

Table 1: Modified BioCondition Scores for each of the 6 habitat assessment sites

Site Number	1	2	3	4	5	6
Regional Ecosystem	11.3.4	11.12.3*	11.12.3*	11.3.9	11.3.25	11.12.3*
Canopy Cover and Health	5	3	4	3	5	5
Canopy Recruitment	3	3	3	5	5	3
Canopy Height	3	5	5	5	5	4
Shrub Layer	0	0	0	0	5	0
Ground Cover	6	0	0	10	10	10
Large Trees	3	8	3	8	3	8
Fallen logs	2	2	4	4	4	4
Weed Cover	0	3	3	10	10	10
Organic Litter	5	3	3	5	3	5
Size of Patch	10	10	10	10	10	10
Connectivity	4	4	4	4	4	4
Context	4	4	4	4	4	4
Total	47	45	43	68	68	67
Total /100	55.3	52.9	50.6	80	80	78.8
BioCondition Score (EcoSM 2013)	4	4	4	2	2	2

* Scores calculated from RE11.12.1 benchmark

3.2 SITE CONTEXT

Four parameters were measured to obtain a site context value of the study area; patch size, connectedness, context and existing threats. Descriptions for three of the attributes for the study area are shown in **Table 2**. **Figure 3** identifies these attributes in relation to the study area.

Table 2: Site Context for the study area

Attribute	Description
Patch Size	Size of patch and directly connecting remnant vegetation is >1000ha
Connectedness	65% of site boundary is connected to remnant vegetation
Context	43% remnant vegetation within 1km buffer

3.2.1 Lack of Threats

Two feral and domestic dog or dingo scats were observed (**Figure 4**). Both scats were in grazed areas and could be from domestic or working dogs.

Evidence of bushfire was recorded at three separate locations. Scorching marks on trees indicated the fire(s) likely occurred in recent years and appeared to be of low intensity (**Plate 2**).



Plate 1: Bushfire scorching on trees.

Lantana camara (Lantana) thickets were observed in gullies in the central western section of the site. Isolated Lantana plants can be found throughout the site however they are very sporadic. Lantana is a Class 3 declared weed in Queensland and a WoNS. A species of the genus *Sporobolus* (Giant Rats Tail grass) was observed in three locations in the south of the site. Identification was inconclusive due to the grass having expelled its seed. Giant Rats Tail grasses are Class 2 declared weeds in Queensland. *Hyparrhenia rufa* (Thatch Grass) is a common pastoral weed in the northern areas that are disturbed by grazing. In such areas the Thatch Grass has formed a monoculture in the understorey.

In southern areas of the study area, some localised vegetation clearing has previously been undertaken for unknown reasons. Vegetation has been windrowed in a number of locations within the immediate area.

No evidence from mortality by vehicle strike was recorded during the assessment. The Koala observed within the proposed offset site exhibited no sign of disease.

3.3 SPECIES STOCKING RATES

KSAT tests at the study area indicated high Koala activity levels at four of six sites based on east coast medium-high benchmarks (**Table 3** and see Section 4 for further discussion). Only 7% of habitat trees at site four contained one or more scats, indicating low activity levels. Scat counts (30%) at site five indicate medium Koala activity levels. The species of tree found to have the most activity was *Eucalyptus crebra* (Narrow-leaved Ironbark); nine species of habitat tree recorded activity (**Appendix 3**).

Table 3: Koala Activity Level for the study area

Site	1	2	3	4	5	6
# of trees with faecal pellets	15	11	11	2	9	13
Activity Level	50%	37%	37%	7%	30%	43%

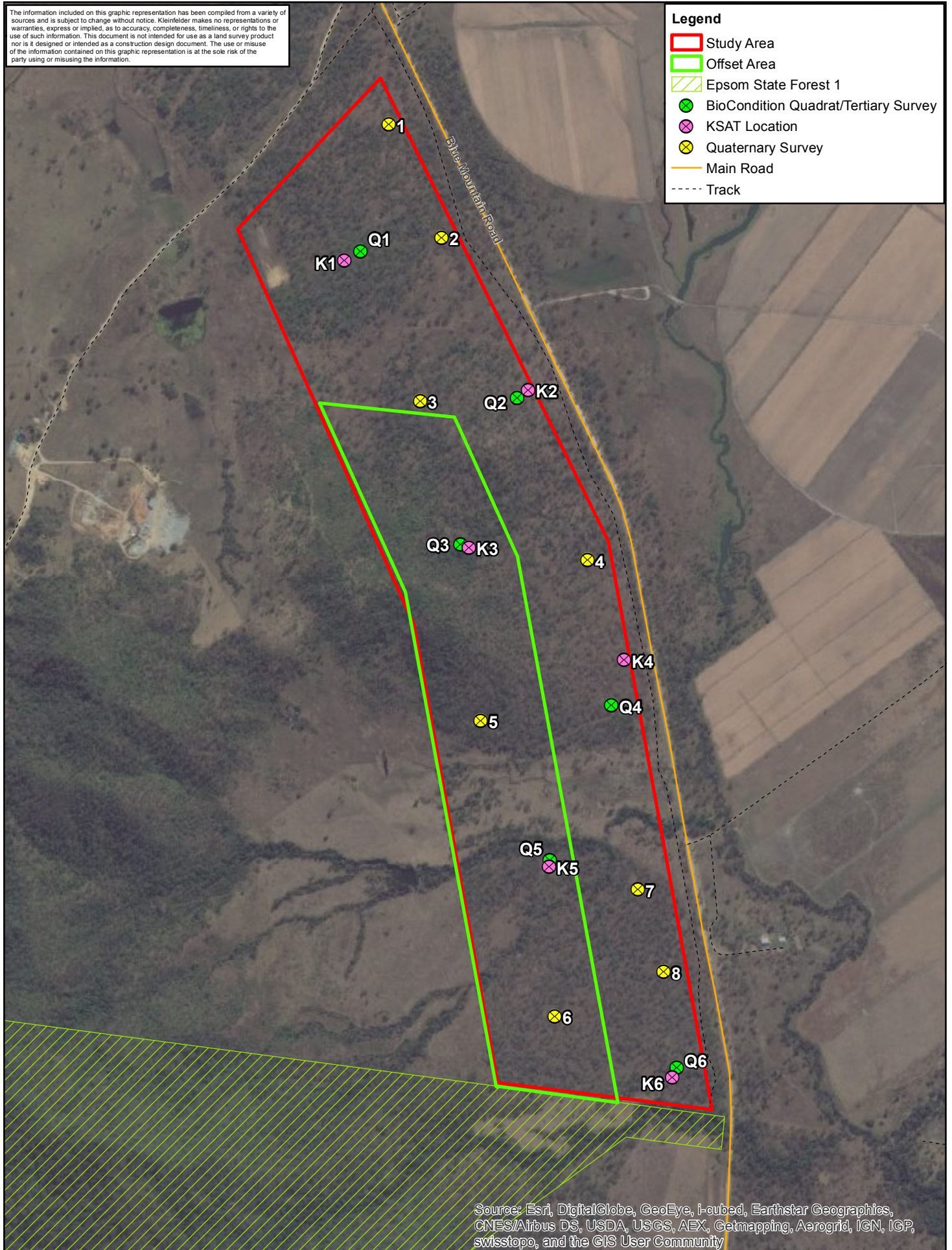
One male Koala was observed during random meander observations within the study area (**Figure 3**). The Koala was situated in a *Eucalyptus tereticornis* (Blue Gum) and appears to be in good health (**Plate 1**).



Plate 2: Koala observed within the proposed offset site.

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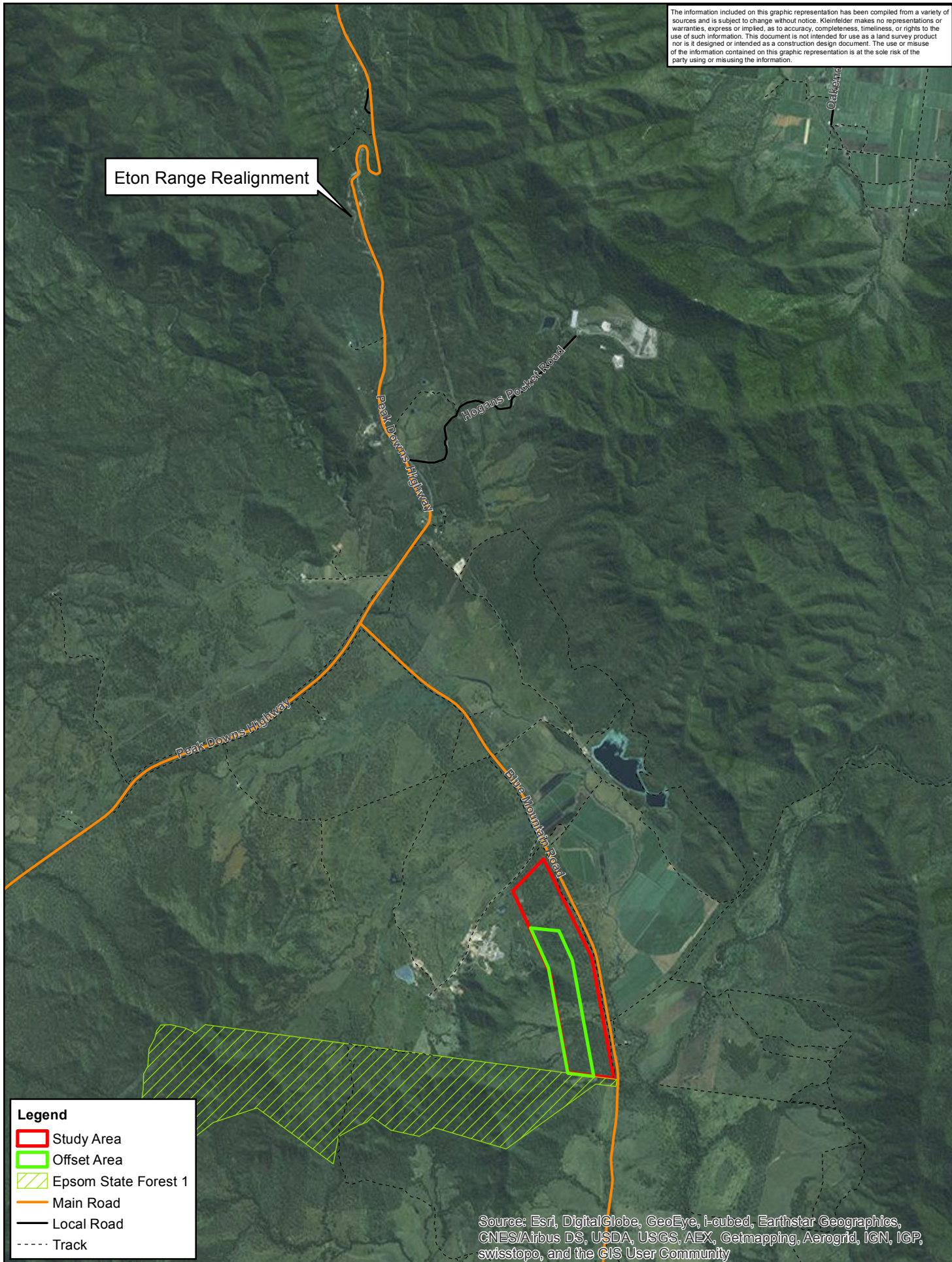
- Legend**
- Study Area
 - Offset Area
 - Epsom State Forest 1
 - BioCondition Quadrat/Tertiary Survey
 - ⊗ KSAT Location
 - ⊗ Quaternary Survey
 - Main Road
 - Track



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

<p>Metres</p> <p>0 50 100 200 300 400 500</p> <p>KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com</p>	<p>PROJECT REFERENCE: 20163096</p> <p>DATE DRAWN: 27/11/2015 14:35 Version 1</p> <p>DRAWN BY: gjoyce</p> <p>DATA SOURCE: © State of Queensland (Department of Environment and Resource Management) - 2010 nearmap - 2015</p>	<p>Survey Effort</p> <p>Queensland Department of Transport & Main Roads Eton Range Realignment – Potential Offset Site Ecological Assessment</p>	<p>FIGURE:</p> <p>2</p>
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Legend

- Study Area
- Offset Area
- Epsom State Forest 1
- Main Road
- Local Road
- Track

0 0.250.5 1 1.5 2 2.5
km



PROJECT REFERENCE: 20163096

DATE DRAWN: 27/11/2015 15:40 Version 1

DRAWN BY: gjoyce

DATA SOURCE:

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nearmap - 2015

Study Area and Offset Site Context

Queensland Department of Transport & Main Roads
Eton Range Realignment – Potential Offset Site
Ecological Assessment

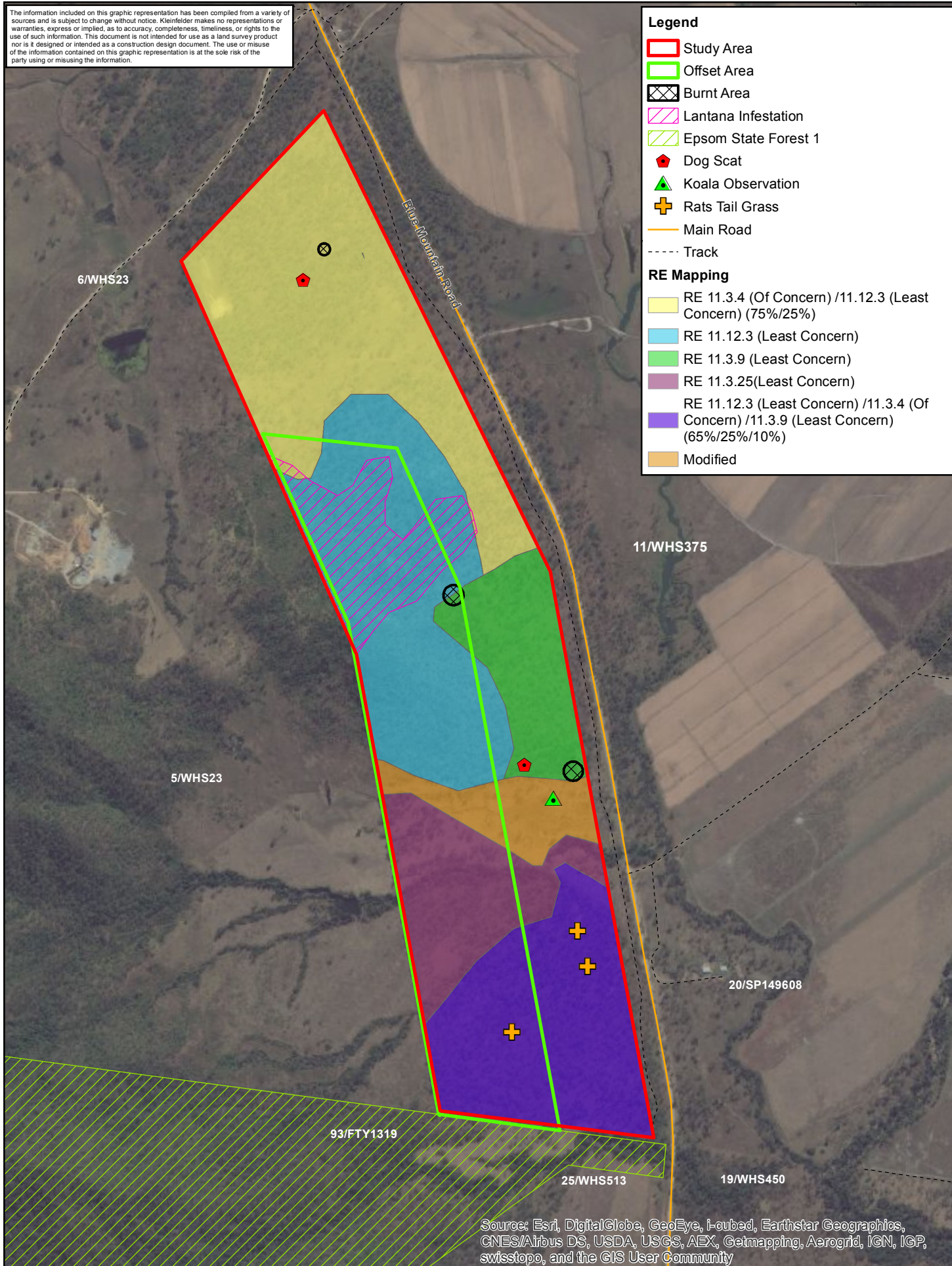
FIGURE:

3



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<p>Metres</p> <p>0 50 100 200 300 400 500</p> <p>N</p>	<p>PROJECT REFERENCE: 20163096</p> <p>DATE DRAWN: 27/11/2015 15:27/Version 1</p> <p>DRAWN BY: gjoyce</p>	<p>Observations</p>	<p>FIGURE:</p> <p>4</p>
<p>KLEINFELDER</p> <p>Bright People. Right Solutions.</p> <p>www.kleinfelder.com</p>	<p>DATA SOURCE:</p> <p>© State of Queensland (Department of Environment and Resource Management) - 2010</p> <p>nearmap - 2015</p>		

4. DISCUSSION

The study area overall was identified as of moderate to poor condition (score averaging), however no characterisation is available on the condition class categories developed by Ecological Survey and Management (2013) which limits interpretation. It should be noted that the condition class metric used by Ecological Survey and Management varies from the metric proposed by Eyre *et al.* (2015). Ecosystems in the northern sections of the study area are more degraded from grazing and the presence of Thatch Grass. Thatch Grass has been identified during separate studies in the area to inhibit Koala movement across the ground (Kleinfelder 2015). Ecosystems in the southern areas score higher and appear undisturbed by agriculture; the understorey exhibits high levels of healthy native grass coverage and good recruitment of Koala feed trees. These areas should be the focus of any potential offset depending on the eventual size required to effectively offset the impacts of the proposed ERRP.

The landscape score of the study area is positive considering that the locality is primarily used for agriculture and is close to a rural road. It exhibits good connectivity and is part of a large regional patch of the required Broad Vegetation Group which forms part of the wider Clarke – Connors Ranges. The study area is also connected at its southern borders to Epsom State Forest.

Species stocking rates indicate medium to high Koala activity in the study area. Broad-leaved Ironbarks and Blue Gums were preferred species with high pellet counts. These species are dominant features of three out of the four REs present on the site.

Threats from external sources appear minimal to moderate. Dog scats were only observed in grazed areas indicating the potential source to be domestic dogs. Uncontrolled domestic dogs can still have a negative impact of Koala recovery objectives. Attacks from domestic dogs are the third most significant known cause of Koala mortality (Environmental Protection Agency 2006). Lantana thickets in the central western areas of the site will hinder movement of Koalas on the ground and inhibit natural recruitment of feed trees. The weed is likely to spread further in the area particularly in places of unstable ground (hill faces) and in the event of bushfire. The Giant Rats Tail Grass is unlikely to spread rapidly from its current position because of the significant coverage of healthy native grass. However in the event of major disturbance such as intense and repeated bushfires or grazing it may spread.

5. REFERENCES

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APPENDIX 1: LEGISLATION

Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act assessment and approval is required for actions that are likely to have a significant impact on matters of national environmental significance. An action includes a project, development, undertaking, activity, or series of activities. When a person proposes to take an action they believe may need approval under the EPBC Act, they must refer the proposal to the Australian Government Minister for the Environment. The Act identifies nine matters of national environmental significance:

1. World Heritage properties;
2. National heritage places;
3. Wetlands of international importance (Ramsar Convention);
4. Listed threatened species and communities;
5. Migratory species listed under international agreements;
6. Great Barrier Reef Marine Park;
7. Commonwealth marine areas;
8. Nuclear actions; and
9. A water resource, in relation to coal seam gas development and large coal mining development.

Point 4 is relevant to this proposal.

Nature Conservation Act 1992 (NCA)

The NCA is Queensland's principal legislation which establishes a framework for the identification, gazettal and management of protected areas, the protection of native flora and fauna (protected wildlife) listed under the adjoining *Nature Conservation (Wildlife Management) Regulation 2006* (NC(WM)R). The NCA is administered by the Queensland Department of Environment and Heritage Protection (DEHP).

The NC(WM)R classifies native flora and fauna species according to their conservation status which includes Extinct in the Wild, Endangered, Vulnerable, Near Threatened, and of Least Concern; which reflects their rareness and what actions need to be taken to protect them.

Areas that contain known EVNT species are considered high risk. High risk areas that contain flora species are identified through trigger mapping. Disturbance footprints within areas identified in trigger maps require further assessment of the area by qualified personnel.

Land Protection (Pest and Stock Route Management) Act 2002 (LPA)

The LPA is designed to establish principles and planning of pest management and stock route network management in Queensland. It is achieved through a range of administrative, restrictive, and preventative measures and fosters responsibility onto industries and personnel involved in land management and development. Within this project the LPA was used to identify declared species of weed (State) and Weeds of National Significance (WoNS – Federal) along with appropriate action requirements.

Vegetation Management Act 1999 (VMA)

The VMA principally regulates the clearing of native vegetation in Queensland. It identifies collective vegetation communities (known as Regional Ecosystems) and classifies them according to the amount of remnant vegetation remaining state wide.

- Endangered ecosystems are identified as remnant vegetation that is less than 10 per cent of its pre-clearing extent across the bioregion; or 10–30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares;
- Of Concern ecosystems are identified as remnant vegetation that is 10–30 per cent of its pre-clearing extent across the bioregion; or more than 30 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares;
- Least Concern ecosystems are identified as remnant vegetation that is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares.

The VMA uses this quantification to regulate what clearing can be done and how such clearing must be undertaken to meet the requirements of state legislation.

Essential habitat is also identified under the VMA and considers remnant or high value regrowth ecosystems that hold at least three different essential habitat factors for any species of listed wildlife to occur during any stage of its life cycle.

APPENDIX 2: SITE CONDITION SURVEY METHODOLOGY

BioCondition Surveys

Modified BioCondition surveys were undertaken in six areas of the proposed offset site as outlined in BioCondition methodology by Eyre *et al.* (2015). Five different measurement units were used. **Table 4** identifies the units of measurement and the attributes.

Table 4: Modified BioCondition measurement units and attributes

Measurement	100 x 50m quadrat	100m transect	50 x 20m quadrat	50 x 10m quadrat	1 x 1m quadrat
Attribute	<ul style="list-style-type: none"> • Large trees • Tree canopy height • Recruitment of habitat species 	<ul style="list-style-type: none"> • Tree canopy cover • Native shrub cover 	<ul style="list-style-type: none"> • Coarse woody debris 	<ul style="list-style-type: none"> • Weed coverage 	<ul style="list-style-type: none"> • Native ground cover richness • Organic matter

Regional Ecosystem Verification

Six standard 0.05 ha (50 m x 10 m) tertiary floristic quadrats were sampled for flora species. One quadrat was undertaken in the study area and one in the reference site. Quadrats were placed in areas deemed to be representative of individual vegetation communities and where vegetation was sufficient. Each quadrat was carefully examined to identify all plant species present and their relative abundance. This assessment is consistent with methodologies used by Nelder *et al.* (2012) for mapping vegetation in Queensland:

Quaternary Survey or Rapid Data Points (RDP) are summaries of dominant floristic composition and stratification taken at random points over a large spatial scale. They are used as a fast and reliable way of identifying ecosystem distribution and support Regional Ecosystem mapping. RDPs are not a standard size; they simply document the vegetation within view (approximate 50m radius), aiming to describe the vegetation type present at any given point. Eight RDPs were used during the survey of the site.

Floristic Identification and Nomenclature

Floristic identification and nomenclature was devised from a variety of published literature and online resources. If a plant was unable to be identified using these references or a specimen was potentially rare or threatened, samples were sent to the Queensland Herbarium.

Vegetation Community Mapping

The identification of vegetation communities was based on dominant species in the overstorey, midstorey, shrub and ground layers as recorded in 0.05 ha floristic quadrats, and supported through RDPs. The species associations recorded in the study area were compared to descriptions of vegetation communities provided by the Queensland Herbarium and supported through DEHP. Vegetation communities that best matched those observed in the proposed offset site were adopted by this study. Observations of Regional Ecosystems (REs) remaining in the area were also used as visual reference points prior to and throughout the study.