

ATTACHMENT I

Eton Range Realignment Project

Field Survey Report for Matters of National
Environmental Significance

August 2015



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1. ABBREVIATIONS AND ACRONYMS

Table 1 Abbreviations and Acronyms

Abbreviation/ Acronym	Description
DBH	Diameter at Breast Height
DoE	Department of the Environment
EcoSM	Ecological Survey and Management
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
ERRP	Eton Range Realignment Project
GPS	Geographical Positioning System
KSAT	Koala Spot Assessment Technique
MNES	Matter of National Environmental Significance
RE	Regional Ecosystem
SMEC	Snowy Mountains Engineering Corporation
TMR	Department of Transport and Main Roads

2. INTRODUCTION

2.1. Background

The Department of Transport and Main Roads (TMR) Mackay are currently managing the planning, procurement and construction of the Eton Range crossing, a realignment of Peak Downs Highway (33B) through Spencer's Gap between Ch. 49,800 – 53,062 m (herein referred to as the Eton Range Realignment Project (ERRP)). The ERRP is located between Mackay and Nebo and comprises tight curves and a very steep grade, increasing 130m altitude in less than 1.5km of road. The realignment is aimed at improving safety, accessibility and freight efficiency on the Peak Downs Highway, particularly for future mining operations.

The ERRP involves the construction of two dual lane carriageways for approximately 1.7km, and the widening of the existing carriage to four lanes with 3m shoulders for approximately 1.2km.

Ecological investigations conducted during the design stage of the ERRP identified a Koala (*Phascolarctos cinereus*) population in the Project area. Koalas are listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and thereby constitute a matter of national environmental significance (MNES). As such, a significant impact on Koala populations, or any other MNES, as a result of the Project will trigger a referral to the Department of Environment (DoE) for assessment under EPBC Act.

Preliminary investigations and the preparation of a draft referral have been previously undertaken for the Project. This report and associated field work was commissioned to gather supplementary information on the MNES within the ERRP and surrounding area, largely with regards to the existing Koala population and activity levels through on-ground assessments and review of existing information. The results will assist with the quantification of potential impacts, development of mitigation measures and amendments to the referral documentation.

2.2. Justification for Supplementary Field Work

Additional field work was required to support the EPBC Referral for the following reasons:

- Ecological investigations and significant impact assessment conducted previously were undertaken prior to the release of the *EPBC Act referral guidelines for the vulnerable Koala*. The supplementary investigation was required to capture information gaps in accordance with these guidelines; and
- Surveys of the Koala population and suitable habitat for threatened species under the EPBC Act have not previously been undertaken outside the Project area. This is required to enable assessment of ERRP impacts at a regional scale.

3. METHODOLOGY

3.1. Desktop Assessment

A review of desktop information was conducted to identify gaps in the existing ERRP investigations. The review included the following sources:

- Existing studies undertaken for the Project;
- Desktop searches, including but not limited to, a Protected Matters Search under the EPBC Act, Wildlife Online search, Flora Survey Trigger Map and Remnant Vegetation Map to identify regional ecosystems (REs) present; and
- Any other literature relating to Koala populations in the vicinity of the ERRP and in non-urban areas.

The results of this assessment were provided to the field team to assist with the on-ground survey and also utilised to inform the assessment of threatened and migratory species under the EPBC Act against the significant impact criteria guidelines.

3.2. Field Investigation

A survey of the ERRP and vegetation immediately outside the proposed clearing area (herein referred to as the “Project Area”) was conducted over two days on 14 and 15 July, 2015. The Koala Spot Assessment Technique (KSAT) was utilised to determine the presence/absence of Koalas across the Project Area (Phillips and Callaghan 2011). This method was selected as it provides data on the distribution of the Koala while providing an insight into the importance of different areas of use by assessing relative activity levels.

The number of KSATs conducted was determined on site, based on the site accessibility, vegetation condition and time availability. As such, ten (10) KSATs were conducted at representative locations across the Project area, including six impact sites and four control sites. These were located at approximate intervals of 200-300m, unless otherwise deemed appropriate e.g. where site conditions did not allow due to steep terrain. This approach was considered to systematically assess the clearing area and adjacent habitat while making no a priori assumptions about which areas may be used by the Koala and enabled both the steep escarpment and flatter ridgeline to be assessed. Moreover, the potential impacts of the ERRP are both habitat loss and the increased risk of vehicle strike which is a major source of Koala mortality. This systematic approach may provide a better indication of likely Koala road crossing points.

The KSAT methodology employed (Phillips and Callaghan, 2011) involves the selection of a focal tree (a koala habitat tree¹ or tree where Koalas are known to occur) at each KSAT site and surveying the nearest 29 Koala habitat trees as described below.

At each of the 30 trees, the base was searched within a 1m radius for two person-minutes or until a scat was identified, whichever came first. This included a visual search on top of the ground layer, followed by removal of the leaf litter if required. The GPS location of the site was determined and the species, height, diameter at breast height (DBH) and presence of Koalas was recorded for each tree.

Where 30 suitable trees were not present within the clearing footprint, or it was deemed otherwise appropriate, trees just outside the footprint were also surveyed. Surveying trees outside the footprint was considered necessary to provide an indication of general presence within the area and potential corridors of movement.

¹ Koala habitat trees are >4m tall or >10cm DBH from the genera *Eucalyptus*, *Angophora*, *Lophostemon*, *Corymbia* and *Melaleuca*

Photographs were taken to show the surrounding habitat. The standard KSAT datasheet used by SMEC requires a description of the vegetation community, including the dominant species, size and height of the vegetation.

Incidental observations of fauna or suitable habitat for other threatened species were noted, though no other MNES were specifically targeted during the survey.

4. RESULTS

4.1. Koala Activity Levels

No direct observations of Koalas were recorded during the survey. However, of the ten (10) KSATs conducted, nine (9) detected Koala scats, thereby indicating presence of Koala across the ERRP area. A summary of the results is provided in Table 2 and displayed in Figure 1 and Graph 1. Figure 1 (the sites are numbered 1-10 within the point symbol) also provides an indication of the level of activity (high, medium or low) determined for each site in accordance with the Phillips and Callaghan methodology. This is further discussed in Section 6.

KSAT 1, an impact site, detected the highest activity level of Koalas with 57% of the 30 trees determined to have scats within 1m of the tree base (Plate 1). The second highest activity level observed was within KSAT 4, a control site, with 40% of trees determined to have scats within 1m of the tree base. Data for all trees surveyed, including GPS location of each KSAT, is provided in Appendix A.

KSAT 5 is an isolated patch of vegetation which is to become the median strip between two proposed roads associated with the ERRP. Koala sightings had been reported in this vegetation previously, but recent evidence of Koalas is minimal. Scats were observed under a small percentage of trees, though they were largely considered to be older scats. However, relatively fresh scats were found under the White Mahogany (*Eucalyptus portuensis*) in which a Koala was previously observed, indicating that this tree continues to be used.

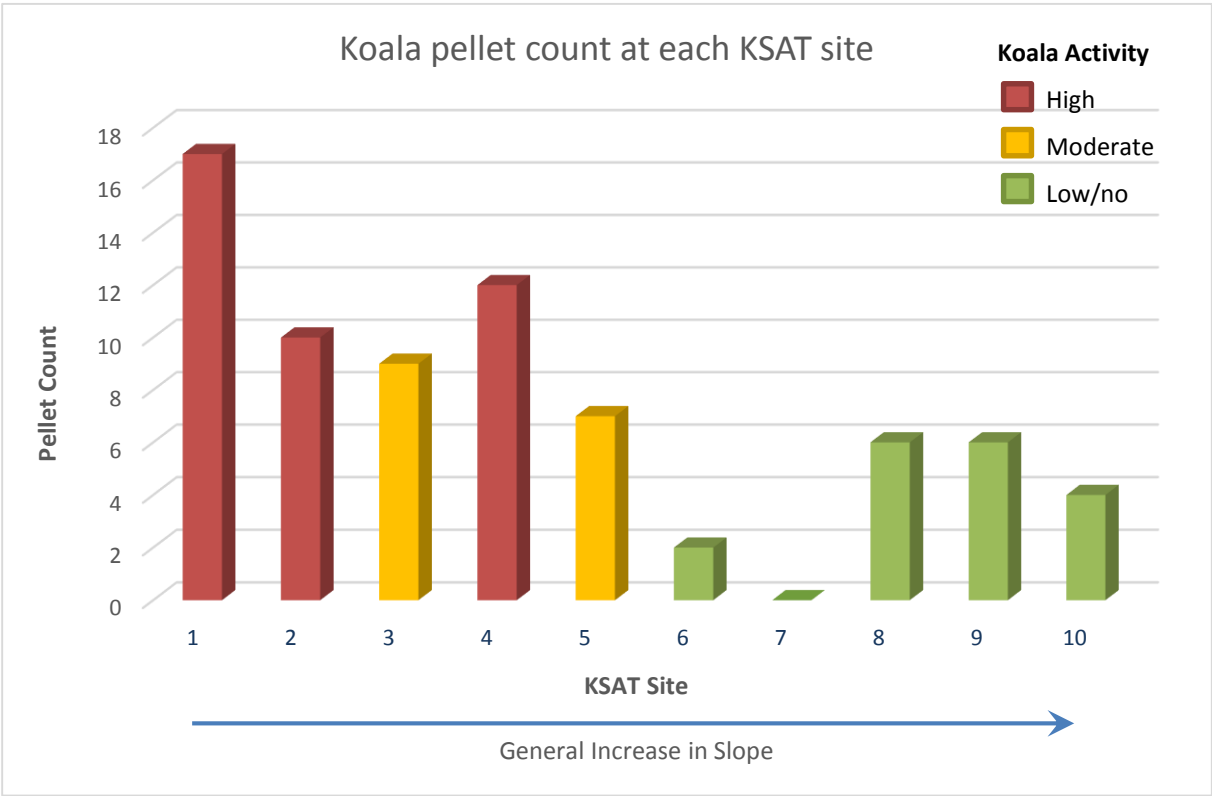
KSAT 7, the only KSAT in which scats were not detected, was the steepest slope of all sites, had a dense groundcover of Lantana (*Lantana camara*) and contained a limited diversity of Eucalypt species. A significant cover of Lantana was also noted across the western side of the existing Peak Downs Highway, observed in the majority of KSATs.

Across the ten (10) KSATs, scats were detected beneath a total of 73 trees. 29% of these were *Corymbia citriodora*, 26% were *Eucalyptus drepanophylla* and 23% were *Eucalyptus portuensis*. No scats were identified beneath *Eucalyptus platyphylla* which is a common species within the ERRP area.

The control sites were surveyed to provide an understanding of the Koala population outside the proposed footprint. A comparison of the mean activity level between impact and control sites found no variation; the mean activity level was calculated to be 24% activity for impact sites and 24% for control sites. Variation in Koala density was related to topography. Medium to high activity levels were found on gentle terrain, with activity declining eventually to zero as slope steepness increased (Figure 1). Representative site photographs are shown in Plates 2 – 5.

Table 2 KSAT Results Summary with activity level according to Phillips and Callaghan (2011) relative to a high density east coast population.

KSAT ID Number	Impact/Control	Number of Trees with Scats	Level of Activity (% of trees with scats)	Activity Level
1	Impact	17	57	High
2	Impact	10	33	High
3	Control	9	30	Medium
4	Control	12	40	High
5	Impact	7	23	Medium
6	Control	2	7	Low
7	Impact	0	0	Zero
8	Impact	6	20	Low
9	Control	6	20	Low
10	Impact	4	13	Low



Graph 1: Koala Pellet Count at each KSAT Site



Plate 1: Koala scats at the base of a *Eucalyptus drepanophylla* at KSAT 1.



Plate 2: KSAT 3 showing undisturbed habitat typical of gentle topography (but noted the presence of *Lantana camara*) associated with medium to high activity levels.



Plate 3: Habitat remaining at KSAT 5, which will become isolated within the split road corridor.

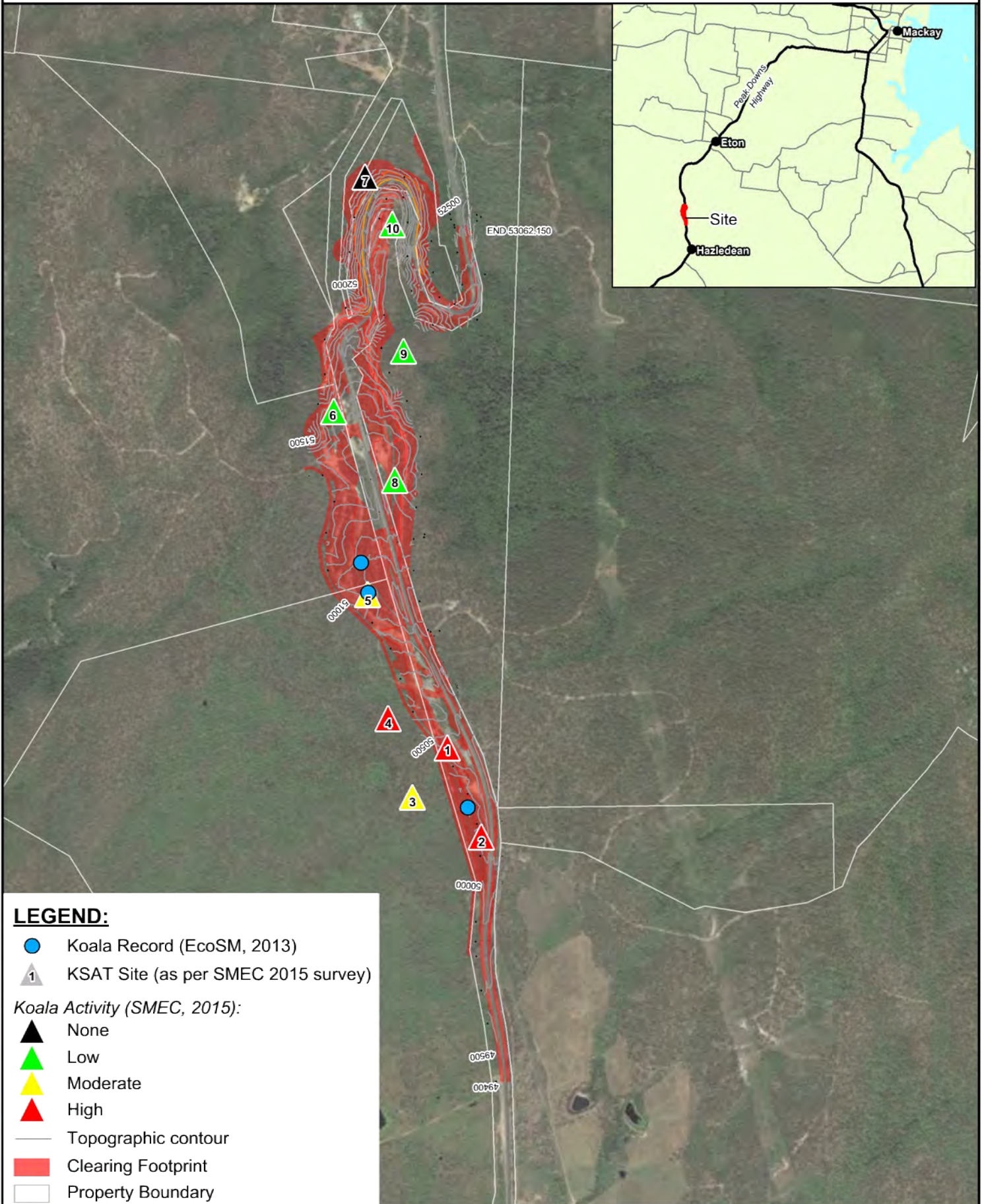


Plate 4: KSAT 6 showing topography of increasing steepness associated with low activity levels.



Plate 5: KSAT 10 recorded low Koala activity; notice the very steep drop off to the left of photo.

Figure 1: KSAT results



LEGEND:

- Koala Record (EcoSM, 2013)
 - 1 KSAT Site (as per SMEC 2015 survey)
- Koala Activity (SMEC, 2015):*
- ▲ None
 - ▲ Low
 - ▲ Moderate
 - ▲ High
 - Topographic contour
 - Clearing Footprint
 - Property Boundary

<p>FIGURE Results</p> <p>CREATED BY AM11482</p> <p>REVISION 2</p> <p>STATUS FINAL</p> <p>DATE 18/08/2015</p> <p>ISSUED FOR INFORMATION</p>	<p>PROJECT NO. 30031488</p> <p>PROJECT TITLE ERRP EPBC</p> <p>COORDINATE SYSTEM GDA 1994 MGA Zone 55</p> <p>SOURCE DEHP, Copyright 2015; Digital Globe Copyright 2015</p> <p>PATH I:\Projects\MISCELLANEOUS PRDJECTS\30031488\007_Spatial\Eton Range.wor</p>	<p>0 250 500m</p> <p>Scale: 1:15,000 @ A4</p> <p>Copyright SMEC Australia Pty Ltd. All Rights Reserved.</p>	<p>CONSULTANT SMEC Australia</p> <p>CLIENT DTMR</p> <p>Queensland Government</p>
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4.2. Assessment of Significance for EPBC Act listed Species

A likelihood of occurrence assessment has been undertaken for all species listed under the EPBC Act, as determined through the protected matters search tool. This returned a list of 25 threatened species, 13 migratory species (including those which are also threatened) and two (2) marine species within a 20km radius of the ERRP.

The likelihood of occurrence assessment has been taken from the Fauna Assessment Report (EcoSM, 2013) and amended as appropriate, based on further desktop assessment and observations in the field. This assessment is provided in Table 3. None of the threatened species provided in this list were directly observed during the recent field investigation. Potentially suitable habitat for two (2) species, in addition to the Koala, has been identified with these species being assigned a moderate likelihood of occurrence. These species are Grey-headed Flying-fox and the Northern Quoll.

A likelihood of occurrence assessment has also been undertaken for migratory and marine species, provided in Table 4. One (1) species, the Spectacled Monarch, has been identified on site previously (EcoSM, 2013) while four (4) others have been assigned either a moderate or high likelihood of occurrence.

Table 3 Threatened Species Likelihood of Occurrence Assessment (adapted from EcoSM, 2013)

Name of Species	EPBC Status	Habitat Requirements	Likelihood of Occurrence
Amphibians			
Eungella Day Frog <i>Taudactylus eungellensis</i>	E	Occurs in upland rainforest streams in the ranges west of Mackay, between Clarke Range and Finch Hatton Gorge. It inhabits exposed, steep sections within the splash zones of waterfalls and cascades (DoE 2015).	Low - This species is associated with streams in wet tropical rainforest, which do not occur within the ERRP area.
Birds			
Red Goshawk <i>Erythrotriorchis radiatus</i>	V	The Red Goshawk is generally found in open woodland, the edges of rainforest, and in dense riverine vegetation of coastal and subcoastal forests (Marchant and Higgins 1993). This species relies on tall trees for nesting and permanent water.	Low - The Red Goshawk may occasionally forage within the ERRP area, though the lack of permanent water suggest it is unlikely to nest in the area.
Australian Painted Snipe <i>Rostratula australis</i>	E	This species occurs in shallow, inland wetlands that are temporary or permanently inundated. This includes either fresh or brackish waters. It nests amongst vegetation near the waters edge.	Low – There is no suitable habitat for this species present in the ERRP area.
Squatter Pigeon <i>Geophaps scripta scripta</i>	V	This species inhabits open forests to sparse, open woodlands and scrub that contain <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Acacia</i> or <i>Callitris</i> species and occur within 3km of water. These are typically remnant, regrowth of partly modified vegetation communities (DoE, 2015). It appears to favour sandy soil dissected with low gravelly ridges and is less common on heavier soils with dense grass cover.	Low - This species may occasionally occur within the woodland vegetation types of the ERRP area, though the soil type is not typically sandy as required by the species.
Star Finch <i>Neochmia ruficauda ruficauda</i>	E	The Star finch occurs only in central Queensland, usually inhabiting low, dense damp grasslands bordering wetlands and waterways. In Queensland this species' range has largely contracted to the southern Cape	Low – There is no suitable habitat within the ERRP area.

Name of Species	EPBC Status	Habitat Requirements	Likelihood of Occurrence
		York. There have not been any confirmed records from the Cairns to Townsville region for some time and none were recorded during the Birds Australia Atlas project (Higgins <i>et. al.</i> 2006).	
Black-throated Finch <i>Poephila cincta cincta</i>	E	This species typically occurs in dry, open grassy woodlands and forests containing <i>Eucalyptus</i> , <i>Corymbia</i> and <i>Melaleuca</i> species, generally in the vicinity of water (DoE, 2015). It is also thought to require a mosaic of different habitat in the wet season to find seed (Mitchell 1996). This species has undergone a significant range contraction from the southern parts of its former distribution. It has not been recorded in south-east Queensland since the early 80s and is now thought to be extinct in NSW (Higgins <i>et al.</i> 2006).	Low - The ERRP area contains limited suitable habitat for this species as the correct forests are present, though they are not within the vicinity of water. This species has not previously been recorded in any of the regional ecosystems present across the ERRP area.
Masked Owl <i>Tyto novaehollandiae kimberli</i>	V	This species occurs in riparian forests, rainforest, open forest, <i>Melaleuca</i> swamps and mangroves in northern Australia (DoE, 2015). It is thought to only occur in three main populations across the Kimberley, Northern Territory and Cape York (Garnett <i>et al.</i> 2011).	Low – Some vegetation is potentially suitable habitat for this species, however there are no known records in the vicinity of the ERRP.
Mammals			
Northern Quoll <i>Dasyurus hallucatus</i>	E	The Northern Quoll is usually associated with dissected rocky escarpments but also known from eucalypt forest, sandy lowlands, grasslands, beaches and woodlands, around human settlement and occasionally rainforest. The areas where the Quoll persist in Queensland tend to be steep, rocky areas close to water that have not been recently burnt. Home range up to 35 ha.	Moderate – Vegetation and the rocky escarpments within the ERRP area suggest suitable habitat for Northern Quoll to occur. This species has previously been sighted in the surrounding area. Paucity of breeding habitat.
South-eastern Long-eared Bat <i>Nyctophilus timoriensis / corbeni</i>	V	In Queensland, this species is mainly in the Brigalow belt south bioregion. It inhabits various woodland vegetation types, including box and ironbark.	Low - This species is generally not considered to occur as far north as Mackay. The ERRP is outside the Brigalow Belt bioregion.
Koala <i>Phascolarctos cinereus</i>	V	This species is widespread in Sclerophyll forest and woodlands on foothills and plains on both sides of the Great Dividing Range from about Chillagoe, Queensland to Mt Lofty ranges in South Australia (Menkhorst and Knight 2011).	Present - This species was recorded at three locations in the Study area in regional ecosystem (RE) 8.12.7. All areas of the Study area, except RE 8.12.3 are considered to provide habitat for this species. No to low Koala activity levels (0% to 22.52%) were recorded along the steep slopes at the northern end of the Project and medium (22.53 - 32.84%)

Name of Species	EPBC Status	Habitat Requirements	Likelihood of Occurrence
			and high (>32.84%) activity levels were recorded at the southern end, where the terrain was more gentle.
Greater Large-eared Horseshoe Bat <i>Rhinolophus philippinensis (large form)</i>	E	This is restricted to a broad strip of coastal and near-coastal habitat in north-eastern Queensland from Iron Range on Cape York Peninsula south to Townsville. It may occur south of Townsville at Mt Elliot and Cape Cleveland. Habitat includes lowland rainforest along gallery forest-lined creeks within open eucalypt forest, <i>Melaleuca</i> forest with rainforest understorey and tall riparian woodland comprising <i>Eucalyptus tereticornis</i> and <i>Eucalyptus tessellaris</i> (DoE, 2015). Roosts in caves and possibly tree hollows, dense foliage and large bridge culverts (Van Dyck and Strahan 2008).	Low - The ERRP area is outside the known distribution of this species and there have been no records in the vicinity of the Project. Suitable habitat in the ERRP area is limited.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	This species prefers forests with fruiting or flowering trees, and roosts in forest near water (including mangroves). Although the northern limit of the species range was previously thought to be Rockhampton, recent years have seen apparent range expansions as far north as Innisfail (CSIRO, 2015; DoE 2015.)	Moderate – Flowering trees, including winter flowering ironbarks, are present across the ERRP area which may be utilised for foraging. However water is not in close proximity to the site, therefore roosting is unlikely to occur.
Water Mouse <i>Xeromyz myoides</i>	V	The Water Mouse is known in mangrove communities and adjacent sedgeland, grasslands and freshwater wetlands.	Low – There is no suitable habitat within the ERRP area.

Reptiles

Yakka Skink <i>Egernia rugosa</i>	V	The Yakka Skink is a ground-dwelling reptile found in dry open forests, woodlands and rocky areas of the Brigalow Belt, landzones 9 and 10. It is often found under dead timber and in deep rock crevices (Wilson, 2005).	Low - This species is usually found further inland and from drier habitats.
Ornamental Snake <i>Denisonia maculata</i>	V	The Ornamental Snake is found in close association with frogs which form the majority of its prey. It prefers woodlands and open forests and Brigalow dominated vegetation communities. It is also associated with moist areas, particularly gilgai mounds and depressions with clay soils but is also known from lake margins, wetlands and waterways (DoE, 2015).	Low – There is no Brigalow or gilgai habitat present in the ERRP area.
White-throated Snapping Turtle <i>Elseya albagula</i>	CE	This species is found only in the Fitzroy, Mary and Burnett Rivers and tributaries of these. It requires clear, flowing and well-oxygenated waters (TSSC, 2014).	Low – There is no suitable habitat present in the ERRP area.
Fitzroy River Turtle <i>Rheodytes leukops</i>	V	Known from the Fitzroy River and its tributaries (Cogger 2000).	Low - There is no suitable habitat for this species within the ERRP area.

Plants

Name of Species	EPBC Status	Habitat Requirements	Likelihood of Occurrence
Three leaved-Bosistoa <i>Bosistoa transversa / selwynii</i>	V	This species is known to grow in lowland subtropical rainforest up to 300m in altitude.	Low – The ERRP area is largely absent of lowland subtropical rainforest.
Black Ironbox (<i>Eucalyptus raveretiana</i>)	V	Black Ironbox occurs on the banks of rivers, creeks and moderate sized watercourses on clayey or sandy loam. It is often associated with <i>Melaleuca leucadendra</i> and/or <i>Melaleuca fluviatilis</i> fringing open forest. Endemic to Central and North Queensland and known from Nebo to Ayr and Aps Creek to Rockhampton (Halford 1997).	Low - Suitable habitat absent. No records within the immediate vicinity.
Holly-leaved Graptophyllum <i>Graptophyllum ilicifolium</i>	V	The populations of this species are localised, within Mount Blackwood and Mount Adder national parks and Mount Jukes. The habitat consists of tall to very tall mixed notophyll forest.	Low – The ERRP is outside the identified localities of this species.
<i>Omphalea celata</i>	V	Occurs along watercourses with steep sided gullies on granitic or heavily weathered metamorphic soils. <i>O. celata</i> has also been recorded in semi-evergreen vine thicket and vine forest. <i>Omphalea celata</i> is known from three sites in central east Queensland - Hazlewood Gorge, near Eungella; Gloucester Island, near Bowen; and Cooper Creek in the Homevale Station area, north-west of Nebo (TSSC, 2008).	Low – There are three known locations in central east Queensland, the closest record being 42km east in Homevale National Park (Atlas of Living Australia, 2015). There is no suitable habitat within the ERRP area.
Lesser Swamp-orchid <i>Phaius australis</i>	E	The swamp-orchid is found in coastal wet heath/sedgeland wetlands, swampy grasslands or swampy forests. Populations are largely across southern Queensland, with one population known near Rockhampton (DoE, 2015).	Low – No suitable habitat within the ERRP area.
Native Moth Orchid <i>Phalaenopsis rosenstromii</i>	E	This orchid occurs in humid rainforest areas, near waterfalls or streams, on sheltered slopes or gullies in notophyll vine thickets, deciduous vine thickets or in open forest (DoE, 2015).	Low – No suitable habitat within the ERRP area.
<i>Cycas ophiolitica</i>	E	<i>Cycas ophiolitica</i> grows on hills and slopes in sparse, grassy open forest at altitude ranges from 80–400 m above sea level. It is often found on sandstone and serpentinite in shallow, infertile soils. <i>Cycas ophiolitica</i> is endemic to Queensland, occurring from Marlborough to Rockhampton in central-eastern Queensland (DoE, 2015).	Low - Outside known distribution of this species. Nearest record is 136km south of project area (Atlas of Living Australia, 2015). There is no suitable habitat within the ERRP area.

Note: CE = Critically Endangered, E = Endangered, V = Vulnerable and NT = Near Threatened

Table 4 Likelihood of Occurrence Assessment for Migratory Species (adapted from EcoSM, 2013)

Species	EPBC Status	Habitat	Likelihood
Migratory Marine Birds			
Fork-tailed Swift <i>Apus pacificus</i>	Migratory and Marine	Aerial over open habitat sometimes over forests and cities (Pizzey <i>et al.</i> 2012).	Low – The ERRP area does not contain suitable open habitat for this species.
Migratory Marine Species			
Saltwater Crocodile <i>Crocodylus porosus</i>	Migratory and Marine	Occurs in coastal waters, estuaries, freshwater sections of lakes, inland swamps and marshes in all coastal areas north of Rockhampton, west to King Sound (near Broome) in Western Australia (DoE, 2015).	Low - The ERRP area does not contain suitable estuarine habitat for this species.
Migratory Terrestrial Species			
White-throated Needletail <i>Hirundapus caudacutus</i>	Migratory and Marine	Aerial over forests, woodlands, farmlands, plains, lakes and towns (Pizzey <i>et al.</i> 2012). Breeds in Asia.	Moderate - Likely to forage over the ERRP occasionally.
Barn Swallow <i>Hirundo rustica</i>	Migratory and Marine	Open forests, woodlands, grasslands, caves, ledges, offshore rocky islands, farmlands, grain stubbles, rail yards and towns, particularly near water. Occasionally roosts in old buildings. Is widespread in Australia and coastal islands (Pizzey <i>et al.</i> 2012).	Low – the ERRP area does not provide suitable open habitat or substantial waterbodies.
Rainbow Bee-eater <i>Merops ornatus</i>	Migratory and Marine	Woodlands, beaches, rainforest and mangroves (Pizzey <i>et al.</i> 2012).	Moderate - Suitable habitat is present in or immediately adjacent to the ERRP area.
Black-faced Monarch <i>Monarcha melanopsis</i>	Migratory and Marine	Rainforest, eucalypt woodlands and forest, coastal scrubs, rainforest gullies (Pizzey <i>et al.</i> 2012).	High – The ERRP area contains suitable habitat for this species.
Spectacled Monarch <i>Monarcha trivirgatus</i>	Migratory and Marine	Rainforest, thickly wooded gullies, waterside vegetation (Pizzey <i>et al.</i> 2012).	Present - This species was identified in the ERRP area during a bird survey in RE 8.12.3 (EcoSM, 2013).
Satin Flycatcher <i>Myiagra cyanoleuca</i>	Migratory and Marine	Heavily vegetated gullies in forests and taller woodlands and during migration coastal forests, woodlands, mangroves, gardens and open country (Pizzey <i>et al.</i> 2012).	Moderate – The ERRP area contains suitable habitat for this species, including heavily vegetated gullies.
Rufous Fantail <i>Rhipidura rififrons</i>	Migratory and Marine	Rainforest, wet eucalypt forests, monsoon forests, paperbarks, sub-inland and coastal scrubs, mangroves, watercourses, parks (Pizzey <i>et al.</i> 2012).	Moderate - All vegetated areas within the ERRP area provide potentially suitable habitat for this species.
Migratory Wetlands Species			
Great Egret <i>Ardea alba</i>	Migratory and Marine	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands, sewage ponds, larger dams (Pizzey <i>et al.</i> 2012).	Low – the ERRP area does not contain suitable habitat for this species.

Cattle Egret <i>Ardea ibis</i>	Migratory and Marine	Stock paddocks, pastures, croplands, garbage dumps, wetlands, tidal mudflats and drains (Pizzey <i>et al.</i> 2012).	Low – The ERRP area does not contain suitable habitat for this species.
Latham's Snipe <i>Gallinago hardwickii</i>	Migratory and Marine	Soft wet ground or shallow water with tussocks, wet paddocks, seepage below dams, irrigated areas, scrub or open woodland (Pizzey <i>et al.</i> 2012).	Low – The ERRP area does not contain suitable habitat for this species.
Eastern Osprey <i>Pandion haliaetus</i>	Migratory and Marine	Coasts, estuaries, bays, inlets, islands and surrounding waters, coral atolls, reefs and lagoons (Pizzey <i>et al.</i> 2012).	Low – The ERRP area does not contain suitable habitat for this species.
Marine Species			
White-bellied Sea-eagle <i>Hiaetus leucogaster</i>	Marine	Coasts, islands, estuaries, large rivers, lakes and reservoirs (Pizzey <i>et al.</i> 2012).	Low – The ERRP area does not contain suitable habitat for this species.
Magpie Goose <i>Anseranas semipalmata</i>	Marine	Large seasonal wetlands and well vegetated dams with rushes and sedges, wet grasslands and floodplains (Pizzey <i>et al.</i> 2012).	Low – The ERRP area does not contain suitable habitat for this species.

5. DISCUSSION

The KSAT methodology adopted from Phillips and Callaghan (2011) categorises the activity levels into low, medium (normal) or high use, based on the mean activity level. This is further broken down into activity categories, based on the density of the area. The ERRP area has been identified as an East Coast (med-high) use 'activity category', whereby the following categorisation of activity levels applies:

1. Low use = less than 22.52%;
2. Medium use = more than or equal to 22.52% and less than or equal to 32.84%; and
3. High use = more than 32.84%.

Within the ERRP area (the impact sites), three (3) KSATs were determined to have low use, one (1) had medium use while two (2) had high use. The control sites identified two (2) KSATs with low use, one (1) with medium use while one (1) had high use. One low activity site at each of the impact and control areas recorded a scat beneath 20% of trees, so they were close to the threshold of medium activity. This suggests that the Koala population extends across the ERRP area but also into adjacent habitat.

In general, the sites within the southern extent of the Project area recorded the highest Koala activity levels. The previous sightings of Koalas were also largely within this area of the ERRP which is relatively flat in elevation but has been recently subject to vegetation clearing due to trial embankment works. On the contrary, the northern extent of the Project area recorded the lowest evidence of Koala activity. These locations were also noted to have the steepest gradient.

Significant areas of Lantana, a declared pest, were observed across the western side of the existing Peak Downs Highway. Lantana has the potential to inhibit Koala access to the base of a tree, depending on the density of the weed invasion. Where Koala activity was lowest, Lantana was considered to be a contributing factor. As part of the mitigation and/or offsets for the ERRP, removal of weeds to improve the habitat value of vegetation adjacent to the realignment works should be considered.

With the exception of the vine thicket community represented by RE 8.12.3, the habitat across and adjacent to the ERRP area is suitable for Koalas. A significant portion of the vegetation is Eucalypt species and related genera. The entire ERRP area is therefore considered to be Koala habitat that will be removed for the Project. In addition, this vegetation has been identified as suitable habitat for several other threatened and migratory species, Grey-headed Flying-fox, Northern Quoll, Rufous Fantail, White-throated Needle-tail, Satin Flycatcher, Rainbow Bee-eater, Spectacled Monarch and Black-faced Monarch.

The proposed road realignment will adversely impact on Koala habitat, through the direct loss of habitat, creation of a barrier to movement and fragmentation of habitat patches between the old and new highway. Due to the life history of the Koala (long lived, slow breeding), small increases in mortality can have disproportionate effects on the viability of its populations. Although there appears to be large areas of similar habitat in the locality, the size of the Koala population is not known. Therefore, any factor that increases mortality should be of concern.

It is likely that Koalas cross the existing Peak Downs Highway, given that scats were observed on both sides of the Highway. There is a known koala movement corridor 10 km south-west of the project area where a significant number of koala fatalities have been recorded on a stretch of the Peak Downs Highway. However, based on Koala home range size (White 1999, Ellis *et al.* 2009, Mitchell 1990), it is unlikely that the Koala population in the Project Area would be crossing at that location. The important crossing points are expected to be in the flatter sections of the Highway at the top of the range (Ch 49,800 – 51, 200 m), where Koala activity levels were highest.

Fauna movement structures and associated furniture to assist in Koala movement should be considered as vehicle strike is a major source of Koala mortality. The installation of concrete barriers to prevent head-on collisions may inhibit Koala movement across the road and further contribute to

mortality. However, the concrete barriers will be installed in areas with a steep gradient and where speed limits will be restricted to 60km/hr. Prevett et al. (1995) found that road kills occurred where vehicle speed exceeded 80km/hr and where wider habitat corridors or linear forests occurred on both sides of the road. A large majority of the proposed road (Ch. 50900 – 53000 m northbound, Ch. 51500 – 53000 m southbound) will be restricted to 60km/hr due to the steep and winding nature of the alignment.

6. CONCLUSIONS

The results of the assessment indicate the Koala population occurs across the majority of the ERRP area and into adjacent habitat. Suitable habitat is present, previous sightings have been recorded and it is likely that Koalas move across the highway.

The proposed road realignment may adversely impact on the Koala population, through direct loss of habitat, creation of a barrier to movement, fragmentation of habitat patches between the old and new highway and the potential increased vulnerability to vehicle strike. The potential impacts of the Project on the Koala are expected to be significant and as such, a referral is to be prepared and submitted to DoE to determine whether the Project will constitute a 'controlled action'. The Project is not expected to result in significant impacts to any other MNES, though this is to be confirmed in the referral.

While the large areas of potential habitat for the Koala in the locality suggest that direct offsets in the immediate area are likely to be of marginal benefit, other mitigation measures should be considered and incorporated into the Project, such as opportunities for fauna movement structures at higher risk areas of the Peak Downs Highway and Lantana control.

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APPENDIX A SURVEY RESULTS

KSAT no.	Tree no.	Species	Ht(m)	DBH(cm)	Scats Observed
1	1	<i>Corymbia citriodora</i>	20	25	X
1	2	<i>Eucalyptus exserta</i>	18	25	X
1	3	<i>Corymbia citriodora</i>	18	30	
1	4	<i>Corymbia citriodora</i>	16	15	
1	5	<i>Corymbia citriodora</i>	20	30	
1	6	<i>Corymbia citriodora</i>	16	15	
1	7	<i>Eucalyptus exserta</i>	10	10	
1	8	<i>Eucalyptus exserta</i>	13	15	
1	9	<i>Corymbia citriodora</i>	22	30	X
1	10	<i>Corymbia citriodora</i>	17	20	X
1	11	<i>Corymbia trachyphloia</i>	9	20	X
1	12	<i>Corymbia trachyphloia</i>	9	20	X
1	13	<i>Eucalyptus drepanophylla</i>	25	40	X
1	14	<i>Eucalyptus drepanophylla</i>	20	40	X
1	15	<i>Lophostemon suaveolens</i>	9	20	
1	16	<i>Corymbia citriodora</i>	20	30	
1	17	<i>Lophostemon suaveolens</i>	9	25	
1	18	<i>Corymbia citriodora</i>	28	30	
1	19	<i>Lophostemon suaveolens</i>	10	15	
1	20	<i>Corymbia citriodora</i>	20	20	
1	21	<i>Corymbia trachyphloia</i>	20	20	X
1	22	<i>Eucalyptus drepanophylla</i>	18	20	X
1	23	<i>Eucalyptus exserta</i>	13	90	X
1	24	<i>Lophostemon suaveolens</i>	15	45	X
1	25	<i>Corymbia citriodora</i>	28	30	X
1	26	<i>Eucalyptus drepanophylla</i>	9	15	X
1	27	<i>Corymbia citriodora</i>	17	20	X
1	28	<i>Eucalyptus portuensis</i>	25	30	X

1	29	<i>Lophostemon confertus</i>	15	30	
1	30	<i>Eucalyptus portuensis</i>	18	35	X
2	1	<i>Corymbia clarksoniana</i>	12	20	
2	2	<i>Eucalyptus drepanophylla</i>	25	35	
2	3	<i>Corymbia citriodora</i>	22	25	
2	4	<i>Corymbia citriodora</i>	33	50	
2	5	<i>Eucalyptus drepanophylla</i>	15	25	X
2	6	<i>Corymbia clarksoniana</i>	8	15	
2	7	<i>Eucalyptus drepanophylla</i>	27	30	
2	8	<i>Corymbia clarksoniana</i>	20	30	
2	9	<i>Corymbia citriodora</i>	22	35	
2	10	<i>Corymbia citriodora</i>	9	15	
2	11	<i>Eucalyptus exserta</i>	7	20	
2	12	<i>Eucalyptus exserta</i>	8	15	
2	13	<i>Corymbia citriodora</i>	17	30	
2	14	<i>Eucalyptus portuensis</i>	18	45	X
2	15	<i>Eucalyptus portuensis</i>	15	30	X
2	16	<i>Corymbia citriodora</i>	15	15	
2	17	<i>Corymbia citriodora</i>	28	40	X
2	18	<i>Eucalyptus exserta</i>	22	50	X
2	19	<i>Corymbia citriodora</i>	14	15	X
2	20	<i>Corymbia citriodora</i>	17	20	
2	21	<i>Corymbia citriodora</i>	35	60	X
2	22	<i>Corymbia citriodora</i>	30	55	
2	23	<i>Corymbia citriodora</i>	18	20	
2	24	<i>Eucalyptus exserta</i>	16	45	
2	25	<i>Corymbia citriodora</i>	18	20	
2	26	<i>Corymbia citriodora</i>	18	20	X
2	27	<i>Melaleuca quinquenervia</i>	9	20	

2	28	<i>Corymbia citriodora</i>	22	25	
2	29	<i>Eucalyptus drepanophylla</i>	18	40	X
2	30	<i>Eucalyptus exserta</i>	14	40	X
3	1	<i>Corymbia citriodora</i>	15	15	X
3	2	<i>Corymbia clarksoniana</i>	17	25	X
3	3	<i>Corymbia citriodora</i>	18	25	
3	4	<i>Corymbia citriodora</i>	30	45	
3	5	<i>Corymbia citriodora</i>	33	40	
3	6	<i>Lophostemon suaveolens</i>	10	15	
3	7	<i>Corymbia citriodora</i>	23	45	
3	8	<i>Corymbia citriodora</i>	35	40	X
3	9	<i>Lophostemon suaveolens</i>	10	20	X
3	10	<i>Corymbia citriodora</i>	17	20	X
3	11	<i>Corymbia citriodora</i>	35	65	
3	12	<i>Corymbia citriodora</i>	8	15	
3	13	<i>Corymbia citriodora</i>	22	20	
3	14	<i>Eucalyptus drepanophylla</i>	17	20	X
3	15	<i>Corymbia citriodora</i>	31	35	
3	16	<i>Corymbia citriodora</i>	18	20	
3	17	<i>Corymbia citriodora</i>	27	25	
3	18	<i>Corymbia citriodora</i>	30	20	
3	19	<i>Corymbia clarksoniana</i>	18	25	
3	20	<i>Corymbia citriodora</i>	32	35	
3	21	<i>Corymbia clarksoniana</i>	8	15	
3	22	<i>Corymbia citriodora</i>	15	15	
3	23	<i>Eucalyptus drepanophylla</i>	15	25	X
3	24	<i>Corymbia citriodora</i>	18	20	X
3	25	<i>Corymbia citriodora</i>	18	20	
3	26	<i>Corymbia citriodora</i>	16	20	

3	27	<i>Corymbia citriodora</i>	25	30	X
3	28	<i>Corymbia citriodora</i>	16	15	
3	29	<i>Eucalyptus drepanophylla</i>	25	30	
3	30	<i>Corymbia citriodora</i>	26	30	
4	1	<i>Eucalyptus platyphylla</i>	15	20	
4	2	<i>Eucalyptus platyphylla</i>	8	20	
4	3	<i>Eucalyptus drepanophylla</i>	15	25	X
4	4	<i>Corymbia citriodora</i>	18	25	
4	5	<i>Corymbia citriodora</i>	18	25	
4	6	<i>Corymbia citriodora</i>	9	15	
4	7	<i>Corymbia citriodora</i>	25	45	
4	8	<i>Corymbia citriodora</i>	20	25	
4	9	<i>Corymbia citriodora</i>	17	35	
4	10	<i>Eucalyptus exserta</i>	15	20	X
4	11	<i>Eucalyptus exserta</i>	18	30	X
4	12	<i>Eucalyptus drepanophylla</i>	20	45	X
4	13	<i>Eucalyptus drepanophylla</i>	25	40	
4	14	<i>Eucalyptus drepanophylla</i>	15	15	X
4	15	<i>Corymbia citriodora</i>	18	20	X
4	16	<i>Eucalyptus drepanophylla</i>	19	25	
4	17	<i>Eucalyptus exserta</i>	10	25	X
4	18	<i>Eucalyptus drepanophylla</i>	16	20	X
4	19	<i>Eucalyptus exserta</i>	12	20	
4	20	<i>Corymbia citriodora</i>	25	30	X
4	21	<i>Eucalyptus drepanophylla</i>	18	20	X
4	22	<i>Eucalyptus drepanophylla</i>	15	20	
4	23	<i>Eucalyptus drepanophylla</i>	28	35	X
4	24	<i>Eucalyptus exserta</i>	12	16	
4	25	<i>Eucalyptus drepanophylla</i>	18	20	

4	26	<i>Eucalyptus drepanophylla</i>	26	45	X
4	27	<i>Lophostemon suaveolens</i>	14	50	
4	28	<i>Lophostemon suaveolens</i>	15	45	
4	29	<i>Lophostemon suaveolens</i>	15	30	
4	30	<i>Lophostemon suaveolens</i>	16	25	
5	1	<i>Corymbia citriodora</i>	28	35	
5	2	<i>Corymbia citriodora</i>	25	45	X
5	3	<i>Eucalyptus drepanophylla</i>	12	20	
5	4	<i>Corymbia citriodora</i>	10	20	
5	5	<i>Corymbia clarksoniana</i>	23	30	
5	6	<i>Eucalyptus drepanophylla</i>	25	50	X
5	7	<i>Eucalyptus exserta</i>	18	30	
5	8	<i>Corymbia citriodora</i>	17	20	X
5	9	<i>Corymbia citriodora</i>	33	35	
5	10	<i>Eucalyptus drepanophylla</i>	22	25	X
5	11	<i>Corymbia citriodora</i>	18	25	
5	12	<i>Corymbia clarksoniana</i>	25	30	
5	13	<i>Eucalyptus drepanophylla</i>	18	20	
5	14	<i>Eucalyptus exserta</i>	15	25	
5	15	<i>Eucalyptus portuensis</i>	32	75	X
5	16	<i>Eucalyptus portuensis</i>	30	40	X
5	17	<i>Corymbia citriodora</i>	12	20	
5	18	<i>Eucalyptus portuensis</i>	18	20	
5	19	<i>Eucalyptus portuensis</i>	8	15	
5	20	<i>Corymbia citriodora</i>	18	15	
5	21	<i>Eucalyptus exserta</i>	10	15	
5	22	<i>Eucalyptus drepanophylla</i>	18	25	
5	23	<i>Corymbia citriodora</i>	30	25	
5	24	<i>Eucalyptus exserta</i>	10	15	

5	25	<i>Corymbia citriodora</i>	25	35	
5	26	<i>Eucalyptus exserta</i>	16	25	
5	27	<i>Eucalyptus exserta</i>	25	25	X
5	28	<i>Eucalyptus exserta</i>	8	15	
5	29	<i>Corymbia citriodora</i>	7	10	
5	30	<i>Eucalyptus exserta</i>	10	20	
6	1	<i>Corymbia citriodora</i>	38	45	X
6	2	<i>Eucalyptus portuensis</i>	18	30	X
6	3	<i>Lophostemon confertus</i>	18	35	
6	4	<i>Lophostemon confertus</i>	12	35	
6	5	<i>Eucalyptus portuensis</i>	10	15	
6	6	<i>Eucalyptus portuensis</i>	8	30	
6	7	<i>Corymbia citriodora</i>	35	55	
6	8	<i>Eucalyptus portuensis</i>	14	35	
6	9	<i>Corymbia citriodora</i>	20	25	
6	10	<i>Eucalyptus platyphylla</i>	10	15	
6	11	<i>Corymbia clarksoniana</i>	12	15	
6	12	<i>Corymbia clarksoniana</i>	8	20	
6	13	<i>Eucalyptus platyphylla</i>	10	15	
6	14	<i>Eucalyptus platyphylla</i>	10	25	
6	15	<i>Eucalyptus platyphylla</i>	9	20	
6	16	<i>Eucalyptus platyphylla</i>	12	20	
6	17	<i>Corymbia citriodora</i>	18	20	
6	18	<i>Eucalyptus exserta</i>	17	20	
6	19	<i>Corymbia clarksoniana</i>	8	15	
6	20	<i>Eucalyptus platyphylla</i>	8	15	
6	21	<i>Corymbia citriodora</i>	22	20	
6	22	<i>Corymbia citriodora</i>	18	15	
6	23	<i>Eucalyptus platyphylla</i>	9	15	

6	24	<i>Corymbia citriodora</i>	30	35	
6	25	<i>Corymbia citriodora</i>	18	25	
6	26	<i>Eucalyptus exserta</i>	18	20	
6	27	<i>Eucalyptus drepanophylla</i>	22	25	
6	28	<i>Corymbia citriodora</i>	12	20	
6	29	<i>Eucalyptus platyphylla</i>	7	15	
6	30	<i>Corymbia citriodora</i>	25	45	
7	1	<i>Corymbia tessellaris</i>	22	25	
7	2	<i>Eucalyptus platyphylla</i>	20	40	
7	3	<i>Eucalyptus platyphylla</i>	8	15	
7	4	<i>Eucalyptus platyphylla</i>	15	25	
7	5	<i>Eucalyptus platyphylla</i>	20	35	
7	6	<i>Eucalyptus platyphylla</i>	15	20	
7	7	<i>Eucalyptus platyphylla</i>	20	45	
7	8	<i>Eucalyptus platyphylla</i>	10	15	
7	9	<i>Corymbia tessellaris</i>	18	15	
7	10	<i>Eucalyptus platyphylla</i>	22	95	
7	11	<i>Corymbia tessellaris</i>	30	25	
7	12	<i>Corymbia tessellaris</i>	12	20	
7	13	<i>Corymbia tessellaris</i>	35	30	
7	14	<i>Corymbia tessellaris</i>	10	15	
7	15	<i>Corymbia clarksoniana</i>	20	65	
7	16	<i>Corymbia clarksoniana</i>	20	40	
7	17	<i>Eucalyptus platyphylla</i>	15	35	
7	18	<i>Eucalyptus platyphylla</i>	17	30	
7	19	<i>Corymbia tessellaris</i>	15	30	
7	20	<i>Corymbia tessellaris</i>	35	40	
7	21	<i>Corymbia tessellaris</i>	18	20	
7	22	<i>Corymbia tessellaris</i>	10	15	

7	23	<i>Eucalyptus platyphylla</i>	16	25	
7	24	<i>Corymbia tessellaris</i>	38	50	
7	25	<i>Eucalyptus platyphylla</i>	8	15	
7	26	<i>Corymbia clarksoniana</i>	20	30	
7	27	<i>Eucalyptus platyphylla</i>	15	30	
7	28	<i>Corymbia tessellaris</i>	16	30	
7	29	<i>Corymbia tessellaris</i>	15	15	
7	30	<i>Corymbia clarksoniana</i>	20	35	
8	1	<i>Corymbia citriodora</i>	20	40	
8	2	<i>Corymbia citriodora</i>	12	25	
8	3	<i>Eucalyptus exserta</i>	22	35	
8	4	<i>Eucalyptus portuensis</i>	12	30	
8	5	<i>Eucalyptus exserta</i>	26	50	
8	6	<i>Eucalyptus drepanophylla</i>	30	35	X
8	7	<i>Eucalyptus exserta</i>	22	35	
8	8	<i>Eucalyptus exserta</i>	17	25	
8	9	<i>Eucalyptus portuensis</i>	18	20	X
8	10	<i>Eucalyptus exserta</i>	10	20	
8	11	<i>Corymbia citriodora</i>	30	25	
8	12	<i>Eucalyptus exserta</i>	15	30	
8	13	<i>Eucalyptus exserta</i>	20	25	
8	14	<i>Eucalyptus exserta</i>	16	20	
8	15	<i>Corymbia citriodora</i>	28	30	
8	16	<i>Eucalyptus drepanophylla</i>	26	35	
8	17	<i>Eucalyptus drepanophylla</i>	25	30	
8	18	<i>Eucalyptus portuensis</i>	20	45	
8	19	<i>Eucalyptus portuensis</i>	18	20	
8	20	<i>Eucalyptus drepanophylla</i>	22	40	
8	21	<i>Eucalyptus drepanophylla</i>	35	40	

8	22	<i>Eucalyptus exserta</i>	15	20	
8	23	<i>Corymbia citriodora</i>	32	30	
8	24	<i>Eucalyptus portuensis</i>	15	30	X
8	25	<i>Corymbia citriodora</i>	30	40	X
8	26	<i>Eucalyptus drepanophylla</i>	28	30	
8	27	<i>Eucalyptus exserta</i>	15	25	X
8	28	<i>Eucalyptus exserta</i>	25	30	
8	29	<i>Corymbia citriodora</i>	25	25	
8	30	<i>Eucalyptus portuensis</i>	22	40	X
9	1	<i>Eucalyptus portuensis</i>	24	60	
9	2	<i>Corymbia citriodora</i>	25	20	
9	3	<i>Eucalyptus portuensis</i>	14	15	
9	4	<i>Corymbia citriodora</i>	25	45	
9	5	<i>Eucalyptus drepanophylla</i>	20	45	
9	6	<i>Eucalyptus portuensis</i>	18	20	
9	7	<i>Eucalyptus portuensis</i>	25	45	
9	8	<i>Eucalyptus portuensis</i>	22	50	
9	9	<i>Eucalyptus exserta</i>	12	25	X
9	10	<i>Eucalyptus drepanophylla</i>	25	50	
9	11	<i>Corymbia citriodora</i>	30	25	
9	12	<i>Corymbia clarksoniana</i>	10	20	
9	13	<i>Corymbia citriodora</i>	28	25	X
9	14	<i>Eucalyptus portuensis</i>	25	50	X
9	15	<i>Eucalyptus portuensis</i>	18	20	
9	16	<i>Corymbia citriodora</i>	35	30	
9	17	<i>Eucalyptus portuensis</i>	18	20	
9	18	<i>Lophostemon confertus</i>	8	20	
9	19	<i>Eucalyptus portuensis</i>	17	25	X
9	20	<i>Eucalyptus portuensis</i>	20	40	

9	21	<i>Eucalyptus drepanophylla</i>	16	25	X
9	22	<i>Eucalyptus drepanophylla</i>	25	25	
9	23	<i>Eucalyptus drepanophylla</i>	22	30	
9	24	<i>Eucalyptus drepanophylla</i>	20	25	
9	25	<i>Eucalyptus portuensis</i>	28	50	
9	26	<i>Eucalyptus portuensis</i>	28	55	X
9	27	<i>Corymbia citriodora</i>	35	40	
9	28	<i>Eucalyptus portuensis</i>	25	30	
9	29	<i>Eucalyptus portuensis</i>	28	45	
9	30	<i>Corymbia clarksoniana</i>	18	45	
10	1	<i>Eucalyptus portuensis</i>	30	35	
10	2	<i>Eucalyptus portuensis</i>	18	20	
10	3	<i>Eucalyptus portuensis</i>	28	30	
10	4	<i>Eucalyptus portuensis</i>	30	70	
10	5	<i>Eucalyptus portuensis</i>	12	15	
10	6	<i>Eucalyptus portuensis</i>	23	25	
10	7	<i>Eucalyptus portuensis</i>	18	20	X
10	8	<i>Eucalyptus portuensis</i>	18	25	X
10	9	<i>Eucalyptus platyphylla</i>	15	20	
10	10	<i>Eucalyptus portuensis</i>	18	25	X
10	11	<i>Eucalyptus portuensis</i>	18	50	
10	12	<i>Eucalyptus portuensis</i>	20	80	
10	13	<i>Eucalyptus portuensis</i>	12	20	
10	14	<i>Lophostemon confertus</i>	12	35	
10	15	<i>Eucalyptus portuensis</i>	12	15	
10	16	<i>Eucalyptus platyphylla</i>	10	25	
10	17	<i>Eucalyptus portuensis</i>	20	30	
10	18	<i>Eucalyptus platyphylla</i>	10	20	
10	19	<i>Lophostemon confertus</i>	10	25	

10	20	<i>Eucalyptus portuensis</i>	24	45	
10	21	<i>Eucalyptus portuensis</i>	12	20	
10	22	<i>Eucalyptus portuensis</i>	14	15	X
10	23	<i>Lophostemon confertus</i>	8	40	
10	24	<i>Corymbia tessellaris</i>	13	20	
10	25	<i>Corymbia citriodora</i>	38	95	
10	26	<i>Eucalyptus portuensis</i>	28	40	
10	27	<i>Eucalyptus portuensis</i>	30	70	
10	28	<i>Eucalyptus portuensis</i>	9	25	
10	29	<i>Eucalyptus platyphylla</i>	7	12	
10	30	<i>Eucalyptus portuensis</i>	22	35	

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