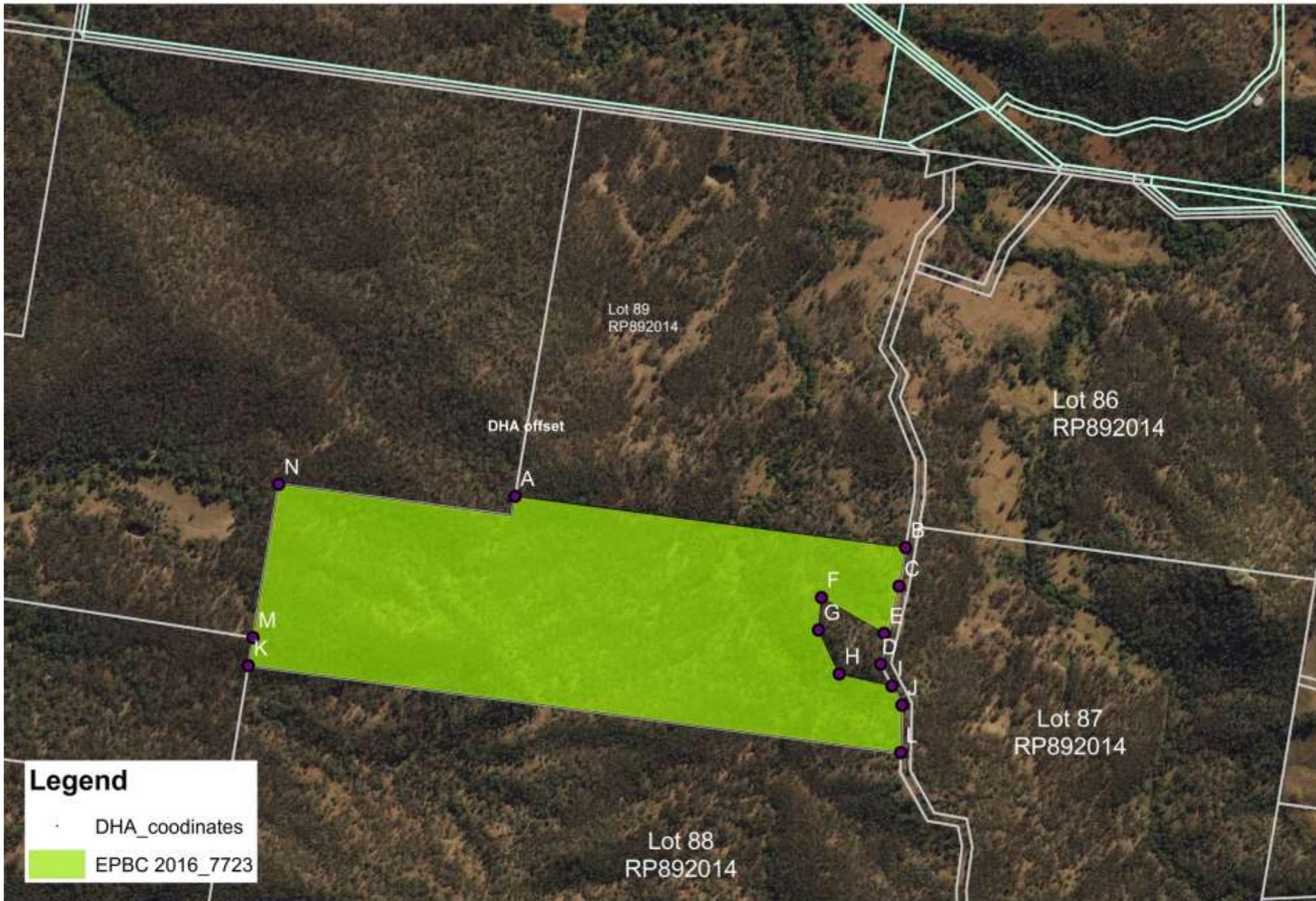
-  Rural B
-  Rural E



Defence Housing Offset Area



Author: T. Pritchard, QTFN
Date: 20/1/18
Source: Cadastre Boundaries
Data supplied by QTFN
<http://qtfnspace.information.qld.gov.au/cadastre/qtfncadastre/index.page>
ACCURACY: 1:50,000
Due to varying accuracy of data, spatial locations may not coincide when overlaid.

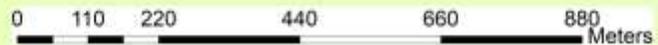


Legend

- DHA_coordinates
- EPBC 2016_7723



**Defence Housing Offset Area
Coordinates**



Author: T.Fordham, QTFN
 Date: 28/1/18
 Source: Cadastre Boundaries
 Data supplied by QGOVEP
 Any information is provided "as is" without any representation or
 ACCURACY STATEMENT
 Due to varying sources of data, spatial locations may not coincide
 when overlaid

APPENDIX B

Koala Offset Management Plan



APPENDIX C

UQ Koala Density Survey June 2015



Koala Assessment at the Queensland Trust For Nature “Koala Crossing” Property

June 2015

Koala Assessment at the Queensland Trust For Nature “Koala Crossing” Property

June 2015

Report prepared by:

Dr Sean FitzGibbon & Dr William Ellis

Koala Ecology Group, The University of Queensland, St Lucia QLD 4072

Acknowledgements:

This report presents the findings of a considerable survey effort conducted at the Queensland Trust For Nature site named “Koala Crossing” at Peak Crossing, Queensland. The survey would not have been possible without the assistance of a large number of volunteers who donated their time and effort. The authors would like to acknowledge these volunteers for their assistance as well as the staff at QTFN (Tanya Pritchard, Felicity Shapland and Ben O’Hara) for their efforts in coordinating and conducting the survey.

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KOALA ASSESSMENT OF QTFN “KOALA CROSSING” PROPERTY

1. Background

This report provides an initial assessment of the distribution and abundance of koalas at the Queensland Trust For Nature (QTFN) property named “Koala Crossing” (hereon referred to as “the site”). The 379ha site is located at Peak Crossing in South East Queensland (Scenic Rim local government area) and comprises four parcels of land, as follows: Lot 86 on RP892014, Lot 87 on RP892014, Lot 88 on RP892014 and Lot 89 on RP892014.

The site spans a variety of landforms and state government mapping identifies three regional ecosystems as occurring on the site, as outline below in Table 1. These ecosystems are dominated by spotted gums (*Corymbia citriodora* subsp. *variegata*) and narrow-leaved ironbarks (*E. crebra*) and contain various other “gum tree” species, many of which are recognized as koala food trees. The remainder of the Koala Crossing site is mapped as non-remnant regrowth vegetation and includes grasslands that were formerly used for grazing purposes (see Figure 1). The vast majority of this regrowth is dominated by spotted gum and ironbarks. Some regrowth areas on the site contain old mature trees that most likely survived historical clearing efforts. This is especially true of some of the large blue gums (*Eucalyptus tereticornis*) fringing creeklines in the northern and eastern extents of the site. The riparian vegetation in these areas was probably once part of regional ecosystem 12.3.7, dominated by blue gum and river oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*), with fringing *Melaleuca* spp. woodland

Table 1. Regional Ecosystems identified on the QTFN Koala Crossing site.

RE ID	Description	VMA class	Biodiversity status
12.9-10.2	<i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus crebra</i> open forest on sedimentary rocks	Least concern	No concern at present
12.9-10.7	<i>Eucalyptus crebra</i> +/- <i>E. tereticornis</i> , <i>Corymbia tessellaris</i> , <i>Angophora</i> spp., <i>E. melanophloia</i> woodland on sedimentary rocks	Of concern	Of concern
12.8.24	<i>Corymbia citriodora</i> subsp. <i>variegata</i> open forest on Cainozoic igneous rocks especially trachyte	Endangered	Endangered

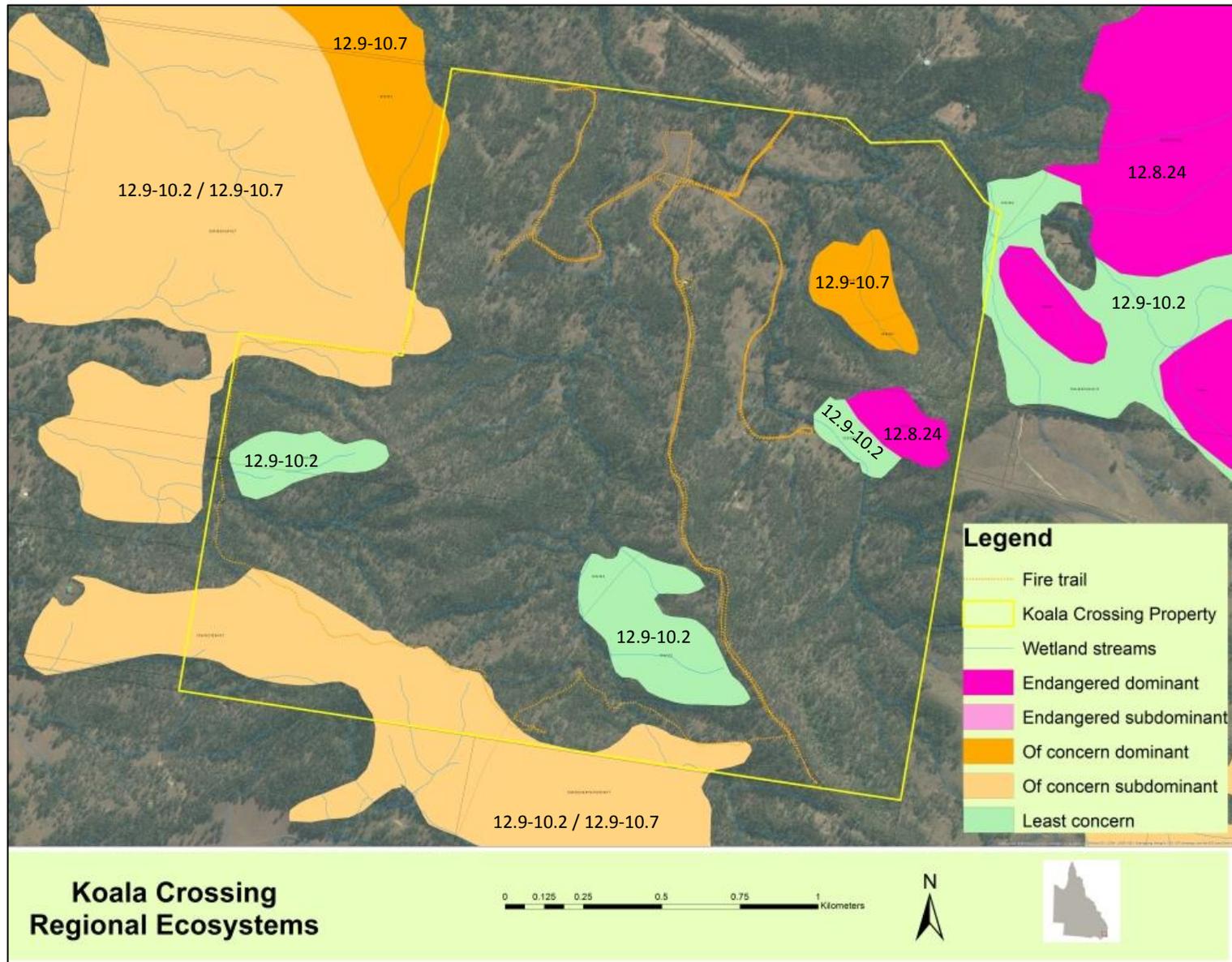


Figure 1. Aerial image of the QTFN “Koala Crossing” site showing the mapped regional ecosystems (refer to Table 1 for RE descriptions). The balance of the site is mapped as non-remnant regrowth vegetation which includes the cleared grasslands that were formerly used for grazing.

2. Methods

To assess the distribution and abundance of koalas at the Koala Crossing site we employed the following two techniques:

1. Scat searches

The presence of koala scats in an area provides unequivocal evidence of koala utilisation. We conducted systematic scat searches across the property using an approach that was based on the Koala Rapid Assessment Method (see Woosnam-Merchez *et al.* 2012). At each plot a central tree was chosen at random and tagged. The area around the base of this tree and the nearest 30 trees (with diameter at breast height >10cm) was examined for koala scats. For each tree the search effort was focused on the area within 1m of the trunk but could also include more distal areas. Searches were carried out by experienced koala ecologists supervising teams of trained volunteers. If there was any doubt regarding the identity of located scats then the volunteers sought the opinion of the koala ecologists. Where very fresh scats were found a brief visual search of the immediate area was conducted to determine if a koala was still present.

In total, 17 plots were assessed across the property (Figure 2 and Appendix 1 for GPS coordinates). Due to access difficulties and occupational health and safety concerns, it was not possible to ensure an even distribution of plots across the entire site.

2. Koala searches

Visual searches for actual koalas were conducted in targeted areas of the property. This included those areas where koalas had been seen previously as well as those habitats that were considered most likely to contain koalas (e.g. riparian areas dominated by blue gum *Eucalyptus tereticornis*). Searches were conducted by day as well as at night (with the aid of spotlights), both on-foot and from a slow-moving vehicle. Searches were conducted by experienced koala ecologists and QTFN staff.



Figure 2. Aerial image of Koala Crossing showing the location and plot number for the 17 plots that were searched for the presence of koala scats.

3. Results and Discussion

3.1 Scat searches

Of the 17 plots that were searched at the site, koala scats were found at all but four (76% detection rate). This finding is consistent with previous fauna surveys at Koala Crossing which found koala scats were widespread across the site. Koala scats were not found at plots 3, 9, 12 and 13, all of which were located in the eastern extent of the site (see Figure 3). The absence of scats from plots 3 and 13 highlights how localised koalas can be in their use of habitat, given that scats were detected very nearby at plots 2 and 14, respectively. This point is also supported by the absence of scats at plots 9 and 12 despite the sighting of a koala less than 120m from each plot, the day prior to the scat survey (see Section 3.2 and Figure 4).

Koala scats were found under a variety of tree species including spotted gum (58% of all detections), narrow-leaved ironbark (21%), blue gum (11%), brush box (*Lophostemon confertus*, 5%) and an unidentified bloodwood species (*Corymbia* sp., 5%). However, these scat distribution data cannot be used to draw conclusions about dietary preferences, as the two are often poorly correlated (see Ellis *et al.* 2002).

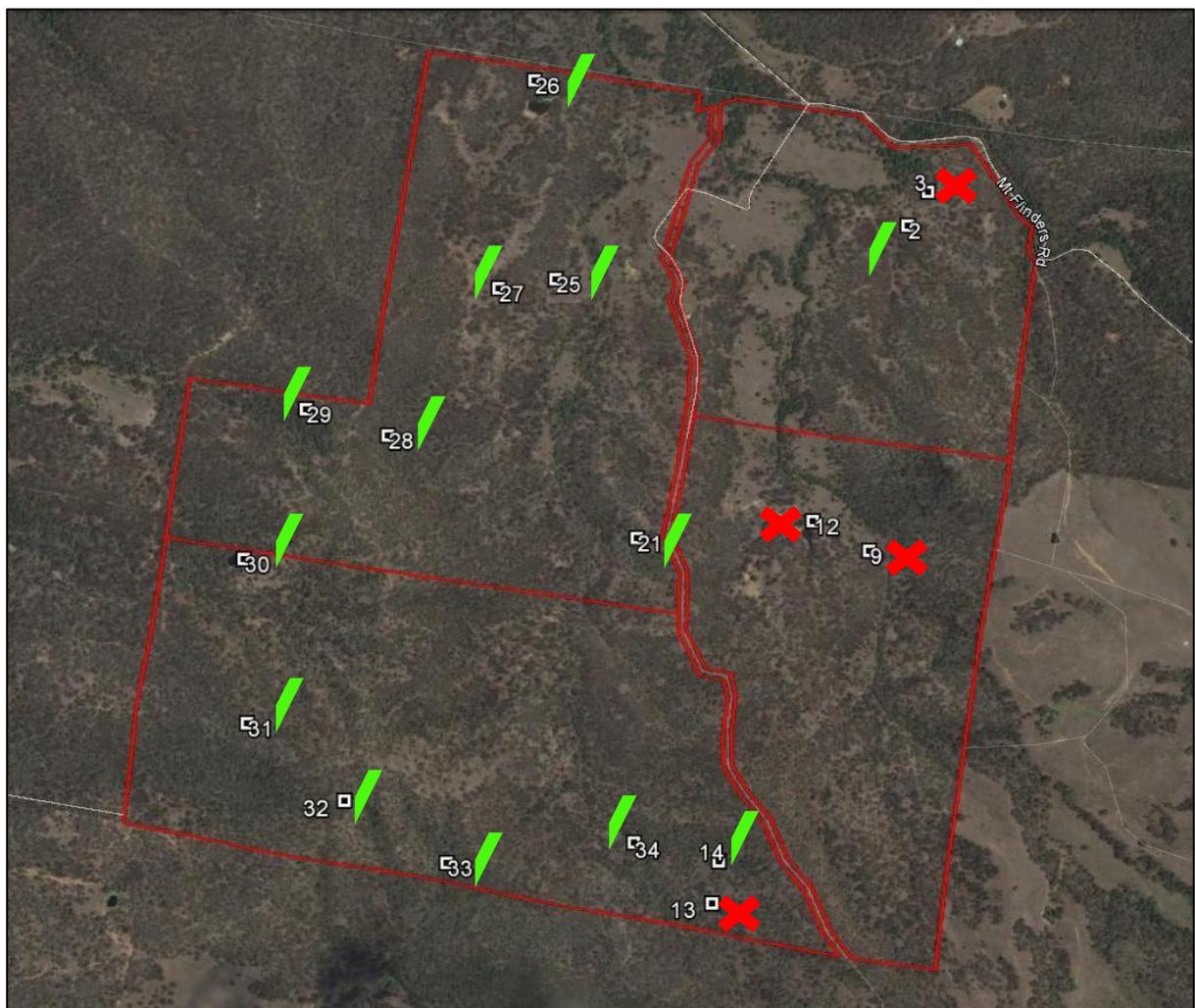


Figure 3. Aerial image of Koala Crossing showing those plots where koala scats were found (green tick) and those where they were not detected (red cross).

Of the 13 plots where koala scats were detected, the mean (\pm standard error) number of trees that were examined before scats were found was 11.2 ± 2.0 (see Table 2). This statistic provides a baseline measure of the search effort required to locate koala scats (at those plots where they were detected), against which future survey effort can be compared as a crude measure of koala utilisation of the site. This statistic expands on simply looking at presence/absence of scats at the survey locations. In theory, if the abundance of koalas increases across the Koala Crossing site then this may be detected by 1. A higher proportion of plots containing koala scats (current detection rate of 76%), and 2. A reduced mean search effort before scats are detected at plots where they are present.

Table 2. Details on the presence/absence of koala scats at the 17 examined plots, as well as the required search effort (# trees examined) before scats were located.

<i>Plot</i>	<i>Koala scats detected</i>	<i>No. trees until detected</i>
2	yes	2
14	yes	6
21	yes	11
25	yes	16
26	yes	17
27	yes	28
28	yes	13
29	yes	9
30	yes	13
31	yes	6
32	yes	1
33	yes	7
34	yes	16
3	no	N.A.
9	no	N.A.
12	no	N.A.
13	no	N.A.
	Mean (\pm SE)	11.2 ± 2.0

3.2 Koala searches

Targeted searches of the site during 1st – 3rd June 2015 resulted in the sighting of two koalas. The first koala was a small female (named Blondie) that was found near to the entrance of the site (Figure 4). Blondie was sighted during initial searches on the 1st June 2015 and already had an ear-tag, as she was a hand-reared joey that was released at the site in early 2015 (N.B. her original location was not far from the site). Blondie may not yet be sexually mature but in late April 2015 a large male koala was seen resting only a few metres from her, near to her release location on Koala Crossing. The large male was untagged and no attempt was made to capture it.

On the 1st June 2015 a second koala was sighted during targeted searches. The koala was spotted in the upper canopy of an emergent spotted gum growing only 20m up-slope from the main creekline that runs north-south through the eastern extent of the site. This large male (named Claus) was untagged and was therefore captured for examination and tracking purposes. Claus was in excellent body condition (body score 8.5/10) and over 8.5kg. QTFN staff believe that Claus was not the same male that was seen with Blondie in April, based on body size and markings. Therefore, it is concluded that at least three koalas have been seen on the site during 2015. In addition, another rehabilitated koala was released on the site but this uncollared sub-adult male has not been seen since its release and is believed to have dispersed. Previous research has shown that sub-adult koalas in south-east Queensland are capable of dispersing considerable distances (>10km) over relatively short periods (see Dique *et al.* 2003).

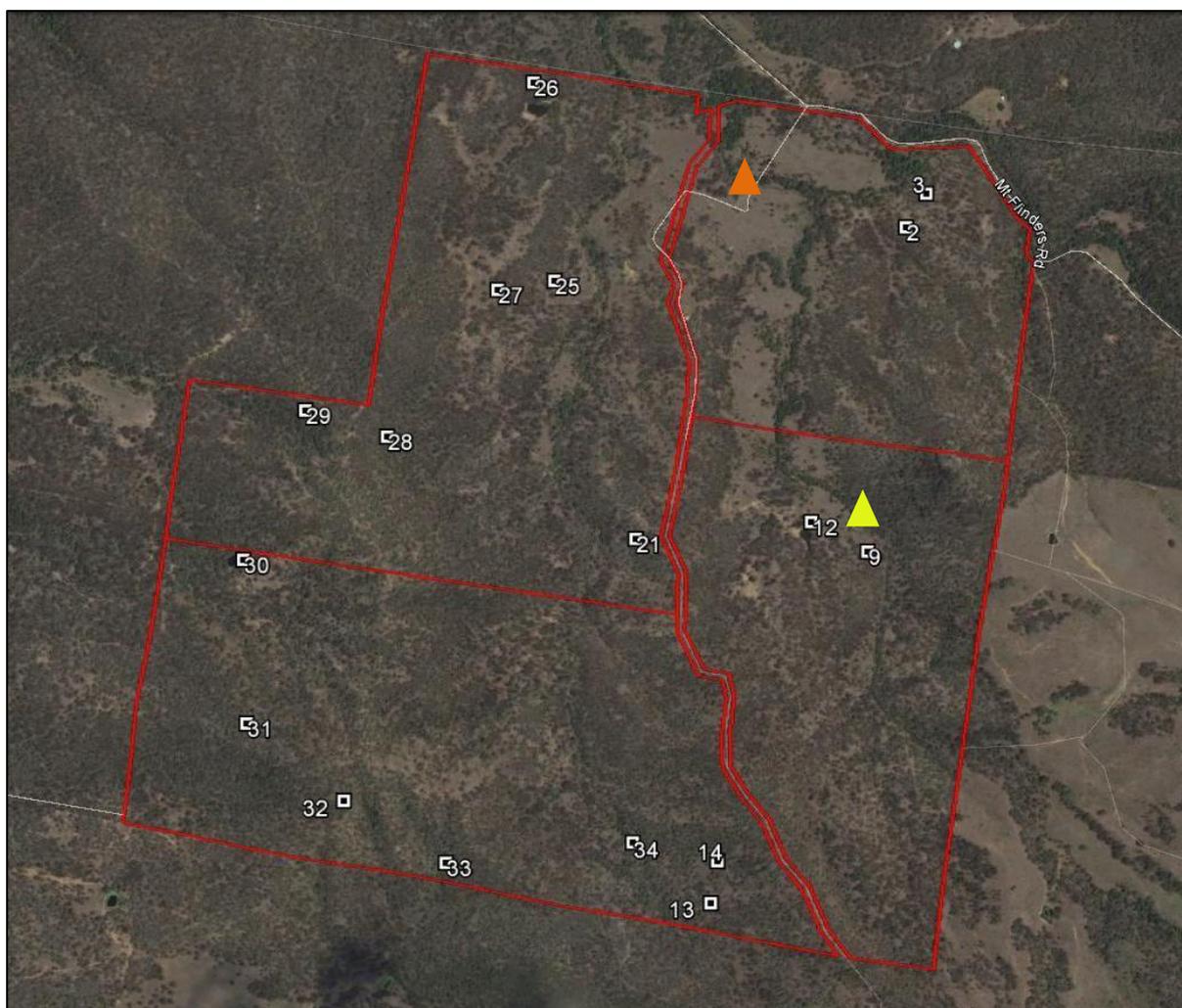


Figure 4. Aerial image showing the location of the two koalas sighted during the survey period (1st – 3rd June 2015); a female was sighted near to the property entrance (orange triangle) and a male was sighted near the creek in the eastern extent of the site (yellow triangle).

During the targeted searches both Blondie and Claus were found in riparian habitats. Both areas contained good numbers of blue gums as well as a variety of other tree species. Based on our experience at other research sites in south-east Queensland it is likely that the highest density of koalas on Koala Crossing will occur in these blue gum-dominated areas. This is likely given that blue gum is a widely favoured food tree and that the creekline habitats probably offer cooler sheltering environments during very hot weather (e.g. in the dense stands of tea tree). However, as the results of the scat searches clearly proved, the non-riparian habitats (mostly dominated by spotted gums and ironbarks) on Koala Crossing also provide habitat to koalas. It will be very interesting to plot the data that are currently being logged on the GPS collars being worn by Blondie and Claus, once they are retrieved. These data will provide extremely valuable insights on habitat use and home range size of koalas in the local environment. It is suggested that for large males (such as Claus), home range size may be quite large (>50ha), relative to the average home range size of male koalas in more coastal environments (e.g. Redlands and Gold Coast, 5-20ha).

4. Conclusions

The results of the scat searches show that koala utilisation of the site is widespread, with koala scats detected at 76% of examined plots. Scats were found in a variety of habitats including those dominated by regrowth spotted gums and ironbarks on slopes with poorer soils. Although it was not possible to conduct searches in a large area towards the centre of the site, there is no reason to expect a lower level of utilisation than was found elsewhere, given the habitat similarities. Two koalas were found during the survey period (1F, 1M) and based on appearances, it is suggested that a different male has been seen residing near to the sighted female earlier this year.

It is extremely difficult to extrapolate koala densities from scat surveys, especially in areas where there has been no research into the correlation between scat distribution/density and koala abundance. Although koala scats were found across most of the survey plots, it is not known if these scats were deposited by a few wide-ranging koalas or by many koalas with small ranges. However, given that only two koalas were sighted during the survey period it is suggested that the former is more likely. Further, much of Koala Crossing is dominated by spotted gums and ironbarks growing on relatively poor soils, habitats which are generally associated with low-density koala populations. In the absence of detailed home range estimates (which will be derived using collar data from Claus and Blondie), it is presumed that koalas occupy relatively large home ranges at the site (>20-50ha). Therefore, based on the size of the site (380ha), the widespread distribution of scats and the presumed large home range sizes, it is estimated that the site is currently utilised by 5 – 10 independent koalas.

Further research at the Koala Crossing site and neighbouring properties will shed more light on the distribution of koalas, their habitat preferences, home range sizes and other aspects of their ecology. Monitoring will also determine how these ecological aspects change through time, especially as the regrowth vegetation on the site matures.

5. References

- Dique, D.S., Thompson, J., Preece, H.J., de Villiers, D.L., Carrick, F.N. (2003) Dispersal patterns in a regional koala population in south-east Queensland. *Wildlife Research* **30**: 281-290.
- Ellis, W.A., Melzer, A., Carrick, F. and Hasegawa, M. (2002) Tree use, diet and home range of the koala (*Phascolarctos cinereus*) at Blair Athol, central Queensland. *Wildlife Research* **29**: 303-311.
- Woosnam-Merchez, O., Cristescu, R., Dique, D., Ellis, W., Beeton, R., Simmonds, J. and Carrick, F. (2012) What faecal pellet surveys can and can't reveal about the ecology of koalas *Phascolarctos cinereus*. *Australian Zoologist* **36**: 192-200.

6. Appendix 1

Location of the scat survey plots on Koala Crossing, including those that were marked but were not subsequently searched.

<u>Plot</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Search</u>
2	-27.7907600	152.7831900	completed
3	-27.7899800	152.7837200	completed
9	-27.7982300	152.7821700	completed
12	-27.7975500	152.7807300	completed
13	-27.8061800	152.7781200	completed
14	-27.8052300	152.7782900	completed
21	-27.7979400	152.7762100	completed
25	-27.7920000	152.7741100	completed
26	-27.7874100	152.7735600	completed
27	-27.79222533	152.7726525	completed
28	-27.7956181	152.7698747	completed
29	-27.7950164	152.7677668	completed
30	-27.7984181	152.7661531	completed
31	-27.8021279	152.7663196	completed
32	-27.8038601	152.7688210	completed
33	-27.8053217	152.7713566	completed
34	-27.8048575	152.7761370	completed
1	-27.7909000	152.7822100	not searched
4	-27.7888800	152.7817200	not searched
5	-27.7882800	152.7797200	not searched
6	-27.7888200	152.7784900	not searched
7	-27.7881400	152.7774200	not searched
8	-27.7897400	152.7781500	not searched
10	-27.7975700	152.7827800	not searched
11	-27.7971400	152.7822100	not searched
15	-27.8047100	152.7774800	not searched
16	-27.8064500	152.7787300	not searched
17	-27.8065300	152.7806900	not searched
18	-27.8053500	152.7799200	not searched
19	-27.8034800	152.7792500	not searched
20	-27.8043800	152.7793600	not searched
22	-27.7977200	152.7755100	not searched
23	-27.7972900	152.7750700	not searched
24	-27.7968800	152.7754100	not searched

APPENDIX D

Fire Management Plan





KOALA CROSSING FIRE MANAGEMENT PLAN

569 MT FLINDERS ROAD PEAK CROSSING



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1.0 Introduction

The Koala Crossing Fire Management Plan is an action orientated plan for use by field staff. The development of this plan has been guided by QTFN's Workplace Health and Safety Policy with information from the QPWS fire strategy template, Planned Burn Guidelines, adjacent reserve Fire Management Plans, in conjunction with a literature review of current fire research.

QTFN has a legislative responsibility under the Queensland Fire and Rescue Authority Act 1990 to ensure, as owner or occupier of land that it prevents fires from escaping its land and also ensure the property is as safe as possible from fire. Under this Act, in order of priority, protection must be afforded to life, property and the environment. In addition to the QFRA Act 1990 QTFN is bound to protect and conserve rare or threatened species or ecosystems under the Nature Conservation Act 1992 and the Environment Protection and Biodiversity Conservation Act 1999 (Cth).

1.1 Purpose

The purpose of this Fire Management Plan (hereby referred to as 'the Plan') is to provide direction for fire management on the Queensland Trust for Nature's Koala Crossing property. The plan aims to mitigate risks to people, property and environment associated with bushfire events and coordinate the prevention, preparation and response to bushfire events across the Koala Crossing property.

This Plan seeks to achieve this purpose by identifying fire management recommendations, conservation values, threats and management issues and applying these via a fire management zoning plan to provide local direction for fire management.

1.2 Related documents

The Southeast Queensland Bioregional Planned Burn Guidelines provide guidance for the fire management zones for this fire strategy ((QPWS) Enhanced Fire Management Team 2012). These guidelines detail fire management for fire vegetation groups. A fire management group is a group of related ecosystems that share common fire management requirements. Fire regimes prescribed in this strategy may diverge from the Bioregional Planned Burn Guidelines where an area has been allocated to an Asset Protection or Fire Exclusion Zone.

1.3 Objectives for fire management

The primary fire management objective for QTFN is the protection of life and property on the QTFN property and neighbouring lands.

In summary the primary objectives are:

- Protection of life and property on Koala Crossing and neighbouring areas;
- Reduce impacts from unplanned fires by a mitigation strategy of planned burns, fireline maintenance and mechanical fuel reduction;
- Minimise social impacts and adverse impacts on air quality;
- Protect the environmental and biodiversity values of Koala Crossing and adjacent reserves;
- Protecting the offset values and rehabilitation areas on the property;
- Maintain ecologically appropriate fire frequencies, distribution, seasonality and intensity.

2.0 Site description

2.1 Planning area

This fire strategy covers an area of 379ha and includes 4 lots which form Koala Crossing. The planning area (Map 1) is referred to as 'the property' throughout this document.

Fire is also managed collaboratively across the property boundary with adjacent Ipswich City Council Reserves and State Government land. This fire strategy does not apply to those lands but informs QTFN's position in development of cooperative planned burns and wildfire response.

2.2 Location and property overview

The Koala Crossing property is located at 569 Mount Flinders Road, Peak Crossing, Queensland approximately 5 km east of Peak Crossing and 20 km south of Ipswich within the Southeast Queensland Bioregion. The site is identified as Lots 86, 87, 88 and 89 on RP892014 and is approximately 379.12 ha in area. The tenure of the site is freehold and the site is included within the Scenic Rim Regional Council local government area (LGA). The site is surrounded by rural and rural residential properties, a conference centre and the Flinders - Goolman Conservation Estate.

The topography of the property is generally hilly with a Peak (a granite extrusion) protruding from the surrounding landscape. The flat areas consist of floodplains with low lying ephemeral creeks and gullies.

In July 2014, QTFN purchased the property with the aim of protecting the regrowth vegetation from potential clearing and investigating the potential of utilising the property for offsets. Part of the property has already been secured under a koala offset with further areas to be secured in future years. QTFN is investigating the opportunity for reconfiguring the lots with the aim of selling 3 for residential purposes and the remaining larger lot to be secured under a nature refuge.

Koala Crossing was previously part of a larger holding that was utilised mainly for grazing for cattle and horses.

2.3 Conservation values

According to GIS analysis of the 379Ha property

- 9% is cleared
- 18% is classified as remnant
- 73% is classified as regrowth of varying age.

The property has 5 regional ecosystems (Table 5), of which two have a status as 'endangered'. The vegetation communities include a mix of eucalypt woodlands and open forest communities. The communities are largely fire adapted or naturally exclude fire. Introduced pasture grasses are evident across this reserve with lantana (*Lantana camara* and *lantana montevidensis*) the most prevalent weed species.

Over 100 species of native plants and animals have been recorded for the property, including many considered significant. This includes three 'vulnerable' species as per the EPBC and/or NCA (Table 6). Some of these species are fire sensitive or have specific fire requirements and therefore can be a useful indicator of appropriate application of fire. They can also act as umbrella species as it is assumed that if suitable fire regimes maintain indicator species they would also provide habitat protection for a large array of other native species utilising the same habitat.

2.4 Climate

Climate in the region is characterized by summer rain and dry winters. The closest weather station is Lyons Albert 8 km east of the property. The annual rainfall for is about 685mm, with highest rainfall received between November and March. June to October are typically characterized by a long period of no significant rainfall from a fire perspective.

The core fire season is typically from June to December; however fire can occur during all months of the year depending on weather conditions and curing of fuel. Implementation of a planned burn program would usually occur from April and continue through much of the fire season due to variability in habitats.

August to October typically provide the most difficult fire conditions with lower humidity's, higher winds and fully cured fuel.

2.5 Fire history

The property has traditionally managed using traditional grazing practices with little active fire management. Grazing has minimized the fuel loads however there have been three hot wildfires since 1994. The largest of these wildfires occurred in 2012 check covering an area of ? and large areas of the adjacent reserve. This hot fire resulted in the death of mature trees and is believed to significant negative impact on the local wildlife including the brush-tailed rock wallaby (pers comm.).

Queensland Government bushfire hazard area mapping indicates that areas of high and medium high fire intensity occur within the property. This is reflected within the Ipswich Planning Scheme 2006 which has the majority of the property mapped within the Bushfire Risk Area (New Ground 2014).

2.6 Infrastructure

There are a number of constructed assets located within the property or in close proximity to the boundary.

On Koala Crossing:

- 3 Bay shed with separate shower and septic toilet, serviced by 15,000 litre concrete water tank;
- Boundary fencing, approximately 80% of the total 379 hectare property has fencing. Most internal fencing has been removed;
- Sealed road running through the centre of the property from north to south, offering multiple access points to all lots;
- Fire access trails and signage (Map 2); and
- 4 dams.

In surrounding areas:

- Ivory's Rock conference centre;
- Neighbours residences and infrastructure;
- Powerlink transmission line;
- Rural and rural residential properties;
- Ipswich City Council recreation facilities; and
- Ipswich City fire access trails and signage.

3.0 Fire Management Zoning Plan

3.1 Fire Management Zones

Various landscape elements within the Koala Crossing property have been ascribed a particular zone based on the ecological requirements of the subject vegetation or the presence of assets likely to be at risk from fire (Map 3. Fire Management Zone Map and Map 4. Regional ecosystems).

There are three fire management zones described as:

- Asset Protection Zone
- Fire Exclusion Zone
- Bushfire Zone

3.2 Asset Protection Zone

The purpose of the asset protection zone is to create an area of reduced fuel to provide a high level of protection to life, property and infrastructure. There are two small asset protection zones which include the shed, water tank, outdoor bathroom and dipping shed. The Asset Protection Zones fuel is managed by planned burning and mechanical means (e.g. mowing).

Management prescriptions also include maintenance of nearby firelines and removal of leaf litter build up on the shed roof and gutters.

Asset Protection zones are depicted in Map 3 and their management is described below in Table 1.

Table 1. Asset Protection Zones for fire management within Koala Crossing

Sub Zone	Location and Description	Aim(s)	Fire Management
P1 1ha	Shed, shower block and toilet	Prevent damage to infrastructure from planned and unplanned fires through maintaining a buffer of 30m around infrastructure.	<p>Remove fallen timber and debris around buildings, cleaning gutters and generally keep area free from debris and combustible vegetative fuels.</p> <p>Mow or brushcut around infrastructure prior to the fire season and prior to planned burns and during the fire season as required. Ensure grass height does not exceed 150mm throughout the year.</p> <p>Tree crowns should be separated by 2 to 5 meters, and the canopy should not overhang within 2 to 5 meters of any asset. Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 30% of the area. Implement low intensity planned burns every 2-3 years in the dry season in adjacent areas.</p>
P2 .2ha	Old dip, yards and water tank	Prevent damage to infrastructure from planned and unplanned fires through maintaining a buffer of 30m around infrastructure.	As for P1

3.3 Fire Exclusion Zone

The fire exclusion zones require a more precautionary approach to fire management, where the focus for these zones and adjacent areas is on fuel reduction rather than ecological outcomes. The riparian areas are fire sensitive communities and therefore fire should be excluded where possible (Queensland Herbarium 2011). Prescribed burns should be planned to avoid fire entering these sites by the careful application of burn prescriptions (Refer Map 4. Regional ecosystems).

Table 2. Fire Exclusion Zones for fire management within Koala Crossing

Sub Zone	Location and Description	Aim(s)	Fire Management
FE1	Tree plantings 8 ha, tree plantings adjacent to riparian areas. Pasture on alluvial plains.	<ul style="list-style-type: none"> Prevent damage to plantings from planned and unplanned fires through maintaining a buffer of 25m around planted areas. 	<p>Mow or brushcut around planted areas prior to the fire season and prior to planned burns and during the fire season as required. Ensure grass height does not exceed 200mm in fire season.</p> <p>Maintain existing fire line lines. Construct new fire lines if increased protection and risk management is required due to high fuel loads in other parts of the property.</p> <p>Implement low intensity planned burns as necessary in the dry season in adjacent areas.</p>
FE2	Riparian areas (Contain some vine forest dominated communities and areas of 12.3.7 <i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>Cunninghamiana</i> +/- <i>Melaleuca</i>)	<ul style="list-style-type: none"> As much as possible prevent damage to riparian areas from planned and unplanned fires. To maintain community composition and structure To reduce abundance of <i>Lantana camara</i> where dominant in the understory. 	<p>Maintain existing fire line lines. Construct new fire lines if increased protection and risk management is required due to high fuel loads in other parts of the property.</p> <p>Implement low intensity planned burns as necessary in the dry season in adjacent areas.</p> <p>Manual clearing of <i>lantana</i> in the understory is required to minimise damage from fire.</p> <p>Wildfires occurring between 20 and 100 + years will provide the occasional high intensity fire needed to regenerate eucalypt species.</p>

3.4 Bushfire Zone

The purpose of Bushfire zones is to maintain ecosystem health and function values through producing and maintaining a mosaic pattern of vegetation with areas of varying age since fire. The bushfire zones are defined by the regional ecosystem groups (Map 4) but also need to reflect the practical implementation of planned burns and the use of firelines which don't follow vegetation boundaries. These areas also refer to the areas of vegetation that are designated offset areas. Fire-sensitive riparian areas within this zone should follow a fire regime of 'limited fire encroachment'. These communities are often self protecting due to topography, moisture, microclimates and fuel characteristics. However, in some cases they may warrant additional protection to ensure fire exclusion. Refer to Fire Exclusion Zones.

The Bushfire Zones adjacent to Asset Protection Zones and Fire Exclusion Area require a more precautionary approach. Burning around these areas are referred to as hazard reduction burns. A shorter inter-fire period 7-12 years has been nominated for all sub-zones as opposed to 7-20 for

ecological burns within the Bushfire Zones. The primary driver for hazard reduction within the FEZ will be the fuel load monitoring results derived from the fire monitoring program.

Strategically located tracks, natural firelines and previously burnt vegetation will be used to contain planned burns in the bushfire zone. As mosaic burning practices become well developed the reliance on tracks and other constructed control lines may diminish because fires (planned burns or wildfires) can be allowed to burn until they reach areas where the fuel has previously been reduced and the fire can be more easily controlled (Stanton 1993).

There are areas of mid-stratum woody thickening in the open forests resulting from previous disturbance. The thickening of trees has resulted in a lower diversity in the ground stratum due to shading and less fine fuel to carry future fires. In these areas it may be difficult to re-introduce fire and the fire intensity may be higher and reach into the canopy when the community does burn. This may promote the further regeneration of woody species rather than grasses and herbs. Scorch height to reduce overabundant saplings of *Corymbia tessellaris* Moreton Bay Ash and *Corymbia citriodora* Spotted gum requires scorching to the tip. In general late summer burning is preferable to provide higher scorch and better conditions for grass recovery. It is possible that more than one planned burn will be required to manage this issue using moderate severity fires to reach higher scorch heights. If the initial fire triggers a flush of new seedlings, follow-up planned burn as fuel allows for low to moderate severity fire.

Prescribed burning plans will need to be developed in conjunction with neighboring properties.

Table 3. Bushfire Zones for fire management within Koala Crossing

Fire Subzone	Aims/Issues	Fire Management Regime	Special attention required
<p>B1 (12.9-10.7)</p> <p>22 ha of Eucalypt woodland with grassy/shrubby understory.</p>	<ul style="list-style-type: none"> Produce and maintain a mosaic pattern of vegetation with areas of varying age since fire. Low intensity planned burns to maintain vegetation composition, structural diversity and fauna habitats. Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. 	<ul style="list-style-type: none"> Low intensity fires every 4 - 25 years. Burn when sufficient soil moisture is present, generally early dry season. Occasional moderate intensity fire generally in the storm season to maintain structure. 40–60 % mosaic (adjust as appropriate) of burnt patches. Aiming for > 90 % of clumping grass bases remaining as stubble after fire. 	<p>Habitat for the vulnerable Koala. Burn with good soil moisture to protect habitat trees. Loss of mature trees in the woodlands needs to be minimised through low intensity patchy fires.</p> <p>Where exotic grasses such as Guinea grass/blady grass are dominant, fire should be implemented under mild conditions to minimise tree deaths and impacts on wildlife.</p> <p>Too frequent fires (< two years) will promote the spread of blady grass.</p> <p>Maintain protection buffer around identified significant trees such as <i>Brachychiton</i> sp and <i>Casuarina</i> sp. and known habitat trees where practicable.</p> <p>Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved.</p>

<p>B2 (12.3.3, 12.9-10.7)</p> <p>6 ha of Eucalypt woodland on alluvial plains.</p>	<ul style="list-style-type: none"> • Produce and maintain a mosaic pattern of vegetation with areas of varying age since fire. • Low intensity planned burns to maintain vegetation composition, structural diversity and fauna habitats. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. 	<ul style="list-style-type: none"> • Low to moderate intensity fires with a range of intervals between 3 – 7 years • Occasional moderate intensity fires to assist in weed control. 1 in every 10 years. • Burning of woodlands should occur when sufficient soil moisture is present. • 40–60 % mosaic (adjust as appropriate) of burnt patches. • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. 	<p>A shorter inter-fire period 3-7 years has been nominated as opposed to 3-25 for ecological burns. The primary driver for hazard reduction within B2 will be the fuel load monitoring results derived from the fire monitoring program.</p> <p>Burn adjacent vegetation under conditions where fire does not penetrate riparian communities or only trickles in at low intensity.</p> <p>Habitat for the vulnerable Koala. Burn with good soil moisture to protect habitat trees. Rake around known habitat trees where practicable. Loss of mature trees in the woodlands needs to be minimised through low intensity patchy fires.</p> <p>Where exotic grasses such as Guinea grass/blady grass are dominant, fire should be implemented under mild conditions to minimise tree deaths and impacts on wildlife.</p>
<p>B3 (12.3.3, 12.9-10.2 /12.9-10.7)</p> <p>9 ha of Eucalypt woodland/forest on alluvial plains. with grassy, shrubby understorey</p>	<ul style="list-style-type: none"> • Protect these communities from fire damage. • Prevent high intensity fires, exacerbated by introduced grass species and lantana. 	<ul style="list-style-type: none"> • Exclude fire to protect tree plantings. 	<ul style="list-style-type: none"> • Effort is required to protect adjacent riparian areas. Reduce fuel loads in adjacent vegetation or burn in mild conditions. • Implement herbicide control of lantana and pasture weeds.

<p>B4 (12.3.3, 12.9-10.2)</p> <p>42 ha of Eucalypt woodland/forest on alluvial plains.</p> <p>Includes open pasture on alluvial plains and tree plantings adjacent to riparian areas.</p>	<ul style="list-style-type: none"> • Protect tree planting area within Fire Exclusion Zone from fire damage. • Prevent high intensity fires, exacerbated by introduced grass species and lantana. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. 	<ul style="list-style-type: none"> • Low to moderate intensity fires every 3 - 12 years. • Priority block for hazard reduction. • Burn when sufficient soil moisture is present, generally early dry season. • Occasional moderate intensity fires to assist in weed control (<i>Lantana camara</i>). 1 in every 10 years. • Implement herbicide control of lantana and pasture weeds. • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. • 40–60 % mosaic (adjust as appropriate) of burnt patches. Up to 25ha/fire season burnt in planned fires. 	<p>A shorter inter-fire period 7-12 years has been nominated as opposed to 7-25 for ecological burns. The primary driver for hazard reduction within B6 will be the fuel load monitoring results derived from the fire monitoring program.</p> <p>Some sections of this zone contain an understory of regenerating vine forest. Burn adjacent vegetation under conditions where fire does not penetrate riparian communities or only trickles in at low intensity.</p> <p>Where planned burning is identified as a control option for an approved weed management activity, burn frequency may be implemented at one year intervals but may not be carried out for more than three (3) consecutive years. Fire should be excluded for a period of at least four (4) years following an increased burn frequency to manage weeds. Ecological burn can be used to reduce lantana when climatic and soil moisture conditions prevail. <i>Lantana montevidensis</i> needs to be managed by a combination of fire and herbicide. Spraying with herbicide is most effective on post fire regeneration.</p> <p>Maintain protection buffer around identified significant trees such as <i>Brachychiton</i> sp and <i>Casuarina</i> sp. and known habitat trees where practicable.</p>
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<p>B5 (12.8.24, 12.9-10.2)</p> <p>23 ha of Eucalypt forest with shrubby/grassy understory on rocky hillslopes with patches of rocky heath on rock outcrops and vine forest dominated riparian areas</p>	<ul style="list-style-type: none"> • Produce and maintain a mosaic pattern of vegetation with areas of varying age since fire. • Low intensity planned burns to maintain vegetation composition, structural diversity and fauna habitats. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. 	<ul style="list-style-type: none"> • Low to moderate intensity fires every 4 - 25 years. • Burn when sufficient soil moisture is present, generally early dry season. • Occasional moderate intensity fire generally in the storm season to maintain structure. • 40–60 % mosaic (adjust as appropriate) of burnt patches • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. 	<p>Habitat for the vulnerable brush-tailed rock-wallabies.</p> <p>B5 contains elements of rocky heath vegetation and vine forest dominated riparian communities. Rocky heath requires an inter-burn period of 10 – 15 years.</p> <p>Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved.</p>
<p>B6 (12.9-10.2)</p> <p>16 ha of Eucalypt forest. The understorey may be grassy, shrubby or mixed.</p>	<ul style="list-style-type: none"> • Protect built infrastructure through fuel reduction • Prevent high intensity fires, exacerbated by introduced grass species and lantana. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. 	<ul style="list-style-type: none"> • Low intensity fires every 4 - 12 years. • The burns in this zone referred to as hazard reduction burns. • Burn when sufficient soil moisture is present, generally early dry season. • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. • 40–80 % mosaic (adjust as appropriate) of burnt patches. 	<p>A shorter inter-fire period 4-12 years has been nominated as opposed to 4-25 for ecological burns to protect adjacent Asset Protection Zone. The primary driver for hazard reduction within B6 will be the fuel load monitoring results derived from the fire monitoring program.</p> <p>Rake around known habitat trees where practicable.</p> <p>Implement herbicide control of lantana and pasture weeds.</p>

<p>B7 (12.9-10.2)</p> <p>58 ha of Eucalypt forest. The understorey may be grassy, shrubby or mixed.</p>	<ul style="list-style-type: none"> • Produce and maintain a mosaic pattern of vegetation with areas of varying age since fire. • Low intensity planned burns to maintain vegetation composition, structural diversity and fauna habitats. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. • Reduction in woody thickening 	<ul style="list-style-type: none"> • Low to moderate intensity fires every 4 - 25 years. • Burn when sufficient soil moisture is present, generally early dry season. • Occasional moderate intensity fire generally in the storm season to maintain structure. • 40–60 % mosaic (adjust as appropriate) of burnt patches • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. 	<p>Habitat for the vulnerable brush-tailed rock-wallabies.</p> <p><i>Woody thickening:</i> A thickening of trees in some areas has resulted in a lower diversity in the ground stratum due to shading and less fine fuel to carry future fires. It is possible that more than one planned burn will be required to manage this issue using moderate severity fires to reach higher scorch heights.</p> <p>Maintain a mosaic of grassy and shrubby understoreys.</p>
<p>B8 (12.9-10.2)</p> <p>14 ha of Eucalypt forest. The understorey may be grassy, shrubby or mixed.</p>	<ul style="list-style-type: none"> • Produce and maintain a mosaic pattern of vegetation with areas of varying age since fire. • Low intensity planned burns to maintain vegetation composition, structural diversity and fauna habitats. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. • Approx. 80% of grass tree skirts burnt with living shoots emerging. 	<ul style="list-style-type: none"> • Low to moderate intensity fires every 4 - 25 years. • Burn when sufficient soil moisture is present, generally early dry season. • Occasional moderate intensity fire generally in the storm season to maintain structure. • 40–60 % mosaic (adjust as appropriate) of burnt patches. • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. 	<p>Maintain protection buffer around identified significant trees such as <i>Brachychiton</i> sp and <i>Casuarina</i> sp. and known habitat trees where practicable.</p> <p>Control of weeds is a major focus of planned burning in most areas.</p> <p>Variability in season and fire intensity is important, as well as spot ignition in cooler or moister periods to encourage mosaics.</p> <p>Maintain a mosaic of grassy and shrubby understoreys. Habitat contains fire trails which can be utilized for lighting planned fires but also creates risk for users in unplanned fires.</p>

<p>B9 (13ha) B10 (33ha) B11 (94ha) B12 (38ha)</p> <p>(RE 12.9-10.2)</p> <p>Eucalypt forest with understorey grassy, shrubby or mixed. Riparian elements in gullies</p>	<ul style="list-style-type: none"> • Produce and maintain a mosaic pattern of vegetation with areas of varying age since fire. • Low intensity planned burns to maintain vegetation composition, structural diversity and fauna habitats. • Create a sufficiently burnt landscape to protect offset vegetation and minimise risk to staff and visitors from unplanned fires. • Approx. 80% of grass tree skirts burnt with living shoots emerging. 	<ul style="list-style-type: none"> • Low to moderate intensity fires every 4 - 25 years. • Burn when sufficient soil moisture is present, generally early dry season. • Occasional moderate intensity fire generally in the storm season to maintain structure. • 40–60 % mosaic (adjust as appropriate) of burnt patches. • Aiming for > 90 % of clumping grass bases remaining as stubble after fire. 	<p>This block contains vine forest elements within the understorey in gullies and low lying areas. These areas should be excluded from fire where possible.</p> <p>Maintain protection buffer around identified significant trees such as <i>Brachychiton</i> sp and <i>Casuarina</i> sp. and known habitat trees where practicable.</p> <p>Maintain a mosaic of grassy and shrubby understoreys.</p> <p>Habitat contains fire trails which can be utilized for lighting planned fires but also creates risk for users in unplanned fires.</p>
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4.0 Fire Management Considerations

5.1 Fuel loads

Fuel load assessment will be undertaken at representative sites within a number of fire blocks as part of an overall Fire-Monitoring Program. While fuel load is an important indicator of potential fire behaviour, consideration is also given to vegetation community type, the general health of each vegetation community and the length of time since the previous fire. Additional species fire requirements, particularly for threatened species, are also important (koala and brush-tailed rock wallaby).

As a general guide 10 tonnes per hectare is considered to pose a hazard (RFS 2003, Wilson 1992), though fuel loads of up to 12 tonnes and even 15 tonnes per hectare in less shrubby forests are acceptable (ICC 2009). Assessment of fuel loads and conditions is done in accordance with the State Government's Planned Burn Guidelines ((QPWS) Enhanced Fire Management Team 2012).

5.2 Prescribed fire

Burning within an appropriate inter-fire period, fire intensity, distribution and season, plays a vital role in ensuring that biodiversity values are maintained or enhanced. Table 6 below outlines an indicative prescribed burn schedule; however it should be recognised that constraints such as drought, environmental stress, and ideal weather conditions may compromise this schedule being strictly adhered to. Riparian areas are fire sensitive communities and therefore fire should be excluded from these zones where possible (QPWS 2012). Prescribed burns should be planned to avoid fire entering these sites by the careful application of burn prescriptions (Refer Map 4. Vegetation Type 2008). Opportunities should be taken to burn areas of lantana when weather and soil moisture conditions provide weed control advantages.

Table 6. Proposed Prescribed Fire

Block	Vegetation	Fire Regime	Proposed Burn Window
1	Eucalypt woodland	3-7 years	2016-2022
2	Eucalypt forest/woodland, Riparian	3-25 years	2016-2022
3	Eucalypt woodland, Riparian, tree planting areas	Fire exclusion	Fire exclusion
4	Eucalypt woodland, Riparian	3-7 years	2016-2022
5	Eucalypt Forest, Rocky Heath, Riparian	7-25 years	2022-2027
6	Eucalypt forest/woodland	3-25 years	2016-2022
7	Eucalypt Forest	7-25 years	2019-2024
8	Eucalypt Forest	7-25 years	2019-2024
9	Eucalypt Forest	7-25 years	2016-2022
10	Eucalypt Forest with vine forest elements	7-25 years	2019-2024
11	Eucalypt Forest with vine forest elements	7-25 years	2019-2024
12	Eucalypt Forest with vine forest elements	7-25 years	2019-2024

5.3 Fire lines

Construction of new fire trails should be avoided, where practicable, except where they can be constructed with minimal environmental impact. Creating fire breaks in steep country may be difficult and could lead to increased soil erosion. In such cases, planning the best positions for fire breaks will be carried out in conjunction with neighbouring properties with consideration given to difficult topography (Fire Lines Map 2, Difficult Topography Map 5).

5.4 Smoke management

The potential impacts of smoke and possible mitigation tactics must be considered when planning for wildfire suppression and prescribed burning operations. If smoke becomes a hazard on local roads or highways the police and relevant media must be notified.

5.5 Threatened fauna management

The management of threatened fauna, in particular the koala and brush-tailed rock-wallaby, needs to be taken into account in conducting wildfire or prescribed fire management activities. Management actions include:

- Protect large and hollow bearing trees;
- Consider breeding season, nesting sites and food sources;
- Avoid inter-fire intervals outside of current ecological guidelines;
- Avoid high intensity fires that consume tree canopies and fallen logs;
- Avoid the use of earth moving machinery in riparian areas; and
- Avoid fire including wildfire, backburning and prescribed fire as far as possible in riparian areas.

5.0 Monitor and review

Vegetation monitoring will occur pre and post fire to demonstrate any changes to species composition, a vital attribute of the health of any ecosystem, and subsequently assist the decision making process with respect to the ecology of each burn block in relation to any prescribed burning. In addition to this information, notes should be attached to the monitoring data describing the preceding environmental conditions (e.g. drought, storm event with resultant leaf/branch fall, rainfall above average). This information will assist to interpret the data particularly over time.

Post-fire evaluation will be undertaken for all burns in order to test the objectives of the burn so that management can be adapted if objectives are not being achieved. The evaluation will also assess the preparedness, response and management of fire events.

Post-fire evaluations should include the following information:

- Fire severity
- Fire extent
- Ignitron source (if known)
- Origin of the fire (ie adjacent property or onsite)
- Response timeline
- Fire management
- Summary of impacts to infrastructure and environmental values

6.0 Key Contacts

It is considered essential through all stages of fire planning and management that a spirit of cooperation with neighbours and other landholders is established. Communication with the Flinders Peak Fire Brigade and Ipswich City Council is vitally important for all fire related activities on the property.

Table 4: Key contacts related to the Plan

Company/Location	Contact person	Phone
QTFN Manager	Ben O'Hara	§11C(1)(a)
QTFN Ecologist	Tanya Pritchard	§11C(1)(a)
Conservation and Catchment Manager Ipswich City Council	Mark Panter	07 3810 6296
Natural Area Supervisor Ipswich City Council		07 3810 6666
DEHP - QPWS Boonah		07 5463 5041 §11C(1)(a)
Neighbour in south east corner – Lot	Chris Hamerton	§11C(1)(a)
Neighbour	Lewis and Faye Mayne	
Neighbour	Randolph Winks	
Neighbour - Dept of Transport & Main Roads		
Neighbour - Flycam	Bob Tozer	§11C(1)(a)
Flinders Peak Rural Fire Brigade 1 st Officer Peak Crossing RFB	Tom Armatage VHF 19	§11C(1)(a)
Ipswich Rural Fire Brigade	John Levack	§11C(1)(a)
Ivory's Rock Conference Centre	Dick Marriott	§11C(1)(a)
Police, Fire, Ambulance		000 or 112
Nearest Hospital is Ipswich Hospital Emergency	Chelmsford Avenue Ipswich	07 3810 1111

Neighbours shown on map in Appendix 1.

7.0 Equipment and consumables

The following sections details the list of equipment of consumables necessary for fire preparedness and management within Koala Crossing and neighbouring properties.

QTFN fire mitigation and management equipment on Koala Crossing includes:

- 1 x 4WD ute
- 1 x 400 litre ute mounted mop up fire fighting unit
- Bushfire fighting foam
- 1 x 19 litre knapsacks
- 1 x 1 litre drip torch
- 2 x fire rake hoes
- 10 x easy strike matches
- 2 x LED headlamp
- Personal protective equipment (2 x goggles, 2 x helmet, 2 x neck flap, 2 x smoke mask with filter,
- 2 x firepro gloves, 1 x Taipan fire boots, 1 x Wildland trouser and Fire coat)
- 1 x incident control folder

8.0 References

Department of Primary Industries and Fisheries 2007. Using fire in spotted gum - ironbark forests for production and biodiversity outcomes. The Department of Primary Industries and Fisheries, Queensland Government, Gympie.

Ipswich City Council, 2009. Flinders – Goolman Conservation Estate Tier 2: Management Plan Fire Management. ICC (unpublished).

New Ground 2014. Koala Offset Assessment Report, Peak Crossing prepared for Investa Residential Group Pty Ltd.

Personal Communication with Chris Hammerton, neighbouring property owner, February 2015.

Queensland Herbarium 2011. Regional ecosystem description database (REDD), version 6.0b, Department of Environment and Resource Management, Brisbane.

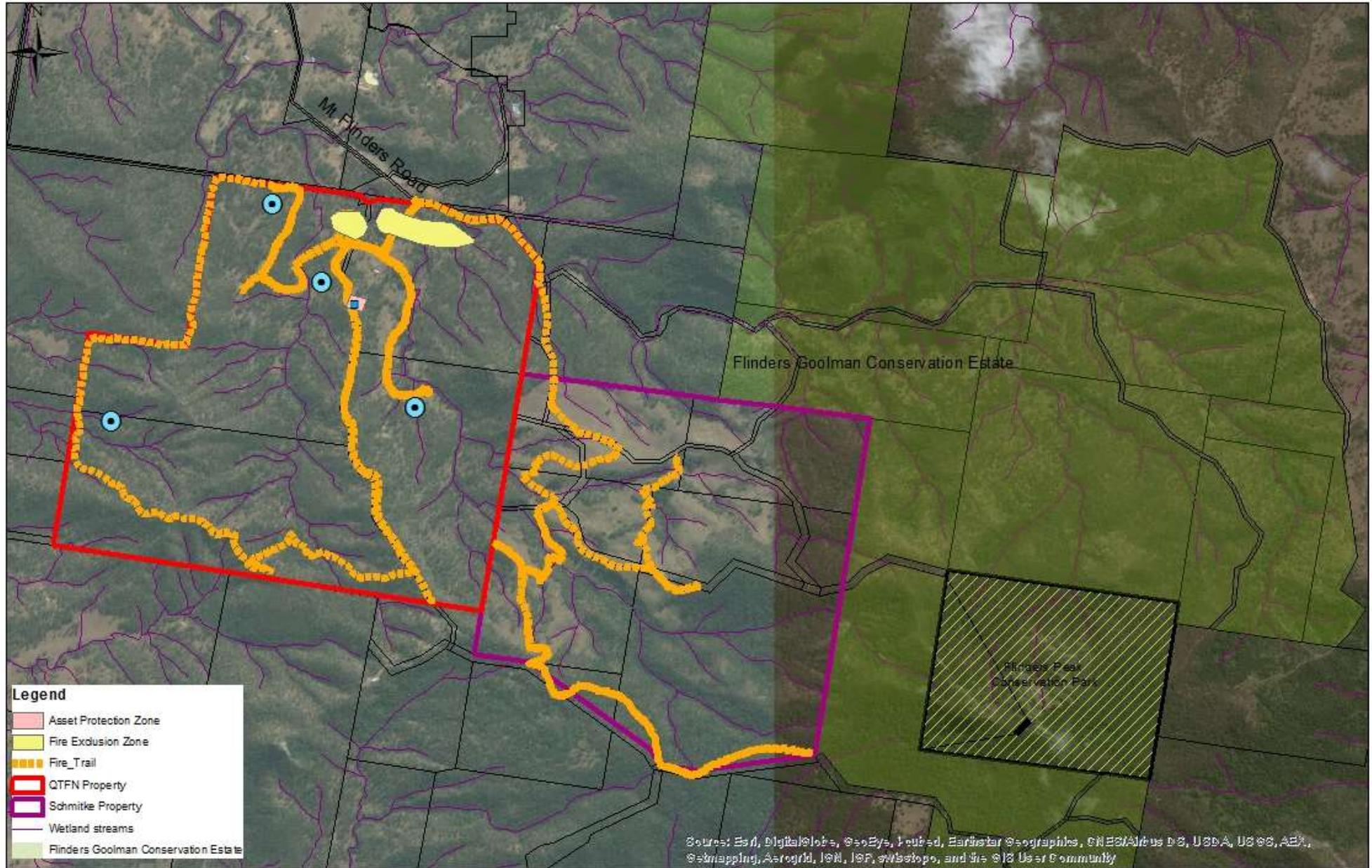
Queensland Parks and Wildlife Service (QPWS) Enhanced Fire Management Team 2012. Planned Burn Guidelines: Southeast Queensland Bioregion of Queensland. The Department of National Parks, Recreation, Sport and Racing, Queensland Government, Brisbane.

Queensland Parks and Wildlife Service (QPWS) Enhanced Fire Management Team 2012. Planned Burn Guidelines: How to Assess if Your Burn is Ready to Go, The Department of National Parks, Recreation, Sport and Racing, Queensland Government, Brisbane.

Rural Fire Service (RFS) 2003. Bushfire Environmental Assessment Code for Asset Protection Zones and Strategic fire Advantage Zones. NSW Rural Fire Service, Granville, NSW.

Appendix 1: Maps

Map 2: Firelines and Infrastructure

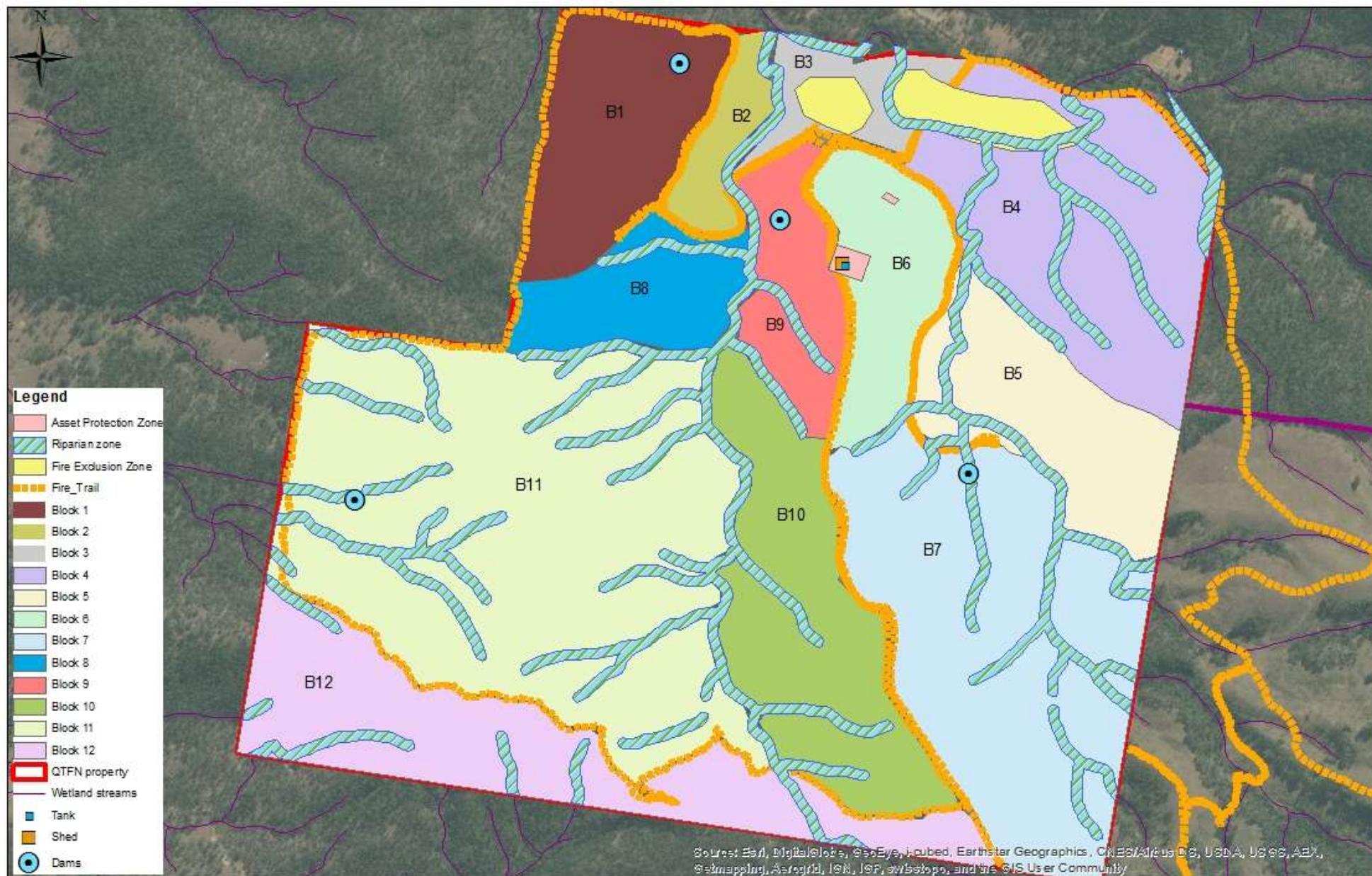


Fire Lines and Infrastructure Map



Author: T. Pritchard, QTFN
Date: 4/5/2015
Source: Cadastral Boundaries supplied by QSpatal
<http://qdspatal.information.qld.gov.au/catalogue/custom/index.page>
Flinders Goolman Estate Boundary supplied by Ipswich City Council
ACCURACY STATEMENT
Due to varying sources of data, spatial locations may not coincide when overlaid.

Map 3: Fire Management Zones

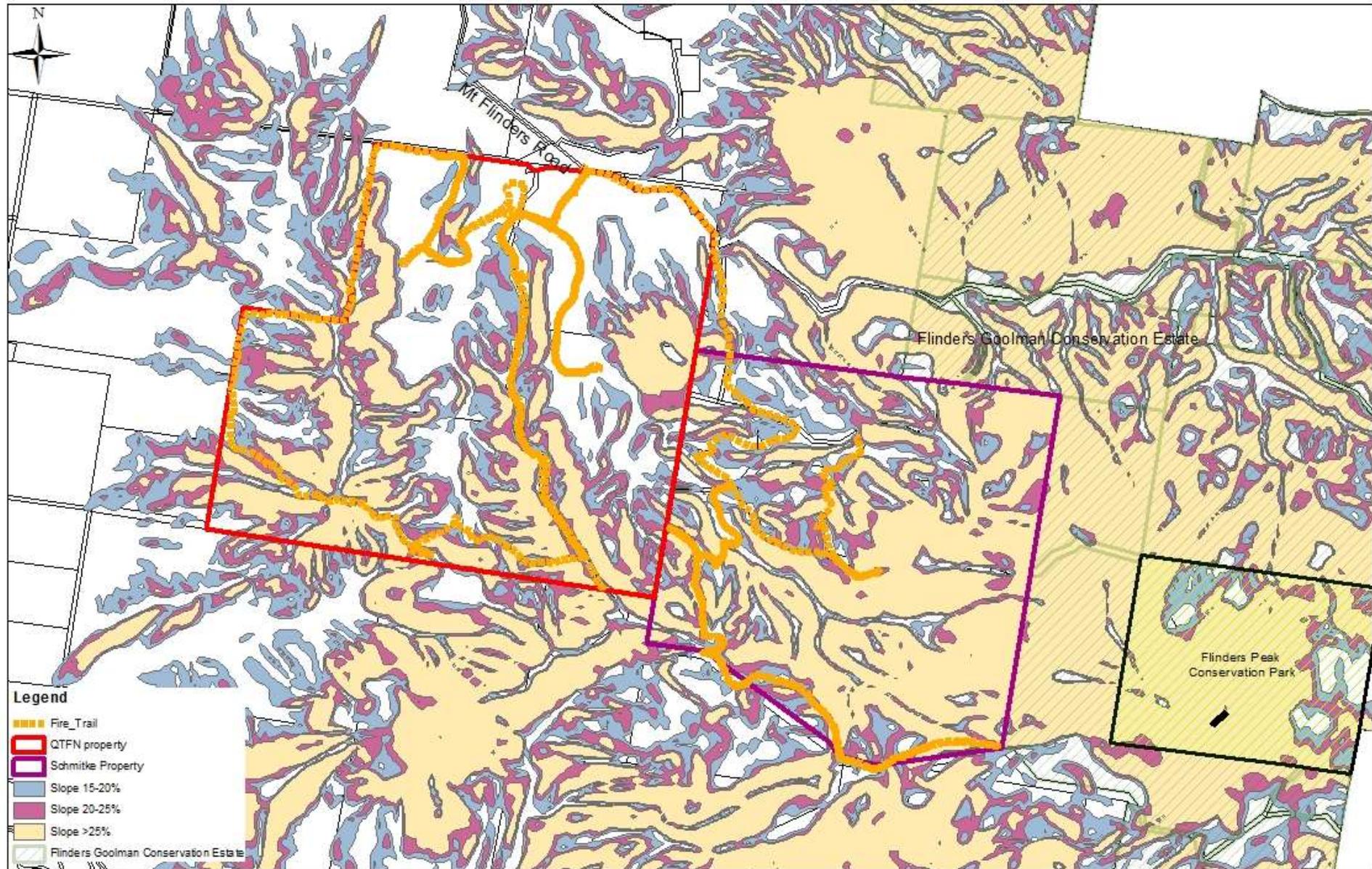


Fire Management Zones Map



Author: T. Pritchard, QTFN
 Date: 4/5/2015
 Source: Cadastral Boundaries, Drainage, Region Ecosystem Data supplied by QSPatial
<http://qdsportal.information.qld.gov.au/catalogue/custom/index.page>
ACCURACY STATEMENT
 Due to varying sources of data, spatial locations may not coincide when overlaid.

Map 4: Difficult topography



Difficult Topography Map

0 475 950 1,900 Meters

Author: T. Pritchard, QTFN
Date: 4/5/2015
Source: Cadastral Boundaries supplied by QSPatial
<http://qspatial.information.qld.gov.au/catalogue/custom/index.page>
Difficult topography supplied by Ipswich City Council
ACCURACY STATEMENT
Due to varying sources of data, spatial locations may not coincide when overlaid.

Appendix 2: Vegetation communities, plants and animals

Table 5: Regional Ecosystems

Regional Ecosystem Description	VMA	Fire zone
12.8.24 <i>Corymbia citriodora</i> subsp. <i>variegata</i> open forest on Cainozoic igneous rocks especially trachyte	Endangered	B
12.3.3 <i>Eucalyptus tereticornis</i> woodland on Quaternary alluvium	Endangered	B
12.9-10.2 <i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus crebra</i> open forest on sedimentary rocks	Least Concern	B
12.9-10.7 <i>Eucalyptus crebra</i> +/- <i>E. tereticornis</i> , <i>Corymbia tessellaris</i> , <i>Angophora</i> spp., <i>E. melanophloia</i> woodland on sedimentary rocks	Of concern	B
12.9-10.17 <i>Eucalyptus acmenoides</i> , <i>E. major</i> , <i>E. siderophloia</i> +/- <i>Corymbia citriodora</i> subsp. <i>variegata</i> woodland on sedimentary rocks	Least concern	B
12.3.7 <i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>Cunninghamiana</i> +/- <i>Melaleuca</i> spp. fringing woodland	Least concern	FEZ

Table 6: Plants and Animals of Conservation Significance.

Scientific name	Common name	NCA	Fire Sensitive	Comment
<i>Phascolarctos cinereus</i>	koala	V	P	High intensity fires will result in fatalities.
<i>Ninox strenua</i>	powerful owl	V	P	Nest trees are important to protect if found within the property. Breeds late April to mid August in tall hollow eucalypts in wet sclerophyll forest.
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	Y	High intensity fires may result in fatalities.

Notes

- (1) Conservation Status - Endangered (E), Vulnerable (V) or Near Threatened (NT).
- (2) Fire sensitive – Yes (Y), Potentially (P), No (N).
- (3) Refer to Wildlife Online for full species lists - <http://www.qld.gov.au/environment/plants-animals/species-list/>



Attachment A9

Koala Offset Calculator

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	koala
EPBC Act status	vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat			Area	29.7		
			Quality	5		12
			Total quantum of impact	14.85		
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
<i>Threatened species</i>						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g. Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator																	
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
<i>Ecological Communities</i>																	
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)									
					0.0	0.0											
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)									
<i>Threatened species habitat</i>																	
Area of habitat	Yes	14.85	Adjusted hectares		Time over which loss is averted (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)									
					20	7.416	70%	10%	4.45	80%	3.56	3.42					
					7	6	5	8	3.00	80%	2.40	2.37	3.26	21.97%	No		
Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)														
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
Number of features e.g. Nest hollows, habitat trees	No																
Condition of habitat Change in habitat condition, but no change in extent	No																
<i>Threatened species</i>																	
Birth rate e.g. Change in nest success	No																
Mortality rate e.g. Change in number of road kills per year	No																
Number of individuals e.g. Individual plants/animals	No																

Summary							
Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)		
					Direct offset (\$)	Other compensatory measures (\$)	Total (\$)
					Birth rate	0	
Mortality rate	0				\$0.00	\$0.00	
Number of individuals	0				\$0.00	\$0.00	
Number of features	0				\$0.00	\$0.00	
Condition of habitat	0				\$0.00	\$0.00	
Area of habitat	14.85	3.26	21.97%	No	\$0.00	#DIV/0!	#DIV/0!
Area of community	0				\$0.00	\$0.00	
					\$0.00	#DIV/0!	#DIV/0!

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	koala
EPBC Act status	vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat			Area	29.7		
			Quality	5		12
			Total quantum of impact	14.85		
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
<i>Threatened species</i>						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g. Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator																		
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source		
<i>Ecological Communities</i>																		
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset										
					Time until ecological benefit	Start quality (scale of 0-10)	Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0								
							Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
<i>Threatened species habitat</i>																		
Area of habitat	Yes	14.85	Adjusted hectares		Time over which loss is averted (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset										
					Time until ecological benefit	Start quality (scale of 0-10)	Future area without offset (adjusted hectares)	2.2	Future area with offset (adjusted hectares)	6.7	4.45	80%	3.56	3.42	3.26	21.97%	No	
							Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	8	3.00	80%	2.40	2.37				
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source		
Number of features e.g. Nest hollows, habitat trees	No																	
Condition of habitat Change in habitat condition, but no change in extent	No																	
<i>Threatened species</i>																		
Birth rate e.g. Change in nest success	No																	
Mortality rate e.g. Change in number of road kills per year	No																	
Number of individuals e.g. Individual plants/animals	No																	

Summary							
Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)		
					Direct offset (\$)	Other compensatory measures (\$)	Total (\$)
Birth rate	0				\$0.00		\$0.00
Mortality rate	0				\$0.00		\$0.00
Number of individuals	0				\$0.00		\$0.00
Number of features	0				\$0.00		\$0.00
Condition of habitat	0				\$0.00		\$0.00
Area of habitat	14.85	3.26	21.97%	No	\$0.00	#DIV/0!	#DIV/0!
Area of community	0				\$0.00		\$0.00
					\$0.00	#DIV/0!	#DIV/0!



Attachment A10

Response to Koala Offset Management Plan Concerns

From: Datta, Anu [<mailto:Anu.Datta@environment.gov.au>]
Sent: Wednesday, 15 November 2017 9:27 AM
To: O'Shea, Meaghan <Meaghan.O'Shea@dha.gov.au>
Cc: Phillips, Ben <Ben.Phillips@environment.gov.au>; Murrell, Andrew <Andrew.Murrell@environment.gov.au>
Subject: FW: Deebing Heights Offset Assessment - 8122 E - 2016/7723 [SEC=UNCLASSIFIED]

Hi Meaghan

As advised on Friday 10 November, and further to James Barker's email below, the Department has reviewed and accepts the Queensland Trust for Nature offset proposal for EPBC 2016-7723 (Residential Development, Rawlings Road, Ripley Valley), provided by Saunders Havill Group on 27 October 2017.

Noting that the proposed offset provides 100% of the offset requirement, you may now finalise and provide the final preliminary documentation for this project to the Department. The final preliminary documentation, should address the following matters:

- The quality scores presented in the offset proposal indicate an improvement in the quality of the offset over time. The Department notes that at present, the proposal discusses measures to 'maintain' quality, which appears to be inconsistent with the premise of the proposed offset. Please ensure that the preliminary documentation clearly identifies and justifies the nominated improvement in koala habitat quality over time.
- Please provide further information on the proposed dog control program, including the existing situation, the actions to be taken to reduce threats from wild dogs, and how the baseline threat and the success of the dog control program will be implemented and measured.
- Please provide further information on how koala density will be increased over time, including if/how the number and density of koala food and shelter trees will be increased, and how success against this goal will be measured.

As discussed, the Department notes that some aspects of the approach adopted to calculate the proposed offset were not consistent with the EPBC Act Environmental Offsets Policy and/or guide. In particular, the method used to calculate habitat quality at the offset site differs from that used at the impact site and is not well suited to measuring koala habitat, specifically. Further, the Department notes that the habitat quality scores were adopted from a previous study undertaken across a much broader property area, which does not appear to be reflective of the quality at the specific patch of this property offered as an offset for your proposed action. The Department can only consider the quality of the offset site offered as part of the referred action. While the Department has accepted the proposed offset in this instance, please ensure that future offset proposals are consistent with departmental policy requirements. We would be happy to talk you through these issues, and our general approach to assessment of environmental offsets more broadly, for reference for future projects if you would find that useful.

Regards
Anu

Anu Datta
Director – Queensland South and Sea Dumping Section
Assessments and Governance Branch
Department of the Environment and Energy

T: (02) 6274 2487 | **E:** anu.datta@environment.gov.au

The Department acknowledges the traditional owners of country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their cultures and to their elders both past and present.



RE: EPBC REFERRAL 2016/7723 - DHA RAWLINGS ROAD

1. Information has been sought to clarify statements where measures are stated to “maintain” rather than “improve.” In short, all actions detailed in the Offset Area Management Plan are designed to achieve improvement in the quality of the koala habitat in the offset area. Any indication that management actions are aimed at “maintaining” rather than “improving” quality are based on attributes which have already been assessed as having the highest value available under the Koala Habitat Assessment Tool.

Despite this and as stated, there is a clear improvement from start to end quality supported by the Offset Area Management Plan. All the actions in the offset area management plan will enhance and improve koala habitat in a way that improves bio-condition of the offset area at a much more significant way than is provided for under the Koala Habitat Assessment Tool.

2. Information has been sought as to the dog control program, including the existing situation, the actions to be taken to reduce threats from wild dogs, and how the baseline threat and the success of the dog control program will be implemented and measured.

In brief:

- Threat to koala from dogs is outlined in table 2.4.
- Current monitoring has recorded the presence of wild dogs and foxes in the area.
- Ongoing bi-annual camera monitoring and monthly incidental observations of wild dog activity on the property will inform if a wild dog control measure is necessary.
- Monitoring will record a Relative Abundance Index to determine if there is an increase in incidence of wild dogs between monitoring periods.
- If wild dog control is required, trapping will target dogs recorded during monitoring periods.
- If there is any evidence of koala mortality as the result of wild dogs, this will also inform the control program.

3. Further information has been sought in relation to “how koala density will be increased over time, including if/how the number and density of koala food and shelter trees will be increased, and how success against this goal will be measured.

In brief:

- In relation to Koala Density: refer to the OAMP table 2.1.
- Koala density surveys will occur at years 0, 5 and 10. Outside of the formal koala density survey event, opportunistic koala sightings to be recorded.
- Corrective Action will be taken if density is found to reduce between monitoring periods, specifically a supplementary assessment to review the cause of reduced occurrence.
- Outcomes of the review will inform the adaptive management approach.

**Queensland
Trust for Nature**

GPO Box 162
Brisbane Qld 4001

 **1800 23 77 24**

 www.qtfn.org.au

 info@qtfn.org.au





- Management of the offset area in accordance with the OAMP will ensure koala density increases over time through:
 - i. addressing a reduction to threats to koala in table 2.4 – threat to koala from dogs; table 2.5 – threat to koala from cats and foxes; table 2.6 threat to koala from vehicle strike; and table 2.9 – threat to koala from fire.
 - ii. Addressing vegetation composition of the offset area, which includes koala food and habitat trees. A baseline assessment of koala food and habitat trees will be undertaken, with further monitoring occurring every 5 years for the lifetime of the offset. As QTFN will not be conducting any vegetation clearing, natural regeneration will continue. The surveys conducted every 5 years will demonstrate when the trees reach a maturity where they can be utilized by koalas.

Thank you for your consideration.

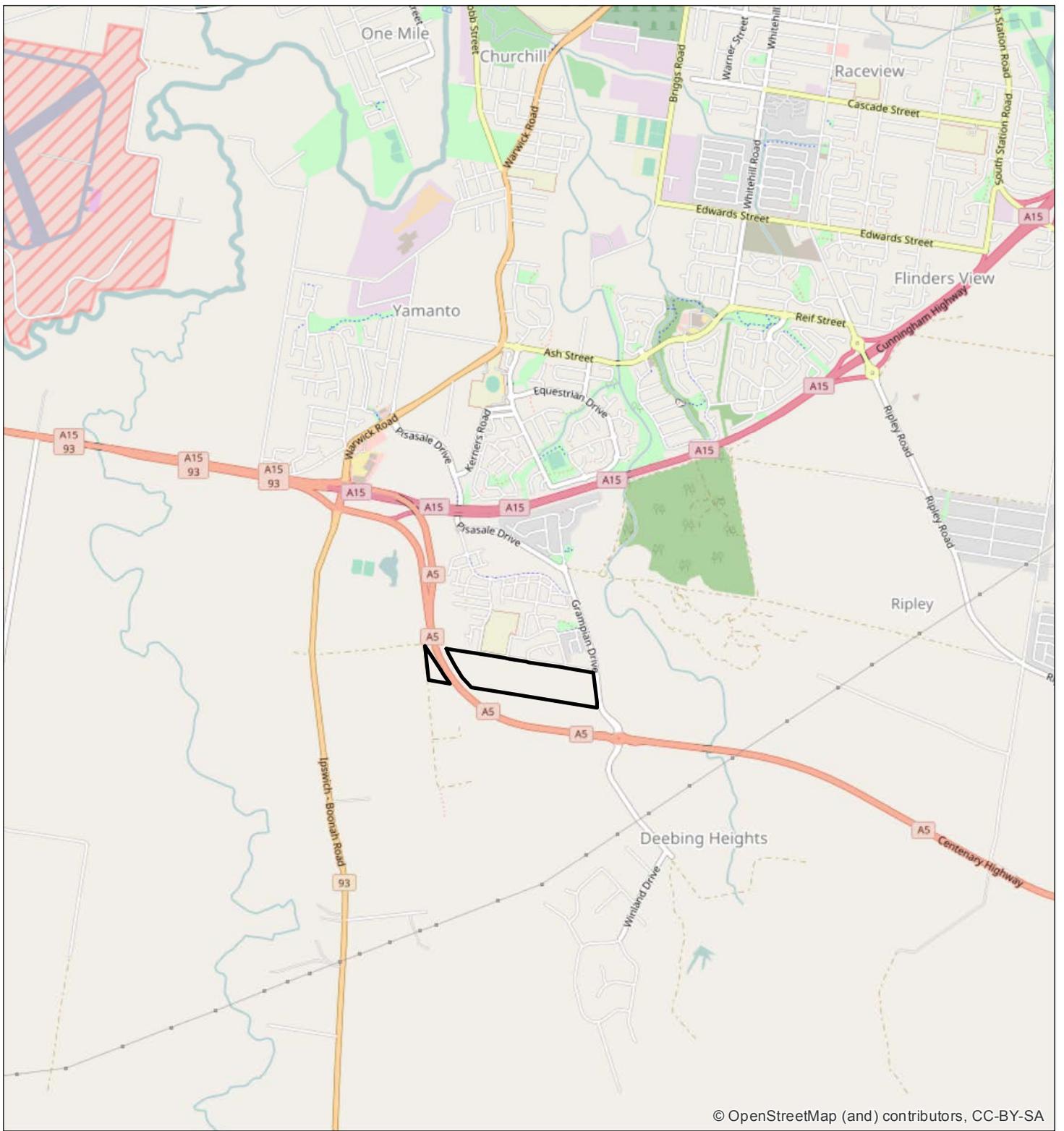
Yours sincerely,

A handwritten signature in black ink, appearing to read 'Nerida', is positioned below the 'Yours sincerely,' text.

Nerida Bradley
Executive General Manager



Figures



Legend

 Project referral area

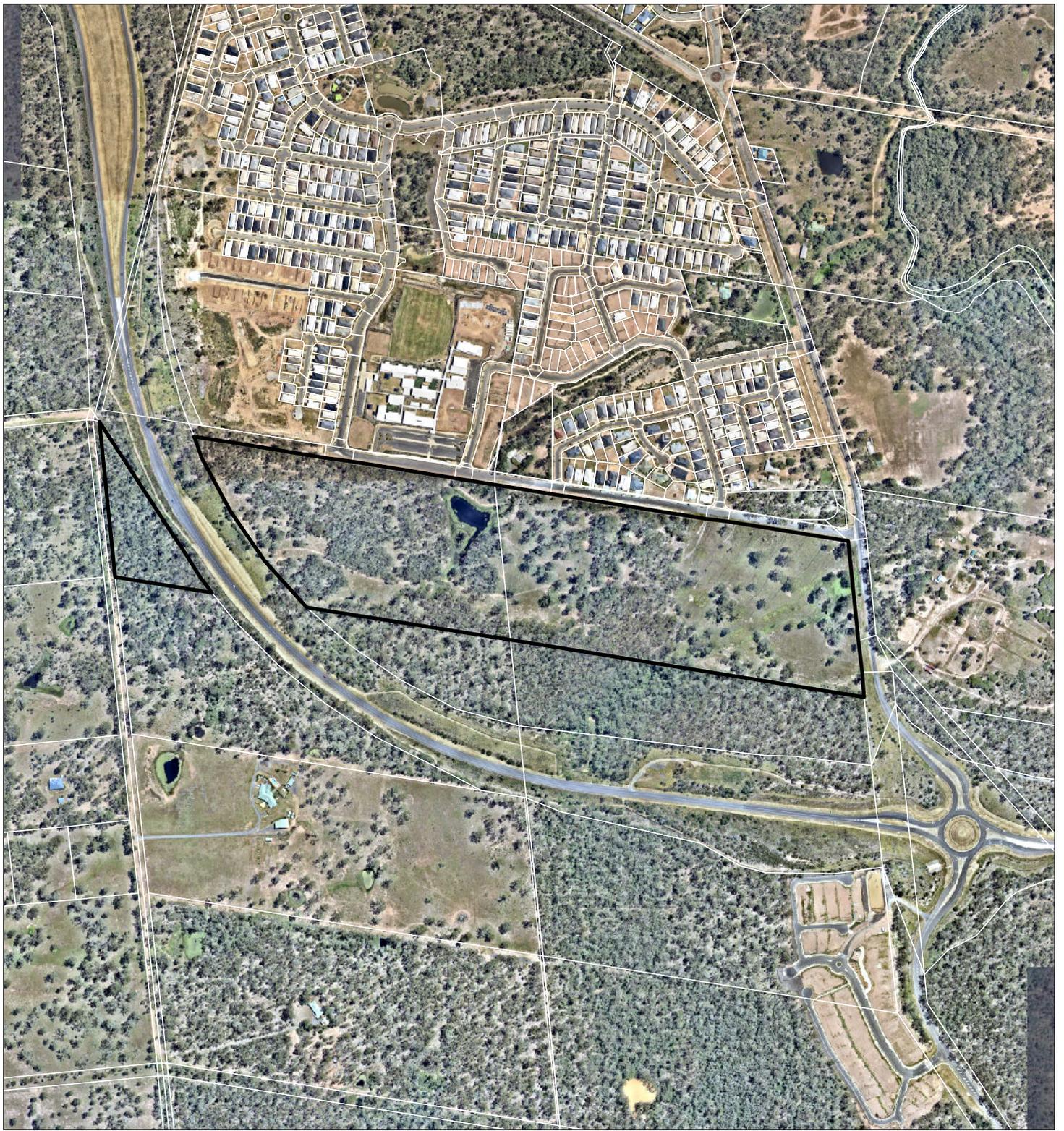
Figure A1
Site Context

File ref. 8122 E Figure A1 Site Context A
Date 2/05/2017
Project Rawlings Road, Deebing Heights

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



THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE OF THE CLIENT. SAUNDERS HAVILL GROUP CANNOT ACCEPT RESPONSIBILITY FOR ANY USE OF OR RELIANCE UPON THE CONTENTS OF THESE DRAWING BY ANY THIRD PARTY.



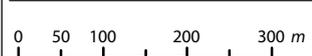
Legend

-  Project referral area
-  Qld DCDB

Figure A2

Site Aerial

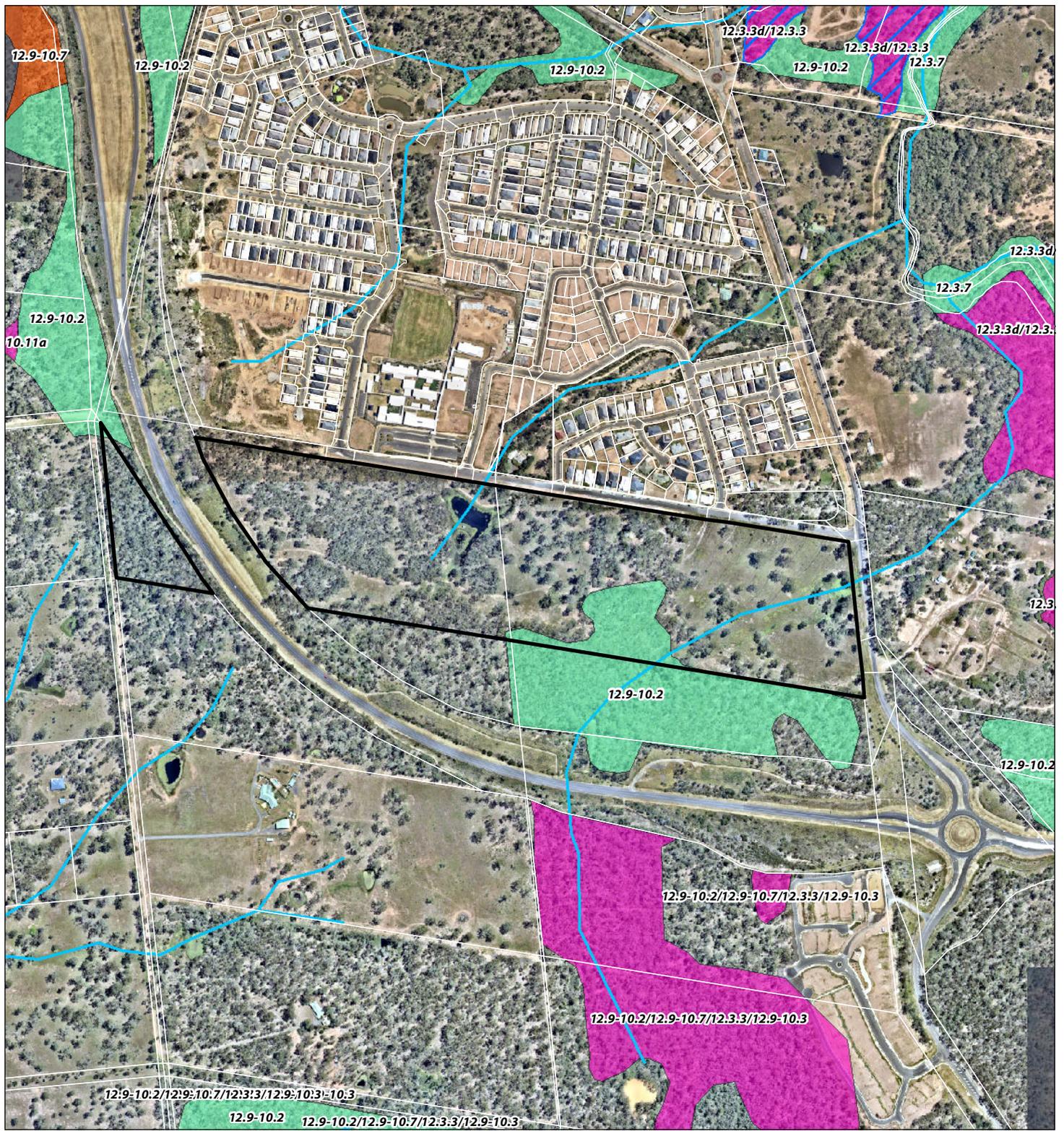
File ref. 8122 E Figure A2 Site Aerial A
Date 28/04/2017
Project Rawlings Road, Deebling Heights



Scale (A4): 1:9,000 [GDA 1994 MGA Z56]



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Legend

-  Project referral area
-  VM Watercourses
-  VM Essential Habitat
-  VM Wetland

Regional Ecosystems mapping

-  Category A or B area containing endangered regional ecosystems
-  Category A or B area containing of concern regional ecosystems
-  Category A or B area that is a least concern regional ecosystem

Figure A3
 VMA Regulated Vegetation Supporting Map

File ref. 8122 E Figure A3 RVSM A
Date 2/05/2017
Project Rawlings Road, Deebling Heights

0 50 100 200 300 m
 Scale (A4): 1:9,000 [GDA 1994 MGA Z56]



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Legend

 Project site

Koala tracker - koala record

 Red = dead,  Yellow = sick or injured,  Green = alive

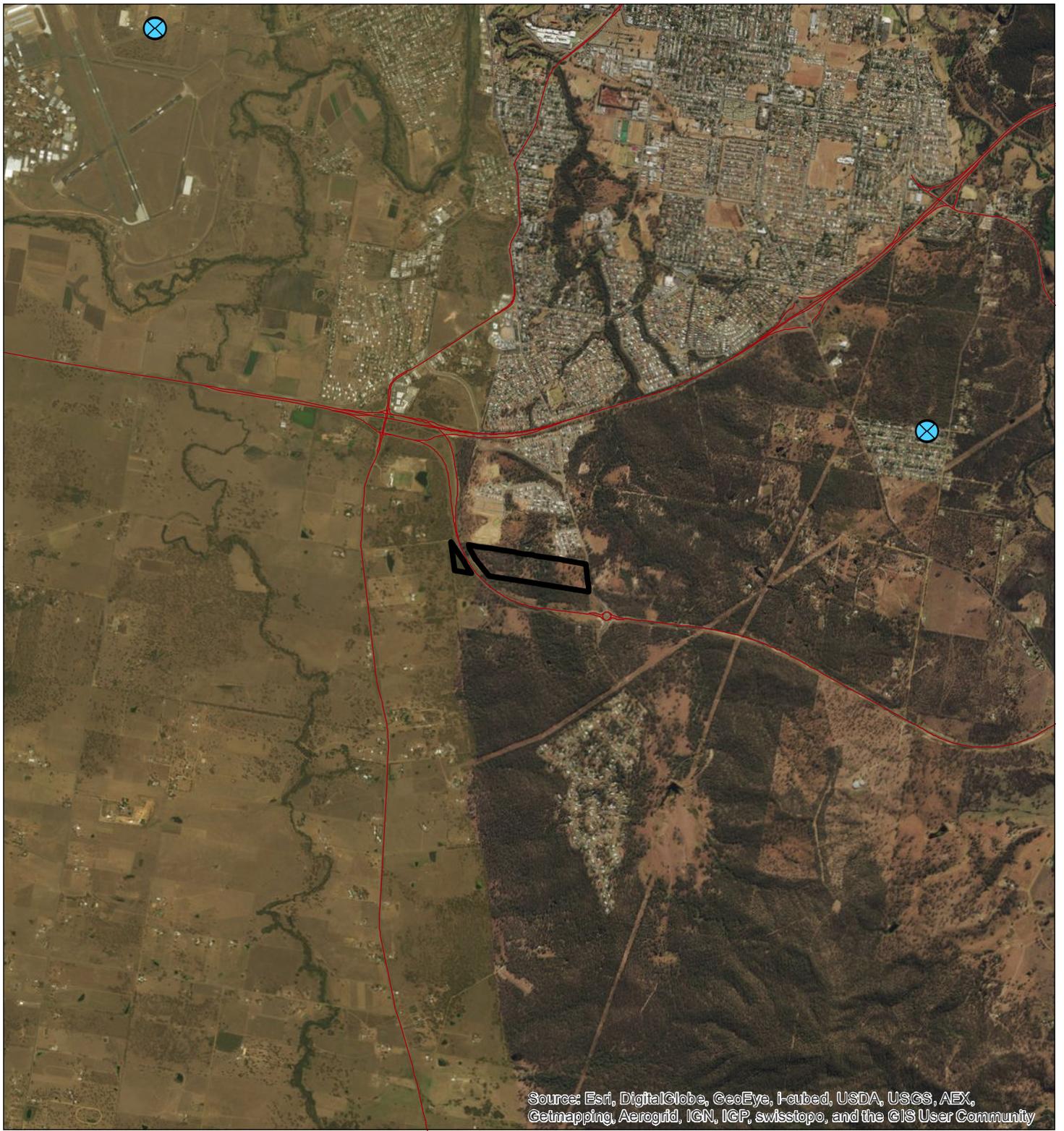
Figure A5

Koala Location Records - Koala Tracker (online)

File ref. 8122 E Figure A5 KoalaTracker online A
Date 28/04/2017
Project Rawlings Road, Deebing Heights



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Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

-  Project site
-  Atlas of Living Australia - Koala record

Figure A6

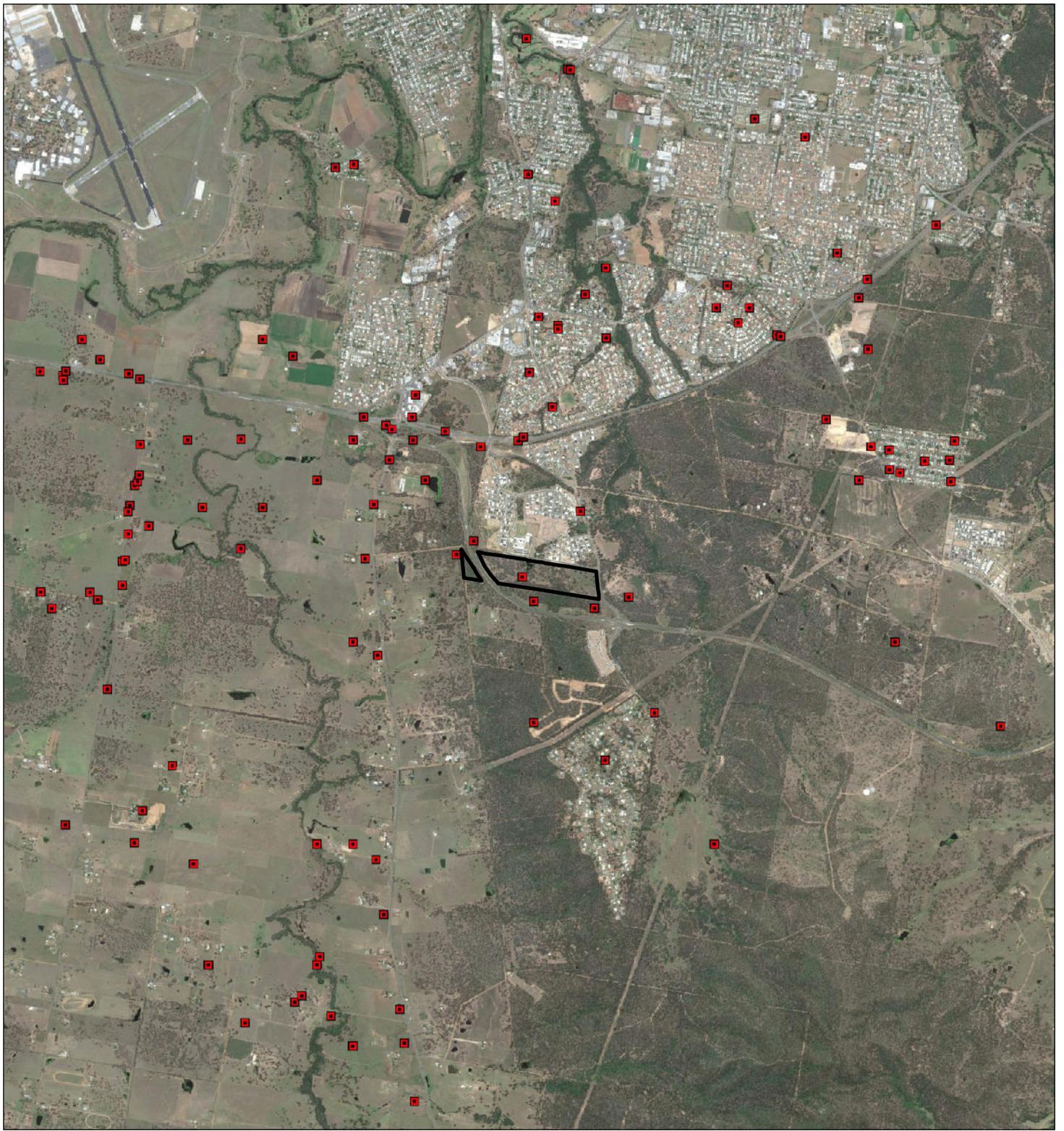
*Koala Location Records -
Atlas of Living Australia (online)*

File ref. 8122 E Figure A6 ALA Koala Sightings A
Date 28/04/2017
Project Rawlings Road, Deebing Heights



Scale (A4): [GDA 1994 MGA Z56]

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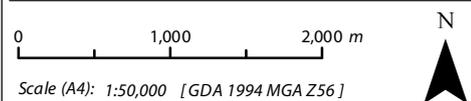
Legend

-  Project referral area
-  Recorded koala sighting

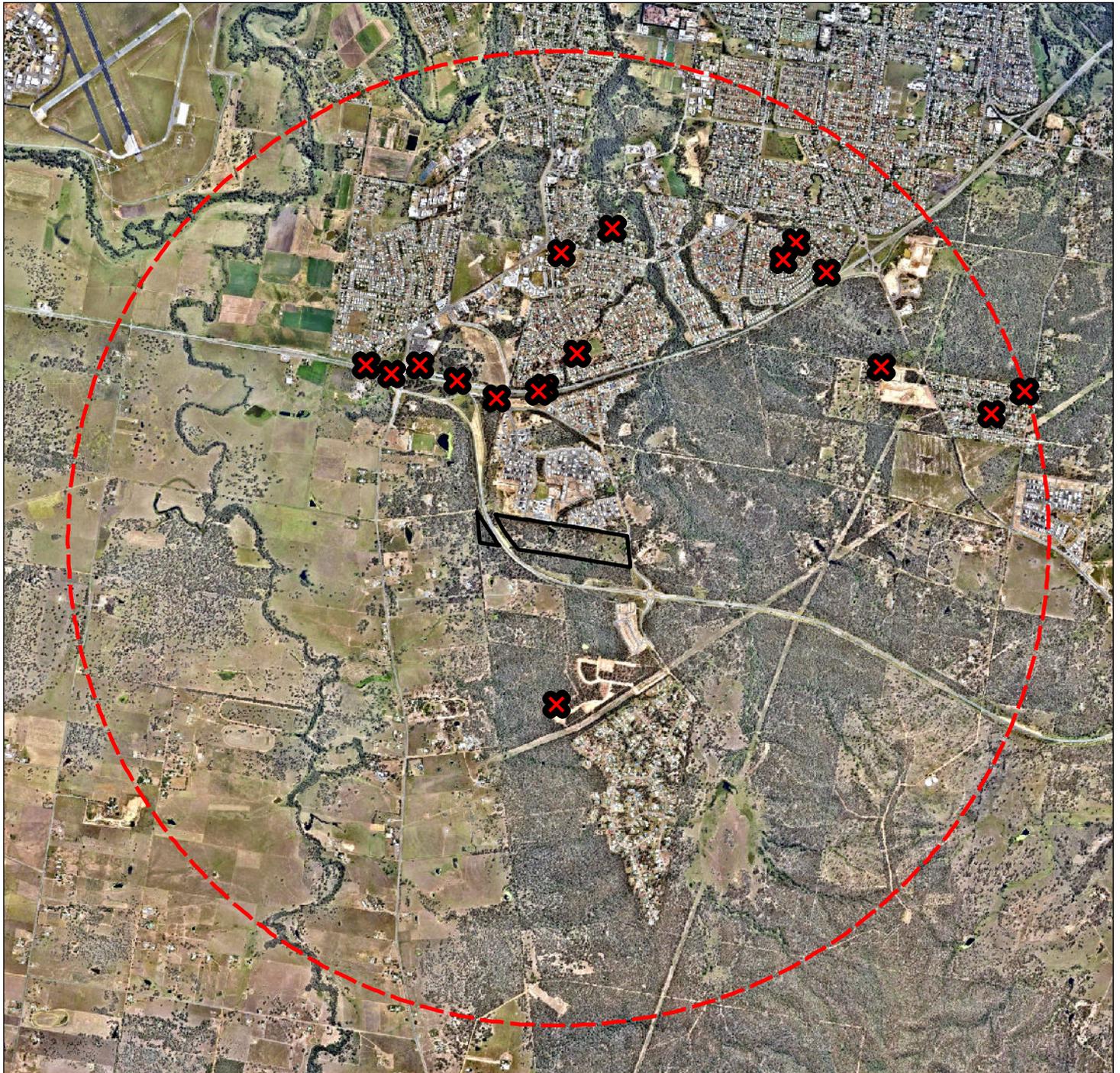
Figure A7

Qld Wildlife Data API - Koala Sightings Within a 5km Radius

File ref. 8122 E Figure A7 Qld Gov IPA Koala Sightings A
Date 28/04/2017
Project Rawlings Road, Deebing Heights



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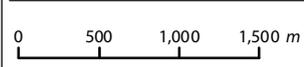
Legend

-  Project referral area
-  Koala hospital incident record locations
-  4 km search radius

Figure A8

*Koala Hospital Incident Records
(4km search radius)*

File ref. 8122 E Figure A8 Koala Hospital Incident Records A
Date 2/05/2017
Project Rawlings Road, Deebing Heights



Scale (A4): 1:47,328 [GDA 1994 MGA Z56]

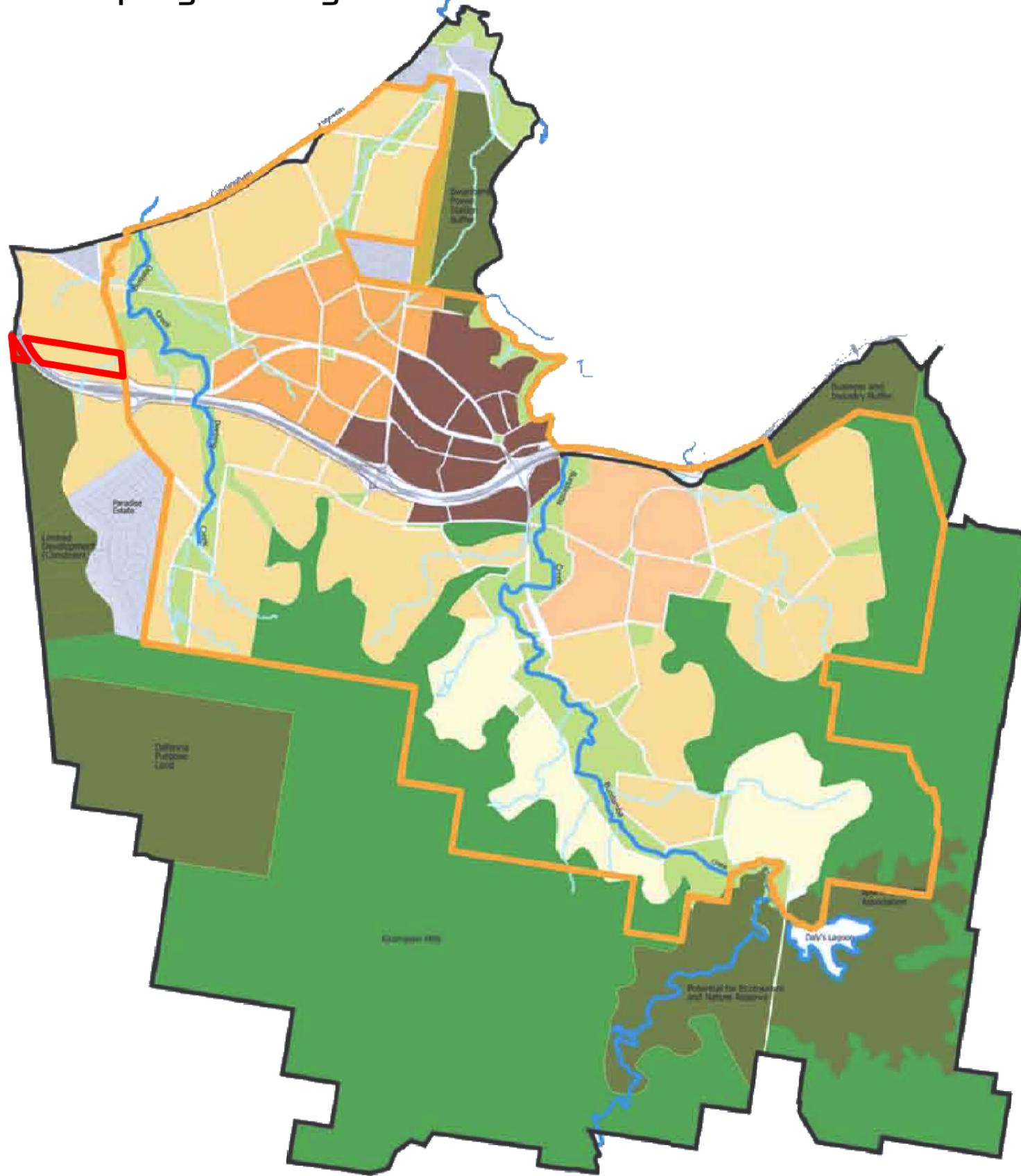


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Plans

A1. I.C.C Ripley Valley Master Plan



-  Urban Core Neighbourhoods
-  Secondary Urban Centre West Neighbourhoods
-  Secondary Urban Centre East Neighbourhoods
-  Neighbourhoods
-  Villages
-  Rural Residential (min 4000sqm)
-  Existing Urban Areas
-  Conservation Areas
source: Ipswich Planning Scheme Zoning Map - Jan 06 2006
-  Open Space
-  Rural / Constrained Areas
-  Watercourses
source: Ipswich City Council - GIS March 06
-  Second Order Streams
source: Ipswich City Council - GIS March 06
-  Site Boundary

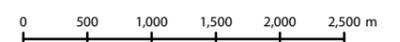
NOTES
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Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2017), Master Plan (Ipswich City Council, 2017)

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LEGEND
 Project referral area

PLAN ISSUE:				
Issue	Date	Description	Drawn	Checked
A	2/05/2017	Preliminary Draft	TC	MS



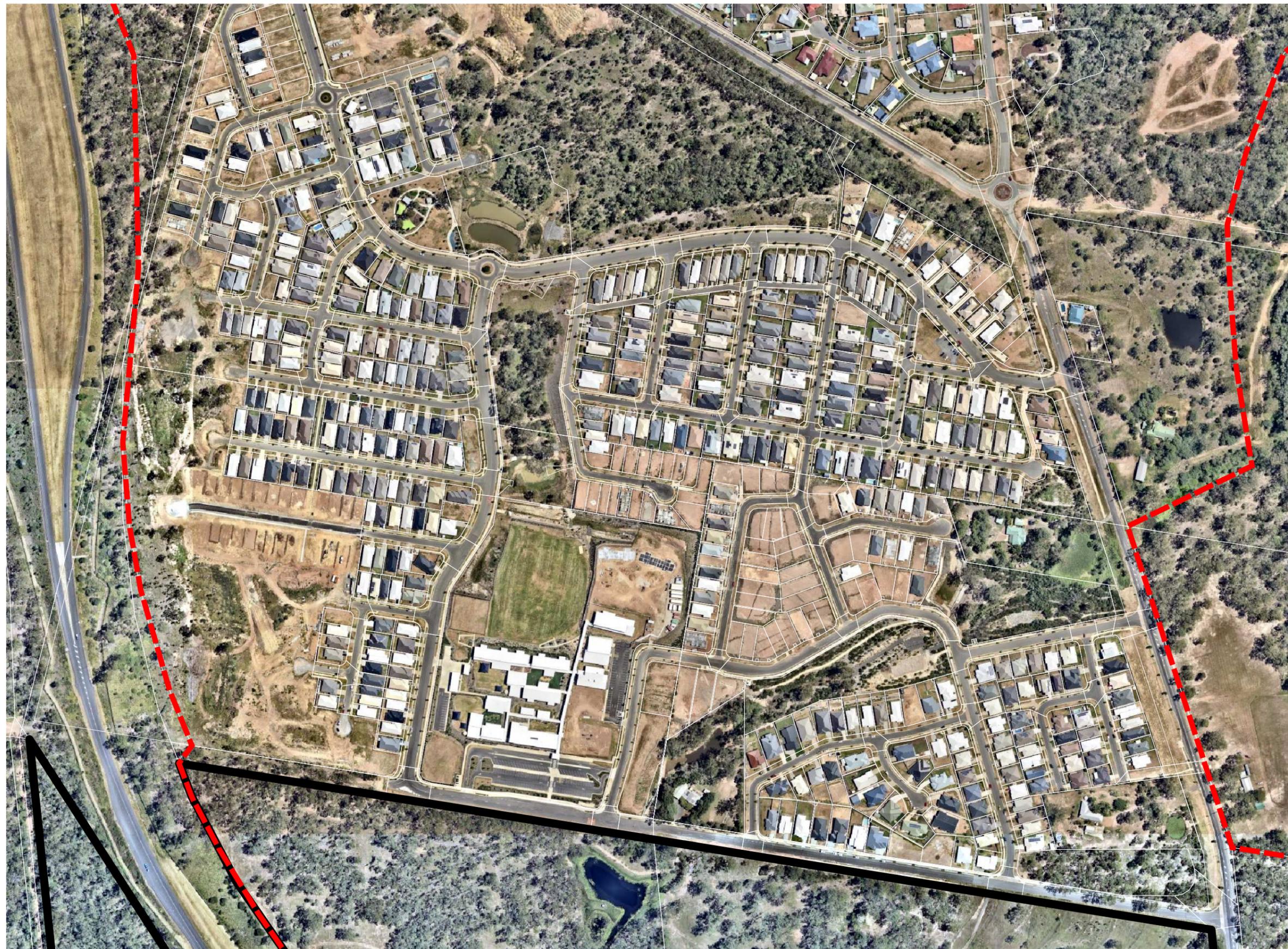
Universal Transverse Mercator GDA 1994 MGA Zone 56 1:55,000 @ A3



Rawlings Road, Deebing Heights



A2.1 Aerial Imagery (North of Project)



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

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LEGEND

-  Project referral area
-  Qld DCDB
-  Ripley Valley Masterplan - Neighbourhoods zoning

PLAN ISSUE:

Issue	Date	Description	Drawn	Checked
A	28/04/2017	Preliminary Draft	TC	MS

0 50 100 200 m

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



A2.2 Aerial Imagery (East of Project)



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

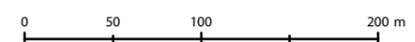
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LEGEND

-  Project referral area
-  Qld DCDB
-  Ripley Valley Masterplan - Neighbourhoods zoning

PLAN ISSUE:

Issue	Date	Description	Drawn	Checked
A	28/04/2017	Preliminary Draft	TC	MS



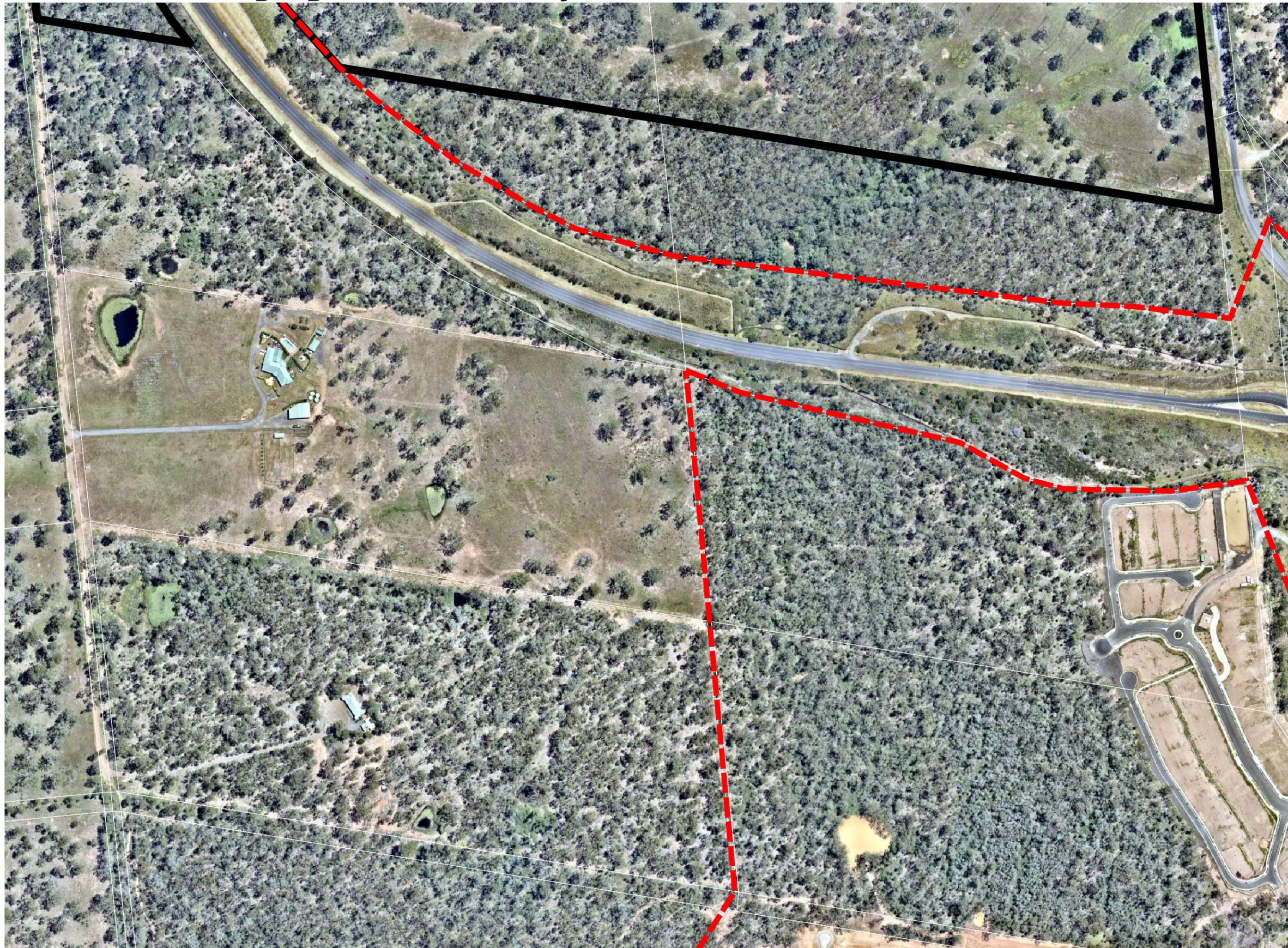
Universal Transverse Mercator GDA 1994 MGA Zone 56 1:4,000 @ A3



Rawlings Road, Deebing Heights



A2.3 Aerial Imagery (South of Project)



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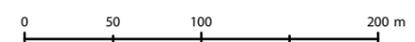
Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2016), Aerial (Nearmap 2016)

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LEGEND

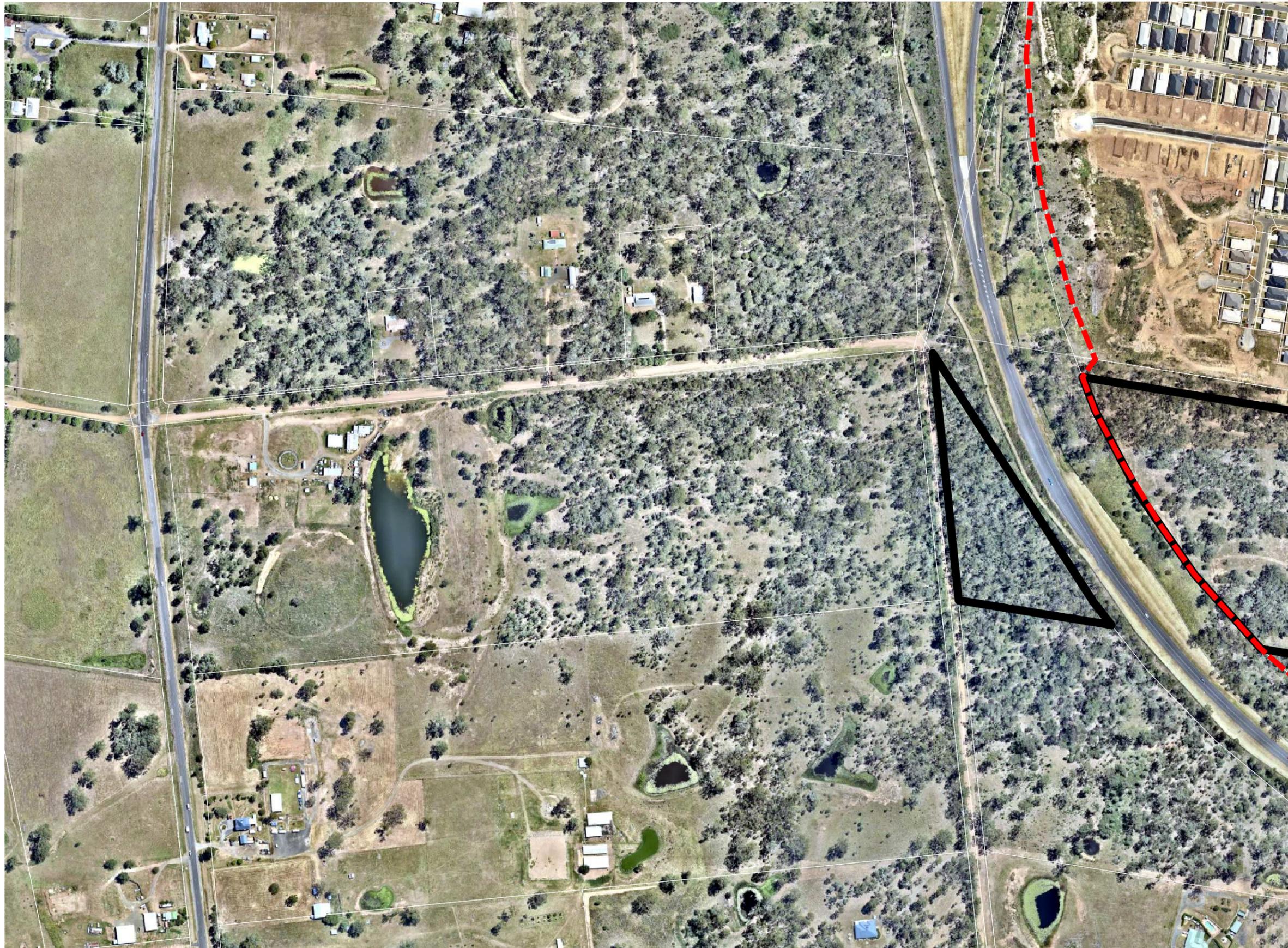
-  Project referral area
-  Qld DCDB
-  Ripley Valley Masterplan - Neighbourhoods zoning

PLAN ISSUE:				
Issue	Date	Description	Drawn	Checked
A	28/04/2017	Preliminary Draft	TC	MS



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

A2.4 Aerial Imagery (West of Project)



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

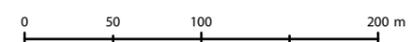
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LEGEND

-  Project referral area
-  Qld DCDB
-  Ripley Valley Masterplan - Neighbourhoods zoning

PLAN ISSUE:

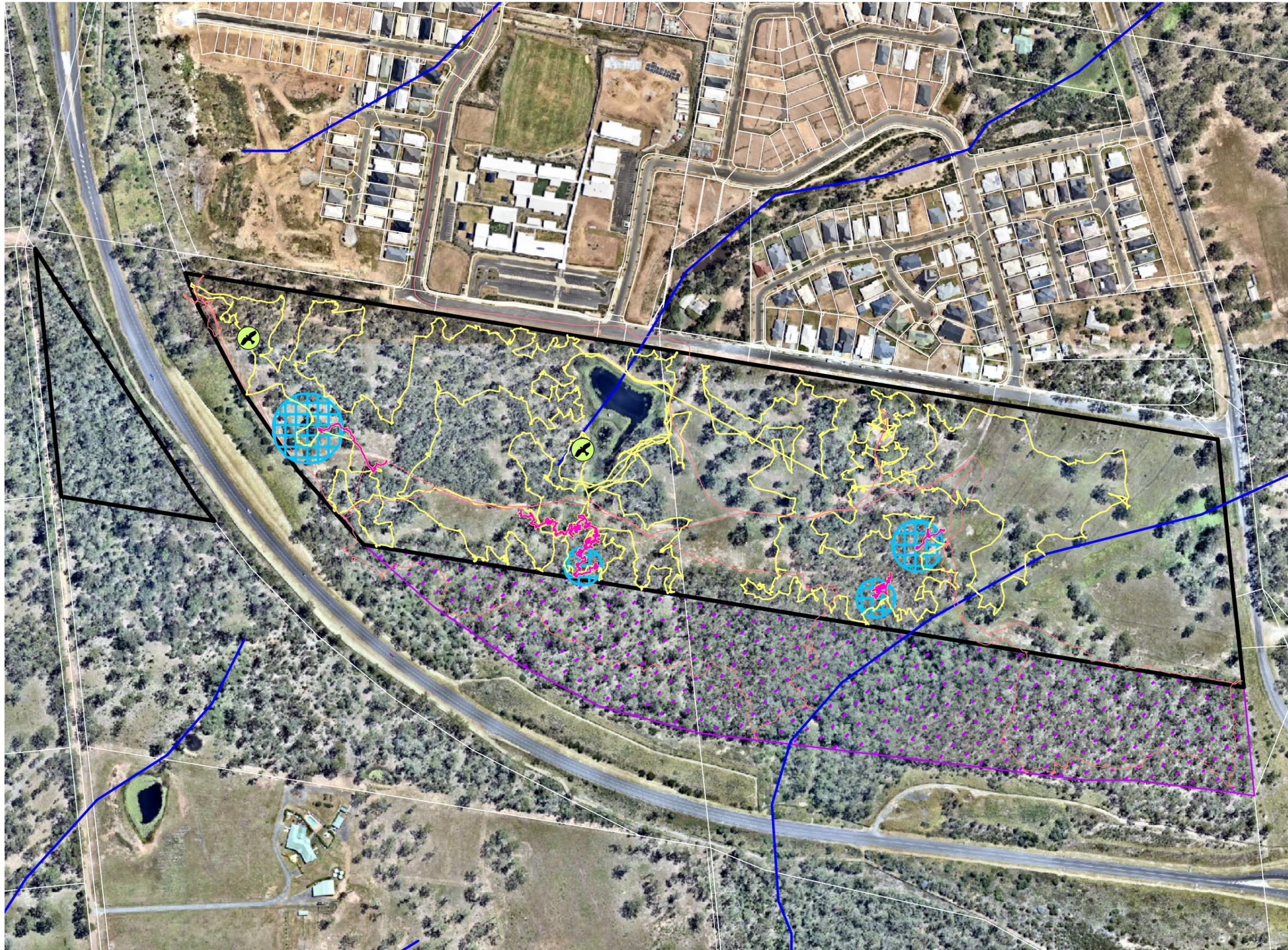
Issue	Date	Description	Drawn	Checked
A	28/04/2017	Preliminary Draft	TC	MS



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



A3. Field Survey



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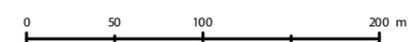
Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2016), Aerial (Nearmap 2016)

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LEGEND

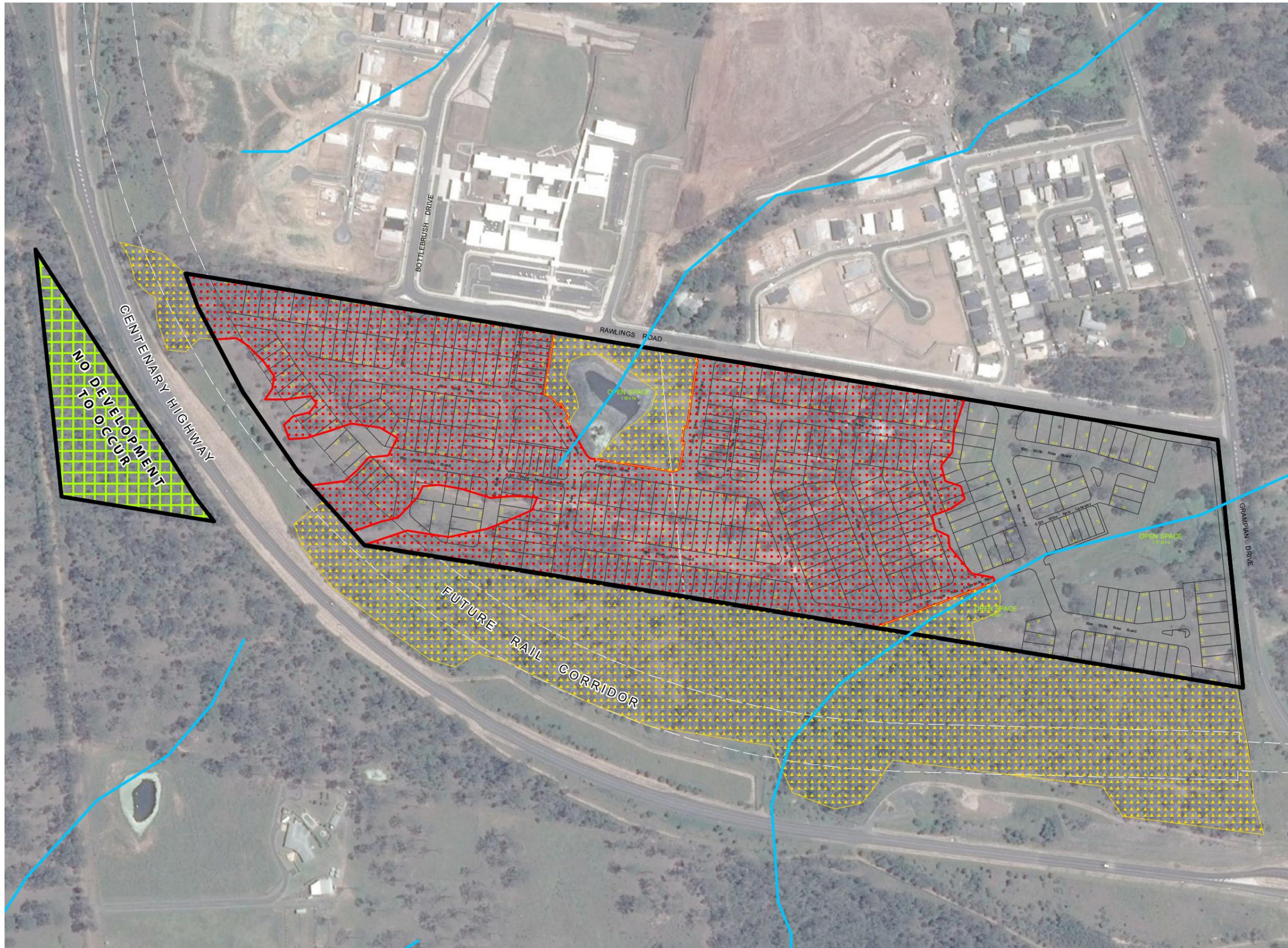
-  Project referral area
-  Secondary investigation area (approximately 10.9ha)
-  Bird survey (2016)
-  VMA Watercourse mapping
-  Scat meander search
-  SAT location (2016)
-  Tracklog (2016)
-  Tracklog (2017)

PLAN ISSUE:				
Issue	Date	Description	Drawn	Checked
A	6/07/2017	Preliminary Draft	MC	AH



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

A4. Critical Habitat Analysis



NOTES
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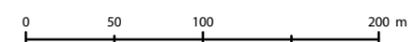
Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2016), Aerial (Neamap 2016)

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- LEGEND**
- Project referral area
 - Development layout
 - VMA Watercourse mapping
 - Direct clearing impact (15ha)
 - Potential edge effects (14.7ha)

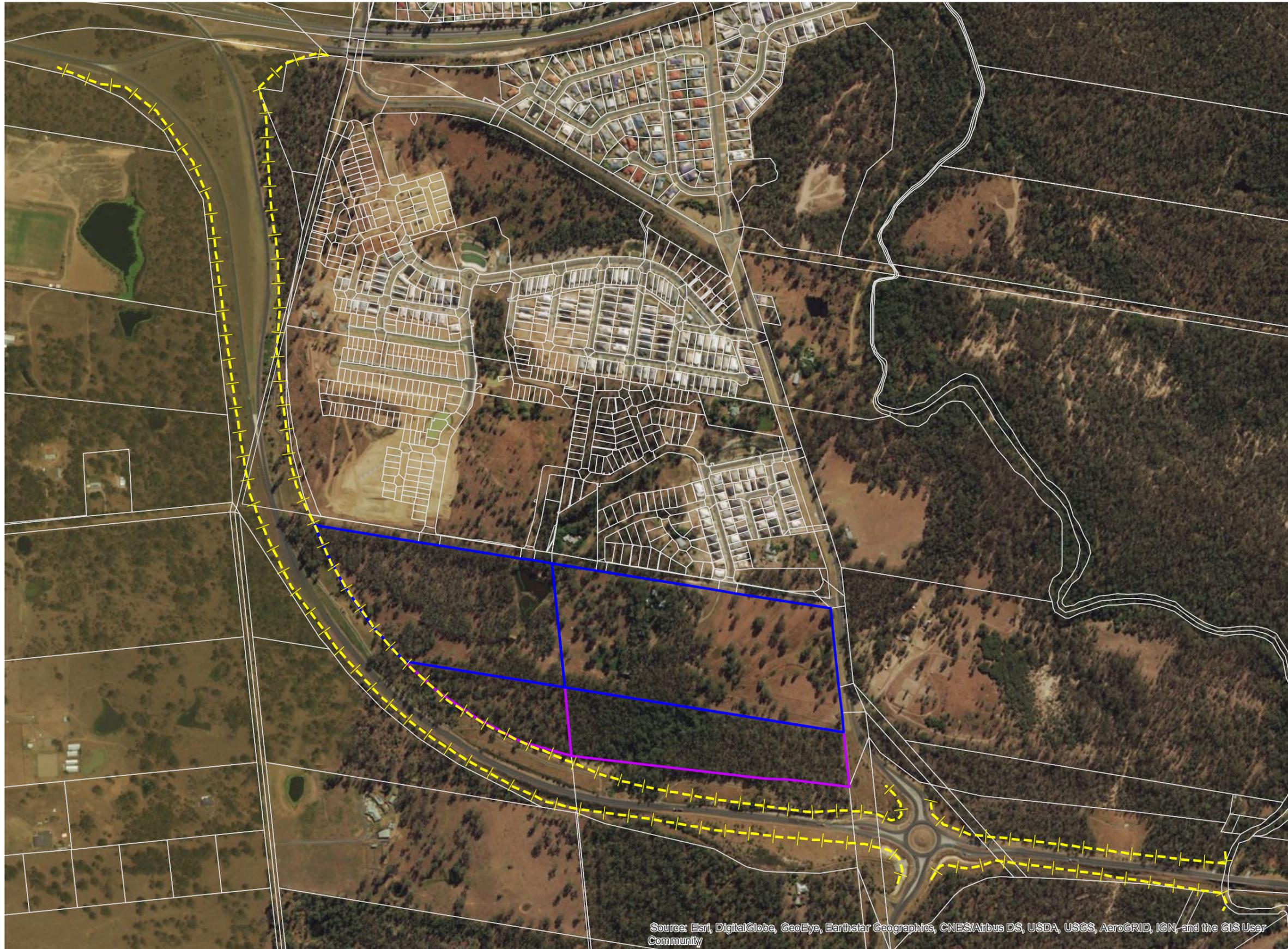
PLAN ISSUE:

Issue	Date	Description	Drawn	Checked
A	28/04/2017	Preliminary Draft	TC	MS



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

A5. Koala Exclusion Fencing Locations



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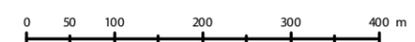
Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2016), Aerial (Nearmap 2016)

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- LEGEND**
- Development site
 - Southern development lots (198 on SP 193445 and 199 on SP 193445)
 - Qld DCDB
 - TMR Compliant Koala exclusion fencing (Drawing 1603)

PLAN ISSUE:

Issue	Date	Description	Drawn	Checked
A	6/07/2017	Preliminary Draft	MC	AH



Universal Transverse Mercator GDA 1994 MGA Zone 56 1:8,000 @A3

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



Rawlings Road, Deebing Heights

