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MACROPOD CONSERVATION PLAN

Background Paper
SUNSHINE COAST COUNCIL

Acknowledgements

The Sunshine Coast Macropod Conservation Plan - Background Paper has been prepared by Ecosure Pty Ltd on behalf of Sunshine Coast Council. Officers from Sunshine Coast Council have been integral to the development of this plan.

Cover image credit: Julie O'Connor.

Glossary, acronyms and abbreviations

CAMCOS	Caloundra Road and the Dedicated Public Transport Corridor
Carrying capacity	The number of animals that can be supported permanently on a given area without inducing negative effects on vegetation or leading to starvation.
Council	Sunshine Coast Council
Critical habitat	Habitat that is essential for the conservation of a viable population of macropods
Dispersal	Movement of an individual away from its natal home range
DO	Desired outcomes
EGK	eastern grey kangaroo
GIS	Geographic Information Systems
Home range	The area of an animal's home that is used for feeding and other activities (McAlpine et al. 2007)
LGA	Local government area
Macropod	Long or large-footed marsupials
MCP	Macropod Conservation Plan
movement pathways	Any space that improves the ability of an animal to move among patches of suitable habitat (Hilty et al. 2006)
NC Act	<i>Nature Conservation Act 1992</i>
NSW	New South Wales
RE	Regional ecosystems
SEQ	South east Queensland
TEC	Threatened ecological community
VCA	Voluntary Conservation Agreement

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1 Introduction

1.1 Background

While human habitat can displace or disadvantage many species, some macropods have adapted well to modified environments, taking advantage of many of our green spaces. The additional habitat we have inadvertently created for them includes golf courses, parks, nature strips, vacant allotments, universities, and even urban front lawns. While such green spaces provide valuable resources for some macropods, their location in busy urban environments can also expose them to significant threats to their survival and wellbeing.

Kangaroos and wallabies are some of Australia's most recognisable and popular animals. Macropods appeal to our identity and culture, as well as being tourism icons, valued by both domestic and international visitors. Highly significant to Indigenous Australians, many traditional land management practices are related to macropods (Bowman et al. 2001). In some areas of Australia, kangaroos can be regarded as a resource or a pastoral pest (Pople and Grigg 1999) and in such areas, consideration for environmental, social and economic values generally form part of any plan to manage kangaroo populations. However, the Sunshine Coast region does not support macropod densities sufficient to cause pastoral damage, nor do they provide a harvesting resource.

1.2 Purpose

This *Macropod Conservation Plan – Background Paper* outlines the information, datasets and analyses used to investigate the seven macropod species that are the subject of council's *Macropod Conservation Plan* (MCP). In particular, the *Background Paper* includes:

- Macropod occurrence across the local government area (LGA).
- Profile of the seven macropod species that form the focus of the MCP, including habitat requirements.
- Threats to macropods across the LGA, including:
 - Future development
 - Roads
 - Predators
- Identification of wildlife injury road hotspots.

2 Focus species

Kangaroos and wallabies are marsupials from the Superfamily Macropodidae which can collectively be referred to as macropods ('macro' meaning long or large; 'pod' meaning foot). Macropods include kangaroos, tree-kangaroos, wallabies, wallaroos, pademelons, bettongs, quokkas and potoroos.

The Sunshine Coast region is home to seven macropod species of the genera *Macropus*, *Thylogale* and *Wallabia*, all of which are the subject of this plan (Table 2). Their status and habitat requirements are described below.

2.1 Eastern grey kangaroo (*Macropus giganteus*)

Eastern grey kangaroos (EGK) (Figure 1) are social animals that live in groups called mobs ranging between 5 and 70 individuals (Brunton et al. 2019). The EGK can grow as large as 2.3 m from head to tail. Adult males typically weigh between 50 and 66 kg, while females weigh around 17 to 40 kg (ALA 2020).

The EGK is primarily a grazer, relying heavily on grasses, herbs and sedges for up to 99 per cent of its diet (Jarman and Phillips 1989), comprising both native and introduced grass species (Dawson 1995; Fletcher 2006a). Eastern greys occupy a range of habitats including woodland, shrubland, open forest, with urban landscapes providing forage in the form of lawns and sporting areas (Brunton et al. 2018). They generally rest during the day in shaded areas and foraging behaviour occurs mostly at night (Dawson et al. 2004).

Eastern grey kangaroos occupy a broad geographic range across eastern Australia from Cape York to Tasmania. On the mainland, provision of artificial water sources has allowed the EGK to expand westward, where they are probably limited by climatic conditions and competition with the well adapted red kangaroos and wallaroos. Their range now also overlaps with that of the western grey kangaroo (*Macropus fuliginosus*) in South Australia, Victoria, NSW and south western Queensland (Coulson in Van Dyck 2008).



Although not migratory, EGKs often have large home ranges, one study estimating home ranges between 25.37 and 106.4 ha (Brunton et al. 2018) with males' home ranges often overlapping females (Jarman & Taylor 1983). Few individuals have been shown to disperse, and those that do are young males. The maximum observed dispersal distance of an EGK is about 17 km (Jarman and Taylor 1983, Zenger et al. 2003). Home range selection is based on forage quality and availability of cover and includes mowed, watered and fertilised grass (Brunton et al. 2018). In the Sunshine Coast LGA, Brunton et al (2018) documented a high level of site fidelity in eastern greys. During road upgrades and construction in the Sippy Downs area, individuals continued to follow long-established

Figure 1 Eastern grey kangaroo. Image credit: J. O'Connor.

movement pathways despite the physical interruptions to passage.

Studies suggest their population has been declining in South-East Queensland (SEQ) since 2000 due to urbanisation and population growth (Brunton 2018). EGKs are widely distributed in the Sunshine Coast LGA, with most known populations found in small mobs east of the Bruce Highway.

2.2 Swamp wallaby (*Wallabia bicolor*)

The swamp wallaby (Figure 2) is the sole living representative of the genus *Wallabia*. Behavioural and genetic differences set the swamp wallaby apart from other extant macropods in the Sunshine Coast region. For example, wallabies from the *Macropus* genus possess 16

chromosomes while the male and female swamp wallaby have 11 and 10 respectively (Merchant in Van Dyck 2008).

Occupying a wide range of habitats, swamp wallabies are considered common on the east coast of Australia. Swamp wallabies are mostly solitary browsers, feeding mostly in open, flat areas close to the forest edge. While the swamp wallaby incorporates both pasture and shrubs into its diet, it prefers coarse shrubs and bushes over grass. In the coastal dunes north of Currimundi Lake it has been observed grazing on bracken *Pteridium esculentum* and sedges *Carex* spp.

They prefer habitats with understorey and dense vegetation and exhibit strong site fidelity.

Watercourses may also be places of refuge from predators and provide resources such as water and nutrient rich soils that support lactation (Dove et al. 1989). Swamp wallabies have been observed using underpasses and a land bridge in Brisbane (Bond & Jones 2006).

Habitat generalists like the swamp wallaby may use several habitats in their daily movements, feeding in the early morning and evening, and resting in dense coverage during the day. Social behaviour of some macropods may require that groups of individuals travel together (Hilty et al. 2006). Documented home ranges vary from 7 to 80 ha in different environments (Ben-Ami & Ramp 2013).

The swamp wallaby is widespread and common in parts of its geographic range on the east and southeast coast from Cape York to Victoria and formerly into South Australia. Local populations within its broader range appear to be limited by shelter opportunities (Merchant 2008).

Wildnet records and surveys undertaken on public and private land have documented a wide distribution across the Sunshine Coast region on both the coast and the hinterland. It is likely that numbers in the coastal zone have reduced in areas where urban development has occurred.



Figure 2 Swamp wallaby

2.3 Whiptail wallaby (*Macropus parryi*)

The whiptail wallaby is a medium-sized macropod that inhabits grassy open woodlands, particularly in hilly and sloped environments (Campbell and Woods 2013). Whiptail wallabies occur in eastern Australia from Cooktown to northern New South Wales, with the highest densities occurring in southern Queensland and northern NSW where they are commonly found in mountainous areas throughout the Great Dividing Range. While some records exist within the Sunshine Coast area, the species is not common in the LGA.

Whiptail wallabies have light grey-brown body fur with a pale, white chest. They exhibit striking facial colouration, with broad white cheek stripes and a contrasting dark section from their nose to eyes. For this reason, they are also known as pretty-faced wallabies. Males are slightly larger than females, weighing approximately 16 kg and 11 kg, respectively.

Whiptail wallabies are highly sociable and are often found in groups of up to 50 individuals. Unlike many other macropods, they are active both during the day and night and are considered the most diurnal of the macropods (Kaufmann, 1974). Whiptail wallabies preferentially graze on grasses, herbaceous plants and ferns.

2.4 Black-striped wallaby (*Macropus dorsalis*)

The black-striped wallaby is a medium-sized macropod distributed across eastern Australia. Their range extends from Chillagoe to northern NSW, with the majority of the population residing in Queensland. This species is listed as endangered in NSW, but remains of least concern in Queensland. It is not widely distributed within the Sunshine Coast LGA, but has been recorded in the Stanley, Mary and Mooloolah River catchments.

Black-striped wallabies have grey-brown body fur with rufous-coloured forearms and a pale chest. As the name suggests, they also have a black dorsal stripe that extends from their forehead down their back. Males grow to three times the size of females, reaching 20 kg and 7.5 kg, respectively (Feldhamer et al. 1999).

Black-striped wallabies are shy and wary in nature and tend to stay in close proximity with other individuals; more so than other macropod species (Hoolihan and Goldizen, 1998). They forage and rest in groups and feed mainly on monocot grasses, seed heads and forbs (Jarman, Phillips and Rabbidge, 1991; Jarman, 1994, Hoolihan and Goldizen, 1998).

Black-striped wallabies inhabit dense patches of woody and shrubby vegetation, including thick forest understory, Brigalow scrub and lantana thickets (Hoolihan and Goldizen, 1998). They often shelter in dense vegetation during the day and venture to more open pastures to graze at night (Evans and Jarman, 1999).

Within the Sunshine Coast LGA, small numbers of the black-striped wallaby have been recorded in the Peachester and Conondale areas, but regional population size and distribution has not been quantified.

2.5 Red-necked wallaby (*Macropus rufogriseus*)

The red-necked wallaby (Figure 3) is a medium-sized macropod that inhabits coastal areas across eastern Australia, extending from SEQ through to south-east South Australia.

Red-necked wallabies have grey-brown body fur and pale/white chest fur with red-brown colouration around the neck and shoulder area. They also have a white cheek stripe, though it is not as distinct as in species such as the whiptail wallaby. Males are slightly larger than females, averaging at 19 kg and 14 kg, respectively.

Unlike many other macropod species, red-necked wallabies are not social animals and instead prefer to forage and rest in solitude. However, they have been observed to form small, unstable groups at times (Johnson, 1989). They preferentially graze on grasses and herbs but will also feed on roots in dry spells.

Red-necked wallabies tend to inhabit eucalypt forests and coastal scrub environments within close proximity to open areas for foraging (Campbell and Woods, 2013). They have also been observed to reside in gullies and dense vegetation during the day (Johnson, 1987).

The red-necked wallaby is abundant in south east Queensland, and on the Australian

mainland its distribution still matches that of its pre-European extent (Jarman & Calaby, in Van Dyck 2008). Where partial clearing has provided an expanded forest/grassland interface its density has probably increased but is likely to have diminished where complete vegetation clearance has occurred. In the late nineteenth and earlier twentieth centuries, red-necked wallabies were heavily hunted for pelts and as a perceived agricultural pest.

In the Sunshine Coast region red-necked wallabies are widespread through the Mary Valley and the open eucalypt forests on the Blackall Range. Anecdotally, numbers appear to be increasing with the appearance in some areas on the eastern side of the Blackall Range.



Figure 3 Red-necked wallaby Image: Shutterstock

2.6 Red-legged pademelon (*Thylogale stigmatica*)

The red-legged pademelon (Figure 4) is a small macropod found across eastern Australia, extending along the coast from Cape York to northeast NSW. This species is listed as vulnerable in NSW but is considered of least concern in Queensland.

Red-legged pademelons have grey-brown body fur with a pale underside. As the name suggests, they have rusty brown/red colouration on their fore and hind limbs as well as a pale stripe along the cheek and thigh. They have a relatively short and thick tail in comparison to other species. Despite being similar in height, adult males weigh approximately double that of females due to greater muscle mass (7 kg and 3.5 kg, respectively).

Red-legged pademelons have a shy and reserved nature, preferring to forage and rest in solitude. Their diet consists of a broad variety of vegetation, including fresh and fallen leaves,

monocot grasses, berries, fruits, ferns and orchids (Strahan, 1983; Vernes, 1995). Due to their shy character, they rarely forage in open pastures and instead remain in covered areas (Campbell and Woods, 2013).

The red-legged pademelon is primarily a rainforest-dwelling species but has also been observed in dense sclerophyll forests and in lantana thickets that previously supported rainforest. They occasionally forage in open pastures on the edge of rainforests but are vigilant and will quickly retreat to cover if disturbed. Red-legged pademelons can be found distributed across the Sunshine Coast hinterland where suitable habitat occurs on private land and public protected areas.



Figure 4 Red-legged pademelon Image credit: E. Kirke

2.7 Red-necked pademelon (*Thylogale thetis*)

The red-necked pademelon is a small macropod occupying coastal regions in eastern Australia. They are closely related to the red-legged pademelon, though their range is more restricted to SEQ and northern NSW.

Red-necked pademelons are similar in appearance to red-legged pademelons, with grey-brown body fur, a pale underside and a short, thick tail. The distinguishing feature separating the two species is the red-brown colouration in the shoulder and neck area, as suggested by the name red-necked pademelon. Males are significantly larger than females, weighing an average of 7 kg and 3.8 kg, respectively.

The red-necked pademelon is a shy species that tends to remain solitary during resting and foraging. They are most commonly observed foraging in open areas on forest edges, feeding on grasses, forbs and shrubs. This species is primarily nocturnal and only emerges from covered vegetation to forage at dusk. Red-necked pademelons primarily occupy wet sclerophyll forests and rainforests, overlapping with the red-legged pademelon in several areas. However, unlike the red-legged pademelon, they tend to remain close to the forest

edge in order to be in close proximity to open grazing pasture (Campbell and Woods, 2013). Distribution and density of the red-necked pademelon is unknown for the Sunshine Coast, but it is not considered common in the region.

2.8 Known threats to macropods

A number of threats for macropods such as roads, predation, changed fire regimes and environmental conditions are considered in Table 3. Roads, predators, lack of habitat connectivity and development are considered the key issues impacting macropods at the landscape scale and as such, are discussed further from Section 3.

Table 1 Threats to macropod movement and longevity

Threat	Description
Roads (including macropod-vehicle collision)	<p>Roads form barriers to movement, fragmenting populations and isolating individuals from resources and mates. Infrastructure, including rail, severs habitat connection as well as producing edge effects such as noise from traffic movement. Data from Australia Zoo Wildlife Hospital between 2003 to 2018 stated roads contributed to 48% of death or injury to macropods.</p> <p>Despite evidence to the contrary (Coulson 1989, Jones 2000), some perceive high roadkill rates reflect abundant populations. Vehicle collisions were the main source of mortality during a 2014-16 study in SEQ (Brunton 2018). As well as causing severe injury or death to animals involved, macropod-vehicle collision can also result in human injury or death as well as damage to vehicles (Bond and Jones 2014).</p> <p>Roadkill is reported as more significant on medium traffic volumes opposed to low volume or high volumes where in relation to the latter wildlife may avoid the high disturbance all together (Bond and Jones 2014).</p> <p>Kangaroos and wallabies can be attracted to roadsides by the resources and forage they provide. Early morning, dusk and at night are peak times for kangaroos crossing roads. Visibility of road verge including, amount of vegetation, sharp bends or corners, contributes to detectability of animals along the roadside. Gullies, creek crossings and drainage lines may also contribute to where macropods are likely to encounter the road environment.</p> <p>Peaks in road deaths of EGK have also been related to lunar phase, with significantly higher numbers of deaths around full moon than during any other times (Coulson 1982).</p> <p>Macropod road-kill surveys in a semi-rural area south-east of Brisbane revealed a strong male bias (94% of 18 sexed carcasses) in EGK and in red-necked wallaby fatalities, but almost parity of the sexes in swamp wallabies (Buchanan 2005).</p>
Habitat destruction / development/ fragmentation (the degree to which species must contend with limitations in the urban matrix)	<p>Agriculture, urbanisation and roads are replacing and fragmenting natural habitat and reducing the availability of suitable forage and shelter. Cover is an important factor as kangaroos tend to flee to it when they are alarmed (Hume et al. 2019). Kangaroos seek shelter not only to avoid predators but to regulate temperature (Brunton et al. 2018).</p> <p>Kangaroos exhibit a high level of site fidelity and will often continue to access preferred habitat and forage, even during road and building construction activities, increasing their risk of being hit.</p>
Environmental conditions (e.g. drought, bushfires)	<p>Rainfall and its effect on plant growth is a significant factor affecting macropod population size. Eastern grey kangaroo distribution corresponds with areas where rainfall either has little seasonal trend or where rainfall in summer exceeds rainfall in winter (Caughley et al. 1987). The relationship between rainfall and EGK use of habitat is recognised in various studies (Calaby 1996, Fox 1974; Hill and Falconer 1978 in Hill 1982), with EGKs moving into more open country to feed as vegetation dries.</p> <p>One study found road-kill rates to be significantly higher during the drought or low rainfall periods than after the drought (2.6 per month) (Lee et al. 2004). This increased road-kill rate was attributed to a much higher presence of all species of kangaroos at the roadside during drought, perhaps due to higher quality and quantity of food at the roadside than</p>

Threat	Description
	<p>further from the road.</p> <p>Fire plays an important role in Australian ecosystems. Bushfires directly impact wildlife through death and injury and can destroy essential habitat, shelter and food as well as exposing macropods to predation.</p>
Predation (wild and domestic)	<p>Macropod species in Queensland have a number of predators including wild dogs/dingoes, wedge-tailed eagles and to a lesser extent foxes (Banks et al. 2000). Macropods exhibit different vigilance responses to different predators. Domestic dogs (<i>Canis lupus familiaris</i>) and wild dogs (<i>Canis lupus dingo</i>) are often observed chasing, hunting or injuring kangaroos (Brunton et al. 2018). Kangaroos are sometimes subjected to persecution and harassment by people and their dogs.</p>
Cluster fences/ kangaroo proof fencing	<p>Some fences, such as cluster fences, are intended to manage grazing pressure of unwanted herbivores, particularly kangaroos. In an urban setting, wildlife fences are sometimes installed to prevent access to dangerous roads or airports.</p> <p>It should be noted that fences can hinder kangaroos' ability to move in response to changing seasonal conditions (Bradby et al. 2014). Kangaroos have been observed as emaciated and stressed if they are prevented from moving through some area (Wilson and Edwards 2019).</p> <p>Fences that prevent passage by kangaroos may also cause macropods to panic when faced with approaching vehicles (Bond and Jones 2014). Fences and housing reduce the amount of space available for kangaroos which may increase the perception of population density.</p>
Disease	<p>Significant disease outbreaks which cause population 'crashes' are often associated with some form of stress such as extreme environmental conditions e.g. drought, flooding or severe hot or cold weather.</p> <p>Macropods are susceptible to a number of naturally occurring diseases and parasites. Common afflictions include lumpy jaw (<i>a chronic infection caused by the bacterium Fusobacterium necrophorum</i>) and the presence of large numbers of nematodes (ACT government 2010). Two cases of Q fever were likely to have been acquired through contact with kangaroos in NSW (Dept of Health 2016). Q-fever is a potentially serious illness in humans caused by the rickettsial bacterium <i>Coxiella burnetii</i>.</p> <p>Capture myopathy is a metabolic disease associated with capture and restraint of animals (Paterson et al. 2007 in Green-Barber et al. 2016), which has implications for any intrusive studies or proposed relocation of macropods in the SCC region. Capture myopathy may be exacerbated by extreme ambient temperatures, difficult terrain, excessive handling, prolonged restraint and pre-existing injuries or disease (Paterson et al. 2007 in Green-Barber et al. 2016).</p>
Human-wildlife interaction (aggressive kangaroos)	<p>Kangaroo mobs establish dominance hierarchies with males defending their breeding rights by fighting with other males. Sparring also establishes their position in the mob from an early age. While most kangaroo/human interactions are positive, kangaroos can pose a threat to people occasionally with defensive/aggressive behaviour. Expanding urban communities could result in increased human kangaroo interaction in schools and golf courses or residential areas.</p>
Translocations and reintroductions	<p>Impacts to wildlife through clearing are often mitigated by rescue and release actions of fauna spotter catchers, however there is little evidence in the literature of survivorship and whether fauna relocations to adjacent habitat ensures long-term survival. Many 'mitigation-driven' translocations fail (Germano et al. 2015). An animal's chance of survival is threatened when the condition and quality of the receiving site habitat is not sufficiently investigated, or the animal is released in a location with a lack of food or shelter resources, increases in disease, competition or predation, or simply from the stress from being displaced (Dodd & Seigel 1991). Translocations are not often used for kangaroos due to myopathy and is not likely to be a preferred mitigation strategy in the SCC area.</p>
Legislation and planning	<p>Common or "least concern" species risk being undervalued and omitted from conservation efforts with a lot of investment going toward threatened species and recovery plans. The consequence of inaction could carry significant social, economic and animal welfare implications.</p>

3 Sunshine Coast context

The total human population on the Sunshine Coast is estimated to reach 386,692 people by 2026 (SCC 2017). This growth brings urbanisation and consequential habitat loss and fragmentation, particularly by roads. The generalist nature of macropods, in particular EGK, allows them to utilise the urban landscape. However, their persistence in these locations relies on the presence of natural areas and suitable supporting habitat and the connectivity between them (Figure 5). Common or “least concern” species, such as the focus species in this MCP, are at risk of being undervalued with a lot of investment going toward threatened species. Key threats that have been identified for macropods include habitat loss, habitat fragmentation and roads.



Figure 5 Eastern grey kangaroos utilise a variety of habitats in the urban landscape. Image credit: J. O'Connor.

For the purpose of guiding the decision-making process in the MCP, a series of spatial data layers (Appendix 1) were investigated and analysed (Appendix 2) using ESRI ArcGIS 10.4 to identify:

- distribution and patterns in known macropod occurrence across the SCC LGA
- the nature and locations of threats (roads, future development and predation)
- broad habitat preferences for macropods using regional ecosystems mapping and open space based on maximum home range
- key macropods movement pathways for preservation and mitigation at a LGA scale.

A number of assumptions were made due to limitations identified in the data:

- where no data exist, this does not imply macropods are not inhabiting or using an area, and conversely, suitable available habitat does not indicate macropod occupation
- injury and death data are likely biased to roads and where people live due to visibility.

Further detail regarding limitations is described in Appendix 2.

3.1 Macropod occurrence

Datasets that attributed macropod death, injury and sightings were combined as an indicator of “macropod occurrence”.

A total of 2,301 macropod occurrences were recorded across the Sunshine Coast LGA (majority between 2005 – 2018). Eastern greys (644) made up the majority of known species records (many unknown species cited as ‘macropod’ or ‘roo’), followed by red-necked wallaby (272), swamp wallaby (185) whiptail wallaby (15), red-legged pademelon (9), black-striped wallaby (3) and red-necked pademelon (1). Records for macropods are widely distributed across the LGA, except in those areas not frequented by humans, reflecting observer bias.

Several clusters of known macropod presence are illustrated within the LGA (Figure 6). Methods used to calculate these clusters are described in Appendix 2. Clusters are mainly concentrated on the coastal plain, a reflection particularly of EGK preferred habitat. The six main clusters, as numbered in Figure 6, are:

- Buderim (1)
- Little Mountain (2)
- Landsborough (3)
- Ninderry (4)
- Twin Waters to Coolumb Beach (5)
- Pelican Waters (6).

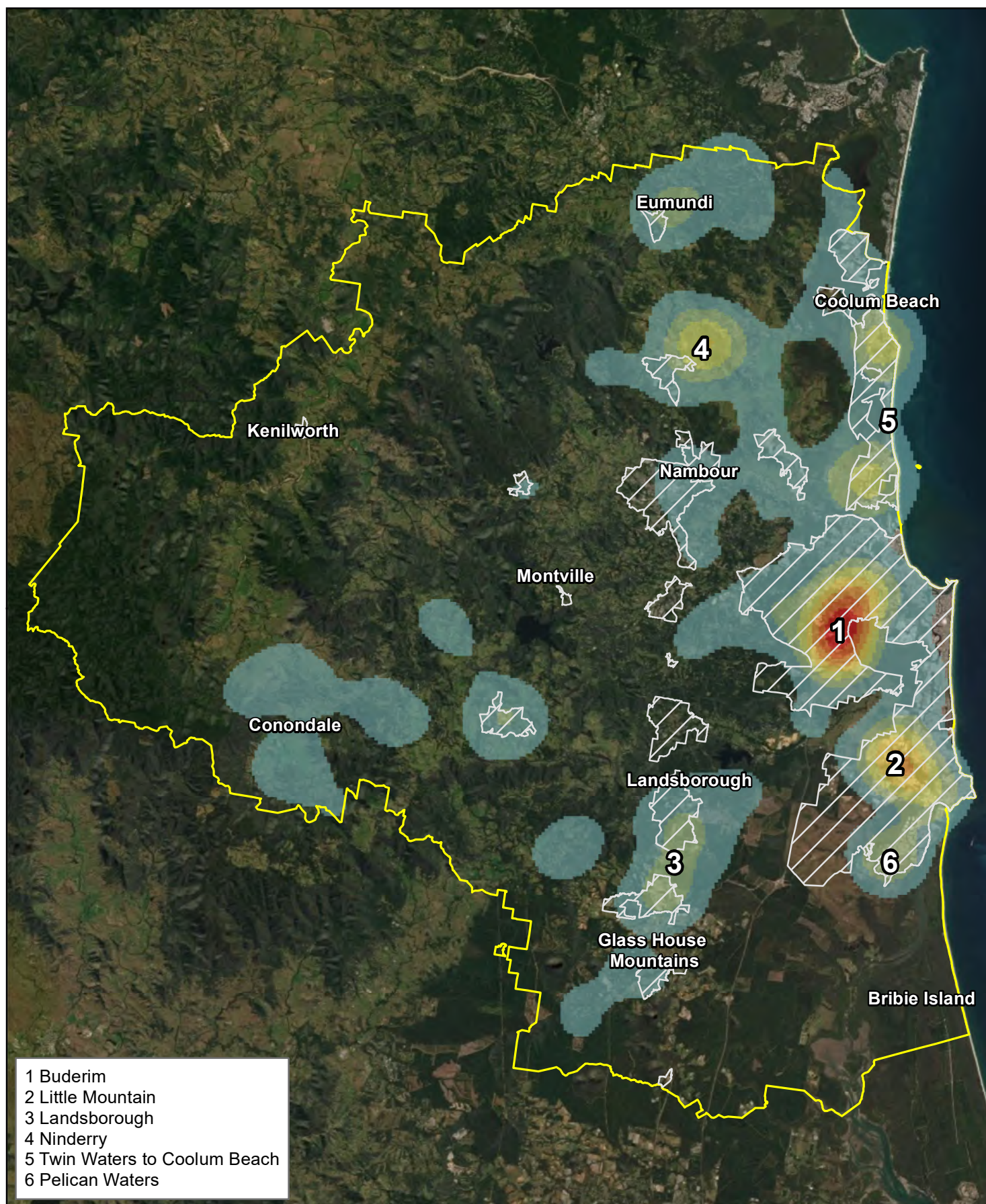


Figure 6: Macropod occurrence hotspots

Sunshine Coast Council
Macropod Conservation Plan



Job number: PR4560
Revision: 2
Author: EK
Date: 10/12/2020



0 1.5 3 6
Kilometers

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

3.2 Local issues for macropods

3.2.1 Roads

Macropods encounter roads when they move through their home range to find a mate, food and water or when they are dispersing. Brunton's (2018) study in Sippy Downs found three in every four kangaroos crossed a road at least once a day and the maximum number of road crossings for each kangaroo was between four to seven times in one day. Australia Zoo Wildlife Hospital data from 2003 to 2018 showed 48% of hospitalisations were from vehicle collision. An assessment of the highest impacting road within the Sunshine Coast region was undertaken. The top ten roads associated with macropod deaths and injuries include David Low Way (29), Sippy Downs Drive (28) and Caloundra Road (26) (Table 2). These roads are both State and Local Government controlled.

Table 2 Roads associated with macropod deaths and injuries (Top 10 LGA wide)

Road	No. of known deaths (AZWH 2003-2018 records)	Controller
David Low Way	29	State
Sippy Downs Drive	28	Council
Caloundra Road	26	State
Parklands Blvd	22	Council
Steve Irwin Way	12	State
Ocean Drive	12	Council
Sugar Bag Road	12	Council
Dixon Road	11	Council & State (small portion of the road)
Peachester Road	11	State
Sunshine Motorway	11	State

Table 3 shows which roads are significant in the clusters (Figure 6 and Figure 7). Kangaroos continue to access preferred habitat and forage, even during road and building construction activities, increasing their risk of being hit. Monitoring and ground-truthing of movement corridors preferred by macropods should be undertaken to ensure mitigation is being placed in correct locations.

Studies show EGKs often utilise features within the urban landscape including golf courses, sports fields and residential areas (Coulson et al. 2014; Tribe et al 2014). However, these expose animals to increased risk of vehicle strike and other threats. It is important to preserve landscape permeability for macropods to help reduce population declines. Movement corridors and culverts should be placed in high quality habitat preferred by macropods in new large-scale developments (Brunton et al. 2018). However, the cost and efficacy of crossing structures and locations needs to be verified by monitoring.

Future developments such as the Dedicated Public Transport Corridor (Figure 8) are likely to sever macropod movement pathways from the eastern side of the Sunshine Coast and potentially isolate coastal macropods.

Table 3 Roads correlating to macropod occurrence clusters.

Cluster	Significant road	Potential movement pathway
1: Buderim	Dixon Road Sippy Downs Drive	East west across Dixon Dispersal west from Mooloolah River National Park within Sunshine Coast University
2: Little Mountain	Parklands Boulevard Sunset Drive Sugar Bag Road Caloundra Road	Preferred movement pathways either north through Meridian Plains Conservation or south west via Jill Chamberlain bushland reserve will need to be identified
3: Landsborough	Steve Irwin Way	Macropod occurrences are not concentrated only on Steve Irwin Way, they are dispersed throughout the rural zone area.
4: Ninderry	Ninderry Road Collins Road	The peri-urban landscape allows for greater permeability through the landscape. Council Biodiversity Corridor aims to link Ninderry to Parklands Forest Reserve south of Yandina Coolum Road.
5: Twin Waters to Coolum	David Low Way Mudjimba Beach Road Bimini Drive	This area includes golf courses utilised by macropods for grazing. Due to broad canals and the tidal influence of the Maroochy River, kangaroos may be moving east west through a series of pinch points in the residential area

3.2.2 Development

Most development reduces the availability of suitable forage and shelter for kangaroos. However, urban space such as golf courses and large open space parks can increase foraging resources. Habitat is also used to avoid predators and to regulate temperature. Figure 8 shows proposed development could threaten macropods, particularly south of the Buderim area where the Declared Master Planned Area of Palmview (yellow) combined with the Kawana Waters Development Control Plan (pink) reduces southerly connectivity with Little Mountain area. Similarly, the Caloundra South Priority Development area (Figure 8 Orange) will need to provide management and mitigation options so that the landscape remains permeable to macropods and population declines are mitigated. It is worth noting the Priority Infrastructure areas.

3.2.3 Predators

Canines such as dingoes (*Canis lupus dingo*), and wild dogs (*Canis lupus familiaris*) are the main predators of macropods and to a lesser extent foxes (Banks et al. 2000). Domestic dogs and wild dogs are often observed chasing, hunting or injuring kangaroos (Brunton et al. 2018). Domestic dog registrations and wild dog records were overlayed with macropod hotspots and reveals some co-occurrence around the Buderim hotspot and other populated areas generally (Figure 9).

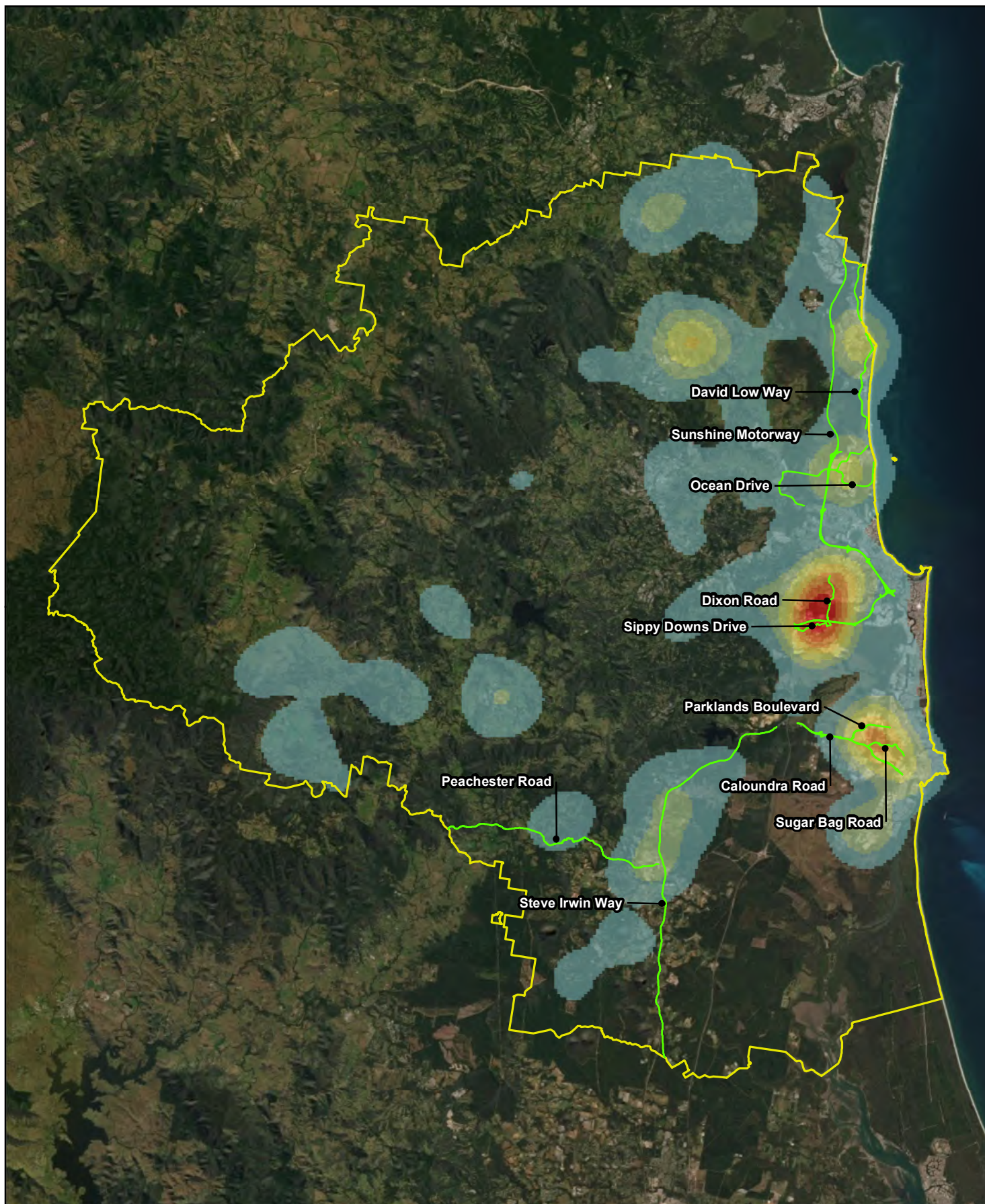


Figure 7: Threats to macropods - roads

— Roads with >10 deaths (2003 - 2018)
 — SCC boundary

Sunshine Coast Council
 Macropod Conservation Plan

Macropods per km2	
0 - 1	7 - 9
1 - 3	9 - 11
3 - 5	11 - 13
5 - 7	> 13



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 Author: EK
 Date: 11/12/2020



0 1.5 3 6
 Kilometers

GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
 Datum: GDA 1994
 Units: Meter

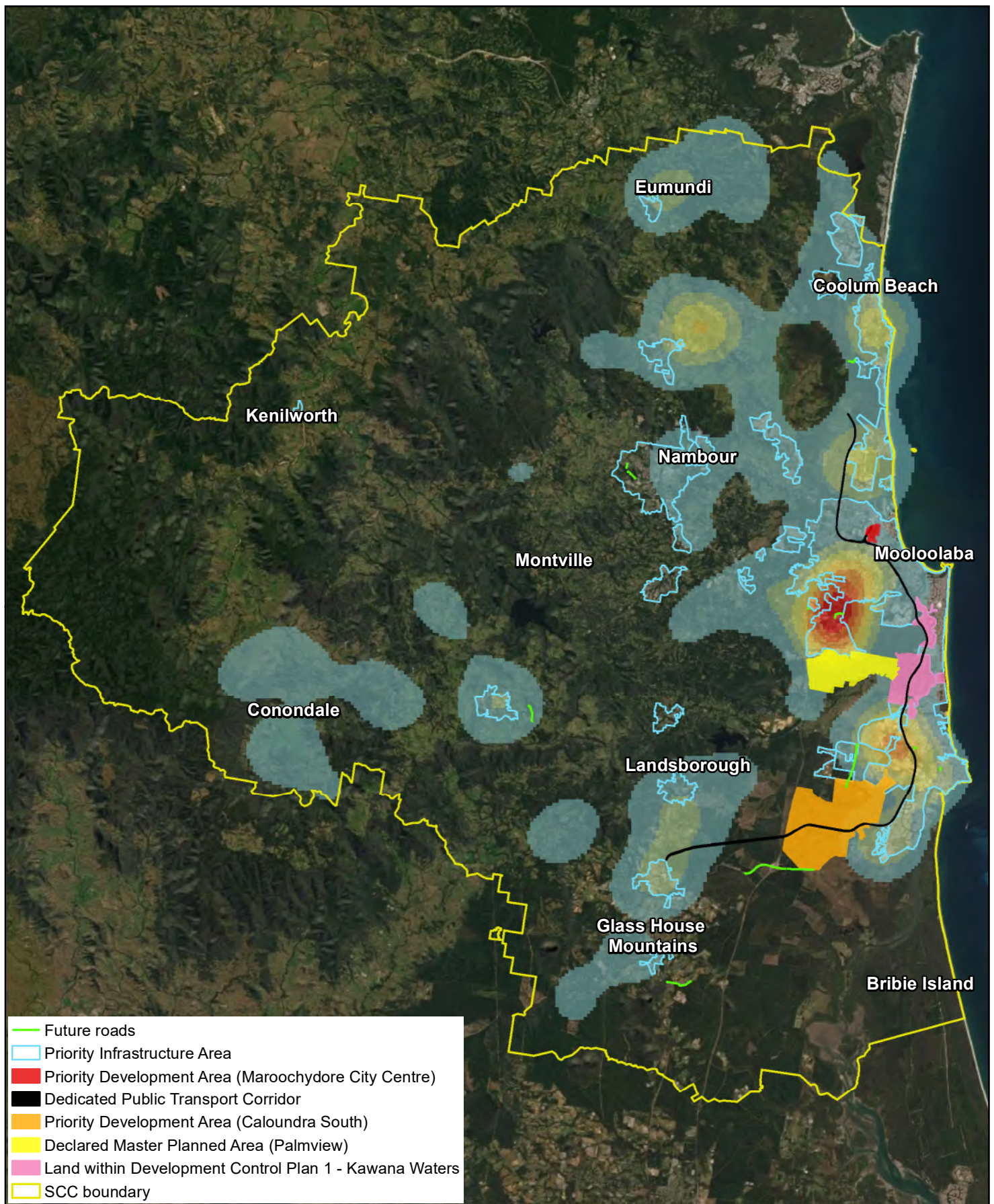


Figure 8: Threats to macropods - future development

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Macropod Conservation Plan



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Date: 11/12/2020



0 1.5 3 6
Kilometers

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

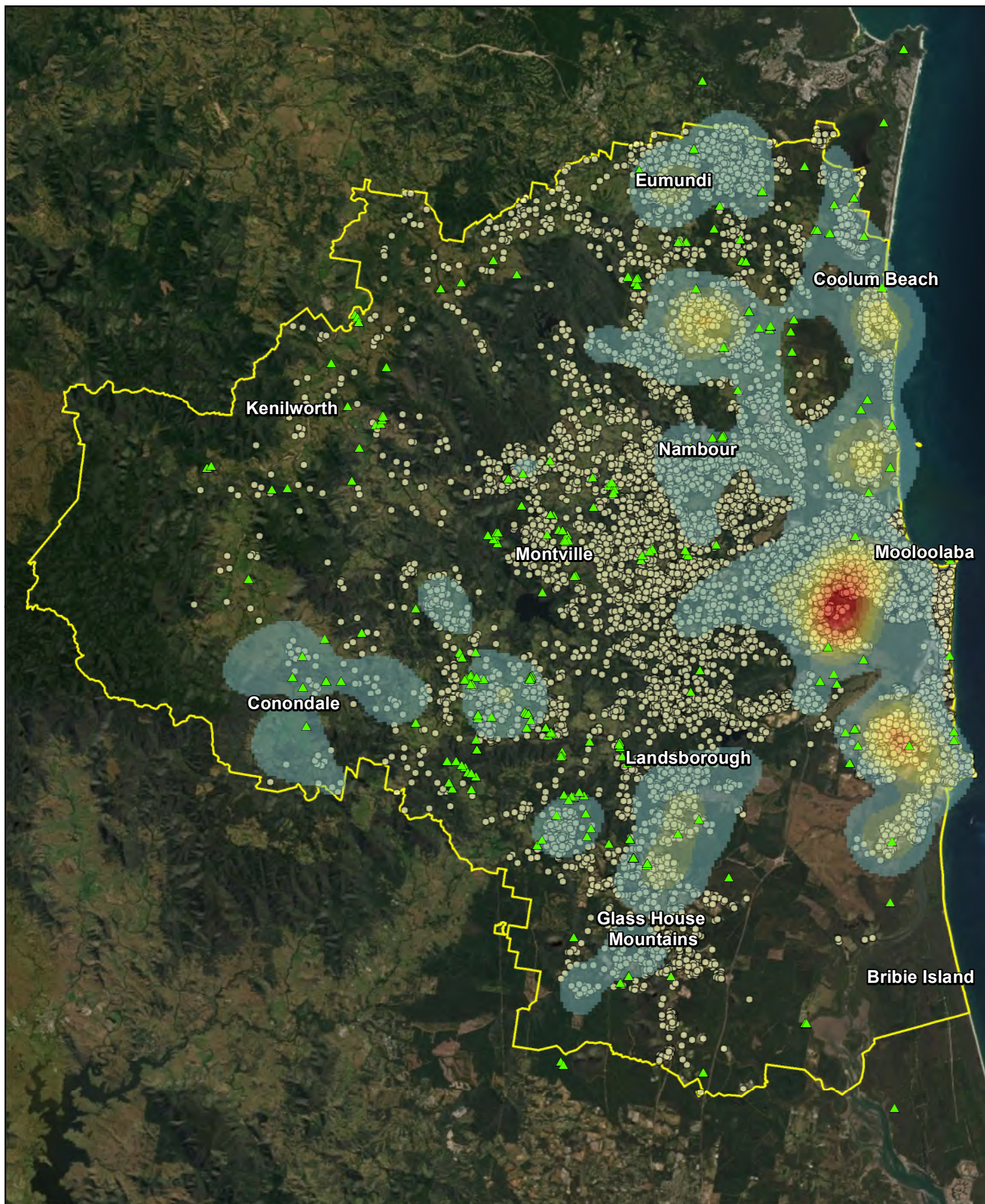
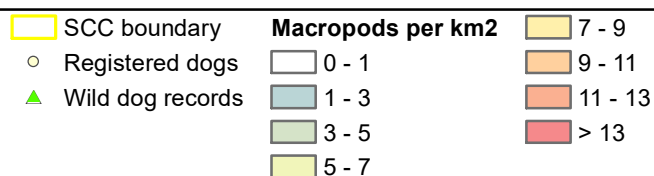


Figure 9: Threats to macropods - predators

Sunshine Coast Council
Macropod Conservation Plan



Job number: PR4560
Revision: 1
Author: EK
Date: 11/12/2020



0 1.5 3 6
Kilometers

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

3.2.4 Habitat connectivity

Macropods are considered generalist grazers or browsers so can utilise a broad range of habitat types. In a Sunshine Coast study within Sippy Downs (Brunton 2018), EGKs showed positive habitat selection for open eucalypt habitat, watered lawn, and melaleuca swamp.

Fifty-five different regional ecosystems (RE, excluding non-remnant and estuary vegetation) were found to contain macropod records; Table 6 shows the majority of macropod records are located in non-remnant areas. Appendix 3 provides a list of the regional ecosystems (and their descriptions) containing macropod occurrence records.

Table 4 RE containing macropod occurrences

RE status	No. of macropods
Non-remnant	1957
Least concern	265
Of concern	114
Least concern; Of concern	32
Endangered	21
Of concern; Least concern	6
Least concern; Least concern	7
Least concern; endangered	1
estuary	2
Total	2405*

* Note, due to the buffering method used to identify 'macropod habitat' (see Appendix 2), some macropod occurrences overlapped multiple RE types. As such, the total number of macropods in Table 4 is greater than the total number of macropod records (i.e. 2,302).

The NC Act states:

Critical habitat is habitat that is essential for the conservation of a viable population of protected wildlife or community of native wildlife, whether or not special management considerations and protection are required.

A ***critical habitat*** may include an area of land that is considered essential for the conservation of protected wildlife, even though the area is not presently occupied by the wildlife.

In this Background Paper, macropod habitat has been defined as any vegetative patch associated with macropod occurrence records (mapped for the whole region), combined with golf courses, ovals, showgrounds, gardens and recreational areas, including parks (see Appendix 2 for further detail). Council estate and other protected reserves were overlayed to identify preferred habitat to focus management actions (Figure 10).

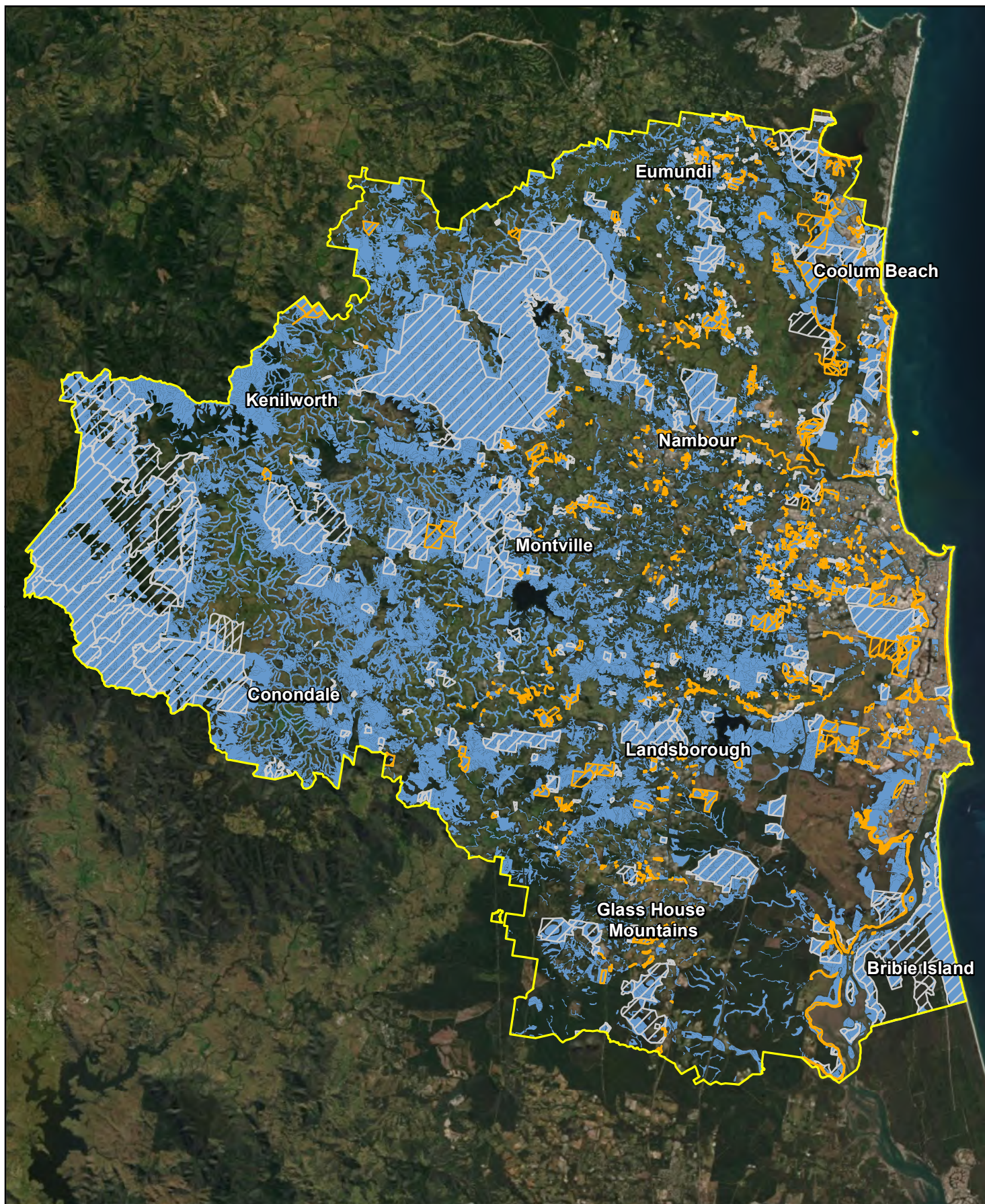






Figure 10: Macropod habitat

Sunshine Coast Council
Macropod Conservation Plan

-  Sunshine Coast boundary
-  Council Reserves
-  Other Reserves
-  Macropod habitat



Job number: PR4560
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Author: EK
Date: 10/11/2020



0 1.5 3 6
Kilometers

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

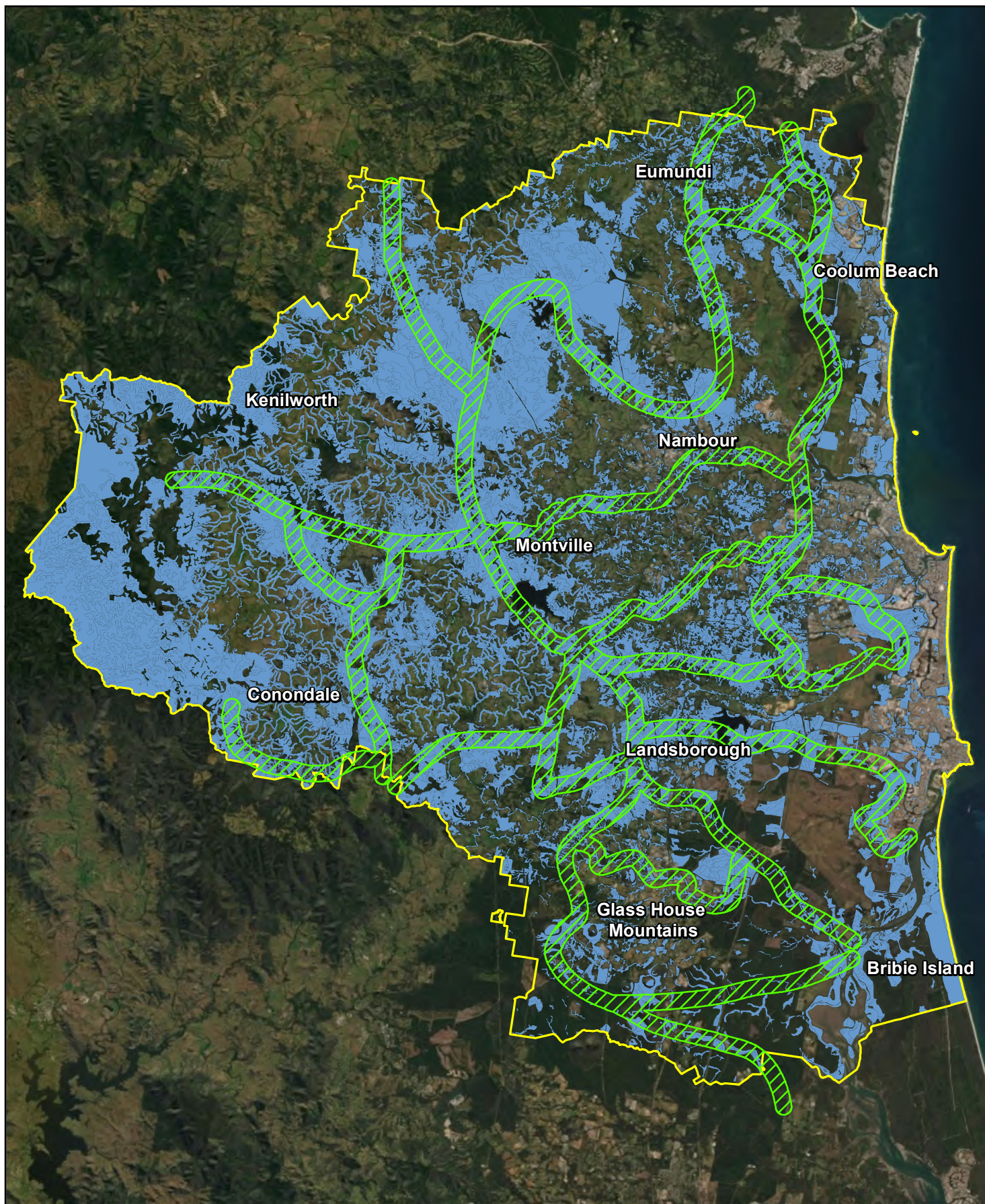


Figure 11: Strategic biodiversity corridors

Sunshine Coast Council
Macropod Conservation Plan

- Sunshine Coast boundary
- Biodiversity corridors
- Macropod habitat



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Date: 2/02/2021



0 1.5 3 6
Kilometers

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

3.3 Current management of macropods

3.3.1 Virtual fencing

Council utilises virtual fencing technology in an effort to reduce vehicle impact. In the August 2018 trial, Council installed virtual fencing along 2.4 km on Sippy Downs Drive, Sippy Downs. In response to community requests and a prioritisation matrix, further installations were undertaken, including 1.8 km on Nojoor Road, Mudjimba in December 2019, 800m on Sugar Bag Road and 1.2 km on Sunset Drive, Little Mountain in 2020. A total of 252 solar powered and mounted posts that trigger an auditory warning and flashing lights have been installed along 6.2 km of road. The benefits of virtual fencing include:

- allows natural migration to feeding and breeding grounds
- causes wildlife to hesitate when approaching road, giving greater response time to motorists
- posts can be relocated to other areas according to needs
- unlike traditional static fences, each device is effective and continues to work independently, i.e. if one is removed from the system, the overall system is still effective over the range
- it does not funnel the animals to a bottleneck or shepherd them towards an accessible predatory area.

One limitation associated with the virtual fencing technology is that it currently only works when motorists are using their headlights. The technology is also at its most effective when vehicles are travelling less than 90km/hr (Fox et al. 2019).

3.3.2 Land for Wildlife

Land for Wildlife is a voluntary conservation program supporting landholders to protect native plants and animals on their property. Land for Wildlife members can create wildlife corridors by restoring degraded habitat through actions such as revegetation and weed reduction.

3.3.3 Voluntary Conservation Agreements

The Voluntary Conservation Agreements (VCA) program fosters partnerships through an agreement between a landholder and Council to conserve wildlife habitat. The program contributes to the survival of animals that are dependent on those habitats as well as providing links between isolated conservation reserves allowing for wildlife movement.

3.3.4 Wildlife Rescue Partnerships

Council has invested in 19 local organisations to help protect and enhance the region's wildlife and natural environment.

4 Urban growth areas

The Sunshine Coast Planning Scheme contains 27 mapped local plan areas (Figure 13) which cover the coastal urban areas, rural towns and villages. Macropods have been recorded in the vicinity of all 27 planning areas (Appendix 4), either through recent surveys, road injury/fatality records and or Wildnet records. To assist Council to consider the habitat requirements of macropods when assessing applications in future urban growth areas, a summary of species has been provided below for each local area plan.



Figure 12 Eastern grey kangaroo joey Image credit: J. O'Connor

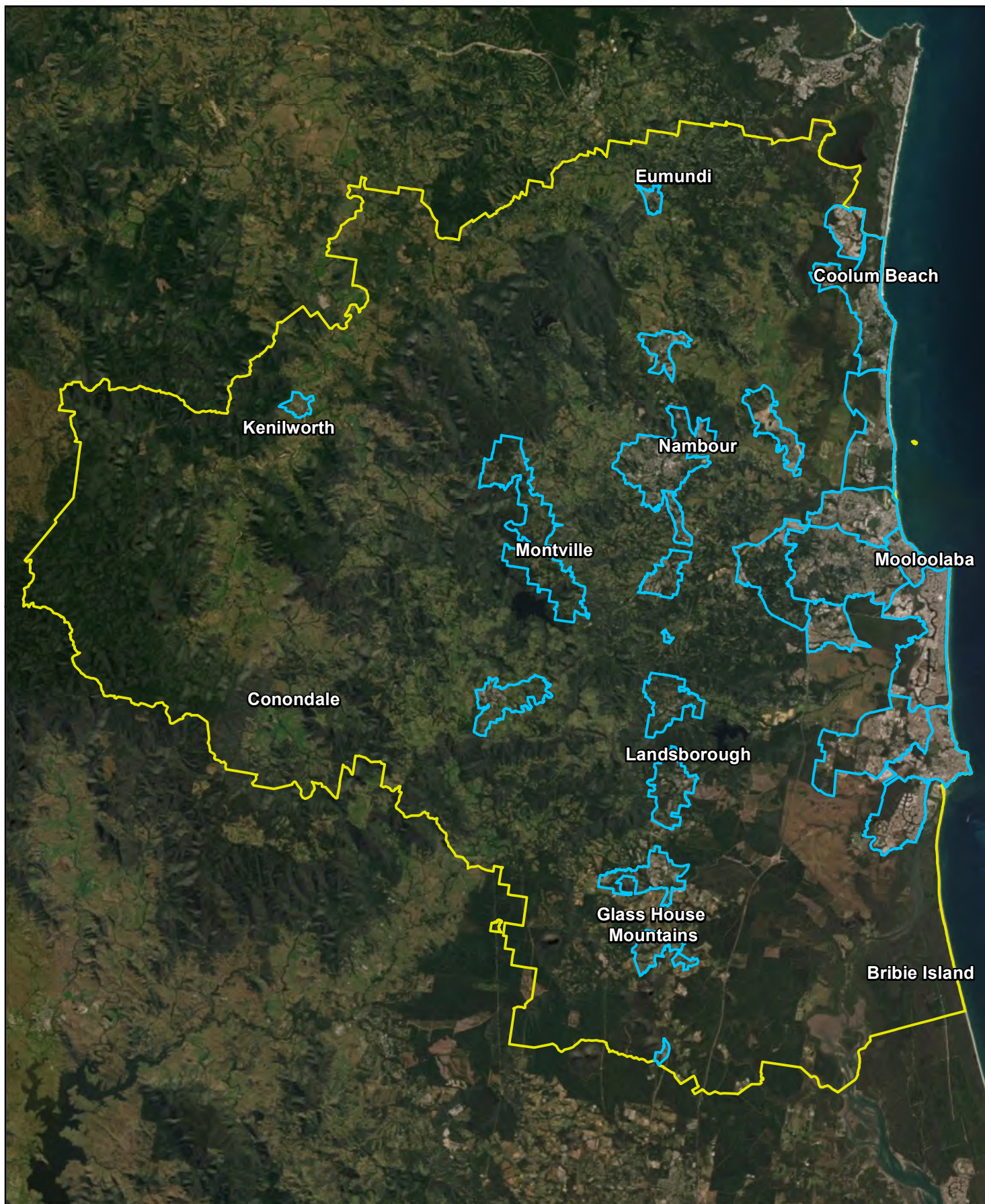




Figure 13: Local plan areas context map

Sunshine Coast Council
Macropod Conservation Plan

 Local plan areas
 SCC boundary



Job number: PR4560
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Date: 4/11/2020



0 1.5 3 6
Kilometers

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

4.1 Beerburrum local plan area

The Beerburrum local plan area is located in the southern part of the region on the North Coast Rail line (Figure 14). The local plan area comprises the small rural village of Beerburrum and residential areas immediately to the south of the village and has a land area of approximately 69 ha. Residential areas are generally characterised by low density development comprising dwelling houses on relatively large lot sizes.

Beerburrum Road and Beerburrum-Woodford Road are major roads in the local plan area.

Eastern greys and red-necked wallabies have been recorded in the vicinity of Beerburrum Road and Beerburrum-Woodford Road, where individuals have likely been moving between surrounding National Park and green space within the urban area.



Figure 14: Beerburrum local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Beerburrum local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
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Author: EK
Date: 14/12/2020



0 50 100 200
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.2 Beerwah local plan area

The Beerwah local plan area is located in the southern central part of the Sunshine Coast on the North Coast Rail Line between the towns of Landsborough and Glass House Mountains (Figure 15). The local plan area comprises the rural town of Beerwah and adjacent urban and rural residential areas as well as the Beerwah golf course and industrial estate and has a land area of approximately 775 ha.

The local plan area is traversed by Coochin Creek and is set within a rural and natural landscape with the prominent Mount Coochin (Glass House Mountains National Park), a key feature within the otherwise gently undulating coastal plain landscape. The local plan area is surrounded by large areas of productive agricultural land. Older residential areas of the local plan area are characterised by relatively large lots typical of a traditional rural town setting. Substantial new urban subdivisions are located off Roberts Road and Pine Camp Road.

Steve Irwin Way is Beerwah's principal road link. Other major roads in the local plan area include Kilcoy - Beerwah Road, Pine Camp Road, Old Landsborough Road and the western end of Roys Road. The North Coast Rail Line extends through the central part of the local plan area on a north – south alignment. The railway station and associated park and ride facilities are currently located off Simpson Street and Beerwah Parade. The Dedicated Public Transport Corridor to Caloundra South (CAMCOS) is intended to link to central Beerwah.

The Beerwah local plan area and surrounds is known to support EGKs, swamp wallabies, whiptail wallabies and red-necked wallabies.



Figure 15: Beerwah local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Beerwah local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
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Author: EK
Date: 6/03/2020



0 235 470 940
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.3 Blackall Range local plan area (Mapleton and Montville)

The Blackall Range local plan area is located on the Maleny plateau in the central hinterland of the Sunshine Coast and has a land area of approximately 2,505 ha (Figure 16). The local plan area includes the small rural villages of Montville and Mapleton, the rural residential community of Flaxton, as well as a number of smaller rural residential estates. The local plan area also includes the rural and natural areas that surround and weave in between these rural villages and rural residential areas.

The local plan area is characterised by a patchwork of rural and semi-rural landscapes interspersed with pockets of ancient rainforest adjacent to creek lines in strongly dissected local catchments. The elevated setting provides a temperate local climate and provides many areas with panoramic views to the coast and hinterland. The local plan area is bounded by a number of environmental reserves including the Mapleton Falls National Park, Kondalilla National Park, Linda Garrett Environmental Park, Mapleton Forest Reserve and the Lake Baroon Catchment Reserve.

Maleny-Montville Road connects to Montville-Mapleton Road to form the major road link within the local plan area, connecting the communities of the Blackall Range local plan area along a north-south alignment. This road link also forms part of a major tourist and scenic route

Swamp wallabies, red-necked wallabies, and red-legged pademelons are known to occur in the Blackall Range area.

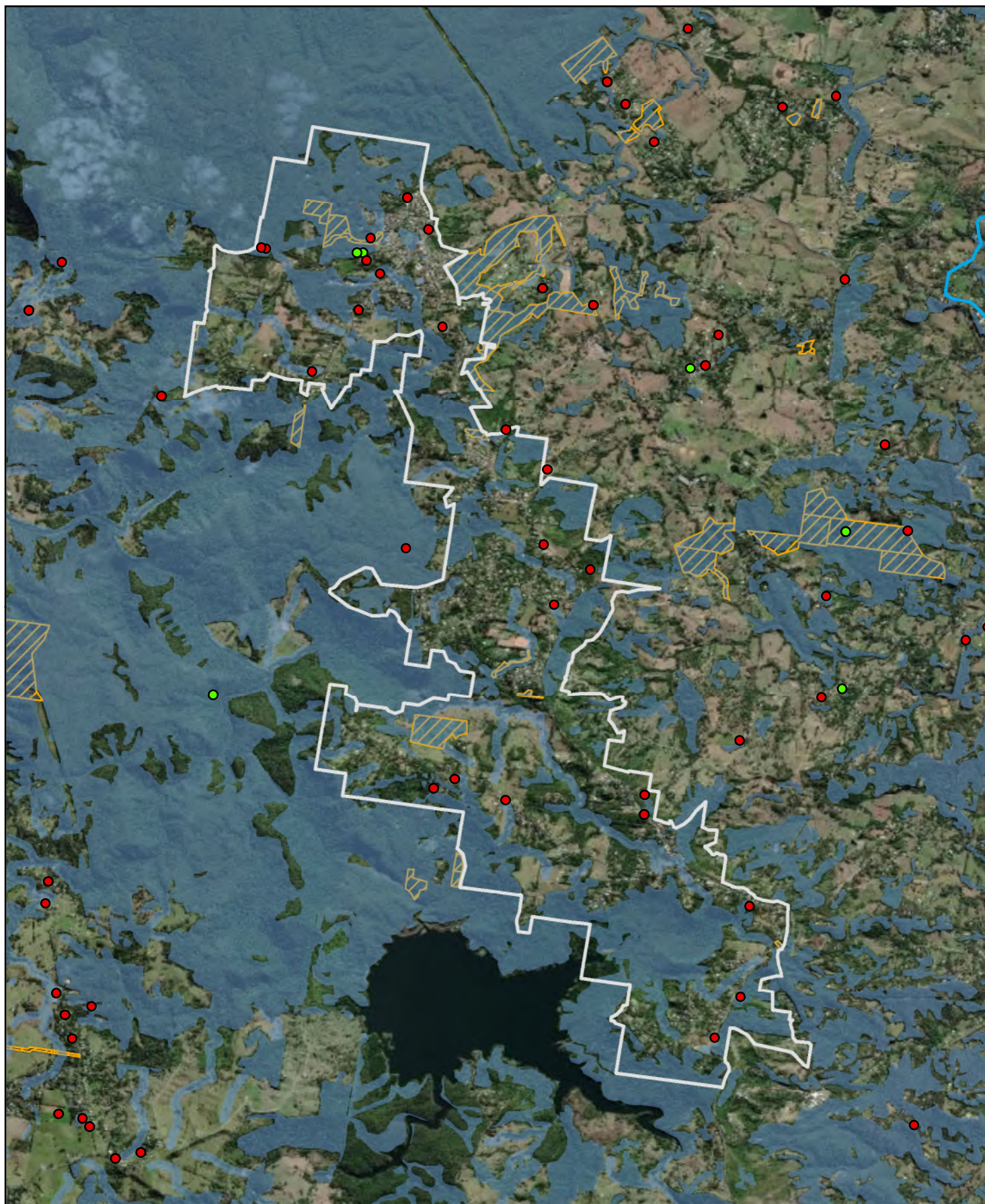


Figure 16: Blackall local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Blackall Range local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
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Author: EK
Date: 14/12/2020



0 250 500 1,000
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.4 Bli Bli local plan area

The Bli Bli local plan area is situated between the urban areas of Nambour, Maroochydore and Pacific Paradise in the central part of the Sunshine Coast (Figure 17). The Bli Bli local plan area includes the Bli Bli Village Centre and residential areas, the Maroochy River and Kirra Road rural residential area and the Parklakes urban residential community. The local plan area has a land area of approximately 740 ha. The Bli Bli local plan area is located within a rural setting with the significant environmental areas of the Maroochy River, Maroochy Wetlands Sanctuary, Petrie Creek and Parklands State Forest key elements within this landscape setting.

The existing remnant vegetation along the ridgelines and gullies and the adjoining wetland areas and waterways, including declared fish habitat areas, have significant environmental and scenic values and contribute to the amenity and character of the local plan area.

The Maroochy River rural residential area located in the northern part of the local plan area is characterised by houses on large sloping rural lots interspersed with remnant vegetation and some rural activities. The emerging Parklakes community comprises predominantly houses on urban size lots with a neighbourhood shopping and community precinct located at the eastern end of the area, with sport, recreational and environmental areas located in the north.

The existing remnant vegetation along the ridgelines and gullies and the adjoining wetland areas and waterways, including declared fish habitat areas, have significant environmental and scenic values and contribute to the amenity and character of the local plan area.

The Nambour-Bli Bli Road, Yandina-Bli Bli Road, David Low Way and Willis Road are major road links within the local plan area.

The Bli Bli local area and surrounds is known to support EGKs, swamp wallabies and red-necked wallabies.

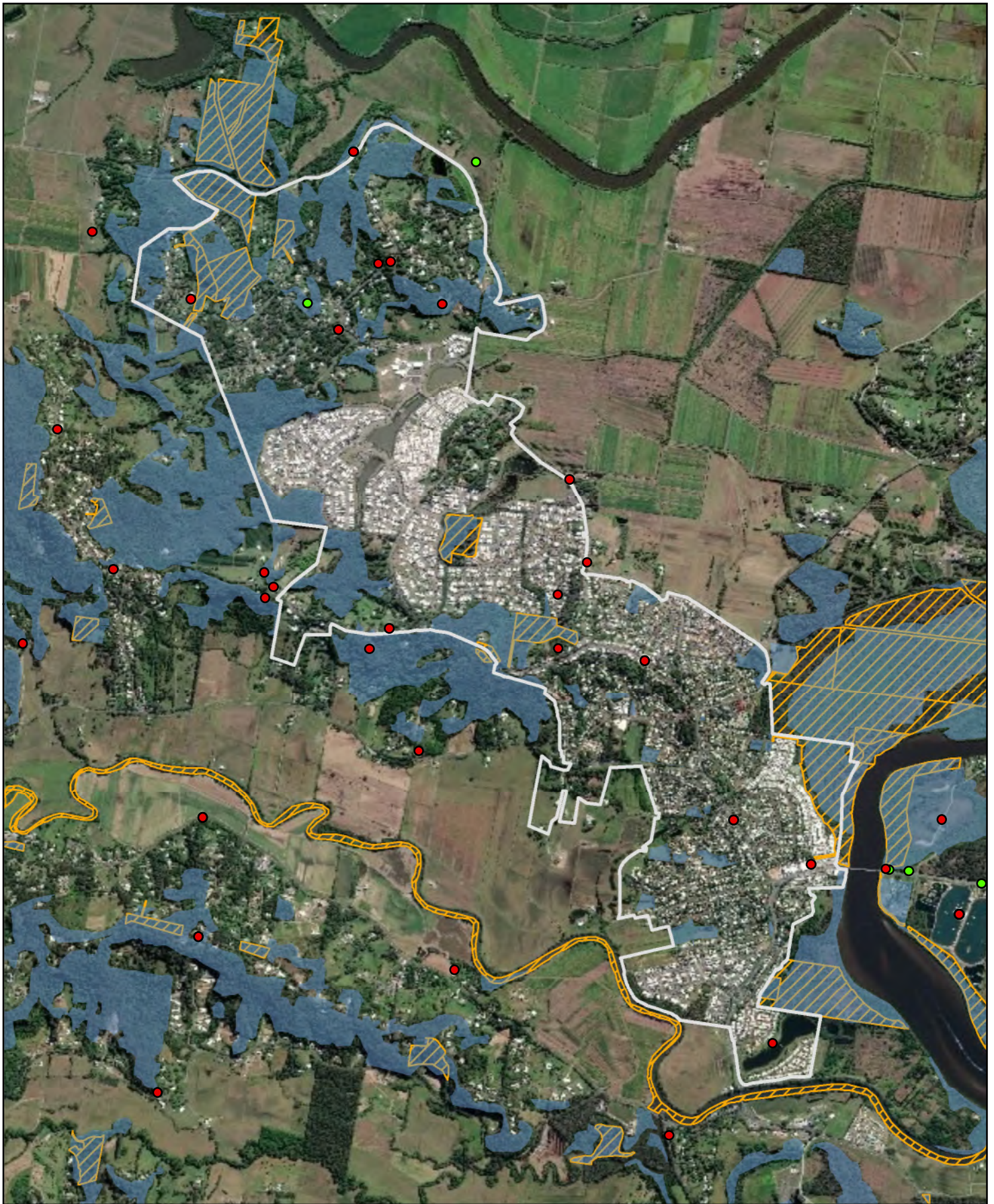


Figure 17: Bli Bli local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Bli Bli local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 14/12/2020



0 250 500 1,000
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.5 Buderim local plan area

The Buderim local plan area is located centrally in the eastern part of the Sunshine Coast and has a land area of approximately 2,775 ha (Figure 18). The local plan area includes Buderim as well as the neighbourhoods of Mountain Creek and Glenfields. The local plan area includes the Buderim Plateau and surrounding escarpment and foothill areas. Buderim plateau is of volcanic origin and comprises planate basalt lava flows underlain by weak beds of tertiary sediments and deeply weathered older rocks. Whilst much of the plateau and the northern and eastern escarpment areas have been developed, the west and south-western escarpment areas are far less urbanised. The undeveloped parts of the Buderim Plateau are a defining feature of Buderim's 'green' appearance and make a significant contribution to the character of Buderim as well as other surrounding local plan areas by providing a vegetated backdrop within the coastal urban setting.

Buderim has a number of environmental reserves including Buderim Forest Park, the Eric Joseph Foote War Memorial Sanctuary, Eggmolesse Environmental Reserve and the Rocky Creek Conservation Reserve. Martins Creek, Rocky Creek and Mountain Creek are the major waterways in the local plan area. A mosaic of ancient rainforest and other remnant vegetation remains within waterway corridors, open space reserves and on some of the undeveloped and steeper parts of the escarpment.

Burnett Street, King Street, Mooloolaba Road, Crosby Hill Road, Ballinger Road, Dixon Road and Jones Road are the major roads traversing the local plan area.

Buderim has the highest number of macropods records in the data for all the local plan areas, totalling 191. Recorded species include relatively large numbers of EGKs, as well as swamp wallabies, red-necked wallabies and a single record of a whiptail wallaby.

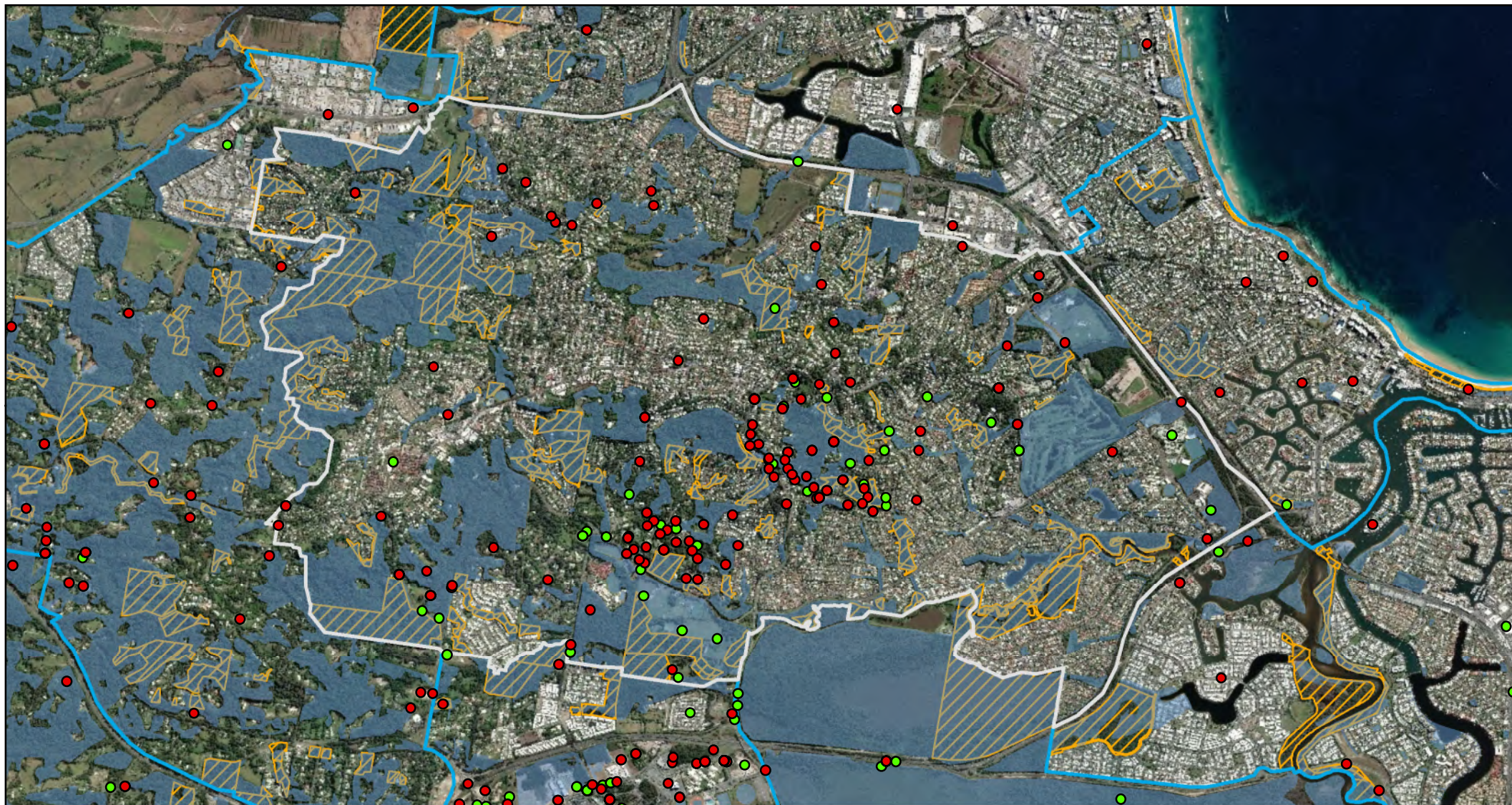


Figure 18: Buderim local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- ▨ Council Reserves
- ▭ Buderim local plan area
- ▭ Local plan areas
- ▭ Macropod habitat



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0 335 670 1,340
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.6 Caloundra local plan area

The Caloundra local plan area is located in the south-eastern part of the Sunshine Coast and has a land area of approximately 1,251 ha (Figure 19). The local plan area includes Caloundra Centre and the beachside neighbourhoods of Caloundra, Kings Beach, Shelly Beach, Moffat Beach, Dicky Beach, Battery Hill and part of Currimundi. The local plan area is characterised by its beachside setting and frontage to the Pumicestone Passage as well as the spectacular coastal and hinterland views, particularly to the Glass House Mountains, Moreton Bay shipping channel and to and from the local headlands, beaches, and other elevated parts of the local plan area. The northern part of the local plan area is located on a dune and sand plain system. The rocky headlands of Moffat Beach and Caloundra Headland are the dominant landscape features in the central part of the local plan area. The western part of the local plan area is characterised by relatively flat terrain that rises up to the west, north and east. Currimundi Lake, Bunbubah Creek, Coondibah Lagoon, Pumicestone Creek and Tooway Creek are the main waterways traversing the local plan area and are important environmental, recreation and local character elements.

Whilst the natural landscape of the local plan area has been substantially altered over time to accommodate urban development, pockets of remnant vegetation remain in the foreshore and creek side open space system including on the land which accommodates the Currimundi Conservation Centre and George Watson Park at Moffat Head. Ben Bennett Botanical Park is a noteworthy conservation reserve.

Vehicle access is predominantly via Caloundra Road from the west and the Nicklin Way from the north. A new intersection and access road are proposed from Nicklin Way via Third Avenue and Oval Avenue and a new northern access road is proposed from Nicklin Way via Queen Street and Ulm Street into the Caloundra Centre. Other major roads in the local plan area include Buderim Street, Beerburrum Street, Buccleugh Street, Tooway Parade, George Street, Regent Street and Bowman Road.

The Caloundra local area and surrounds is known to support EGKs, swamp wallabies and possibly red-necked wallabies. Eastern greys have also been observed swimming from the northern tip of Bribie Island across the Passage to Shelly Beach.

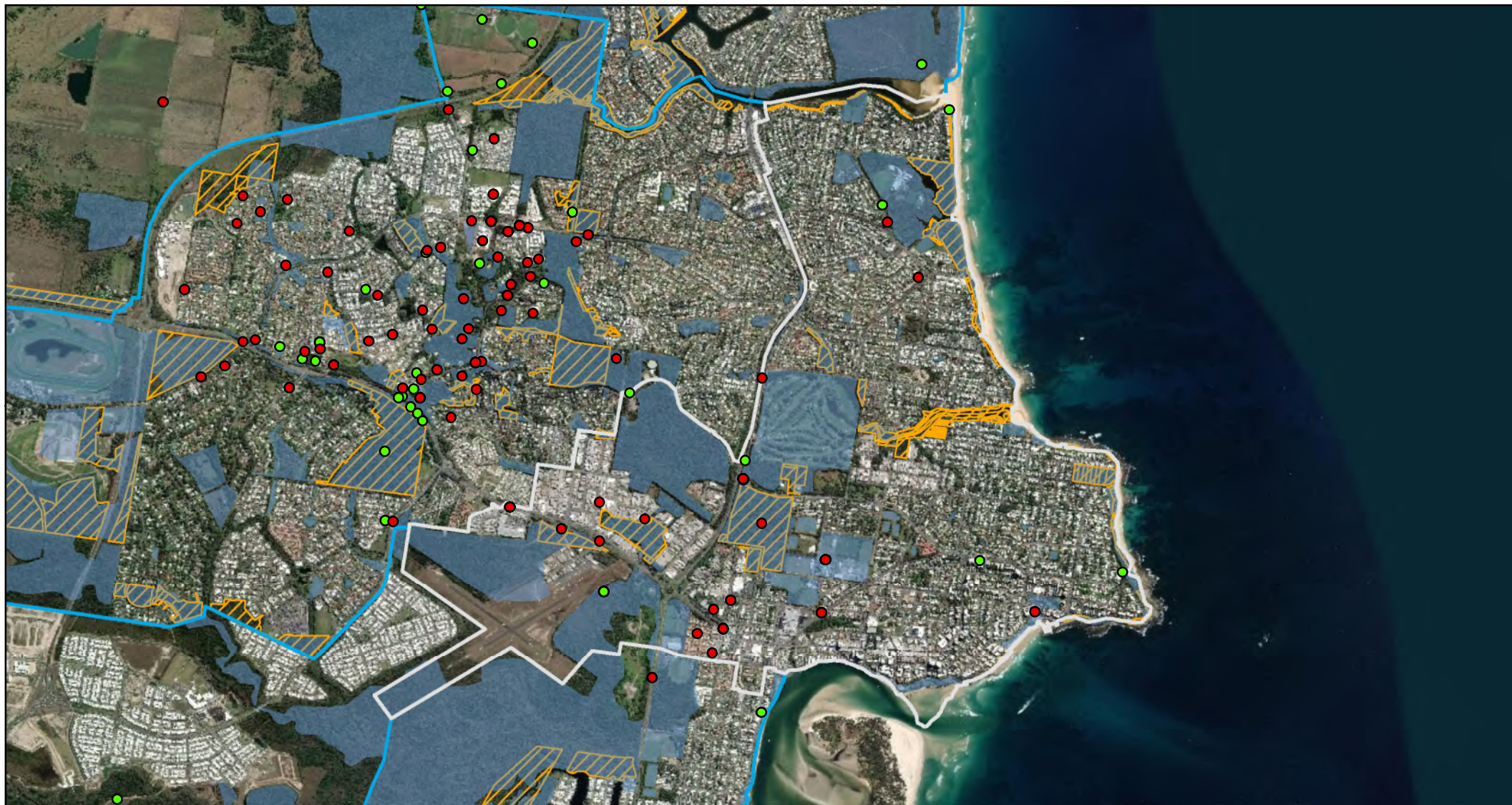


Figure 19: Caloundra local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- ▨ Council Reserves
- ▭ Caloundra local plan area
- ▭ Local plan areas
- ▭ Macropod habitat



Job number: PR4560
Revision: 2
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Date: 6/03/2020



0 310 620 1,240
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.7 Caloundra West local plan area

The Caloundra West local plan area is located in the south-eastern part of the Sunshine Coast and has a land area of approximately 2,295 ha (Figure 20). The local plan area includes the established residential neighbourhoods of Aroona, Little Mountain and part of Currimundi as well as emerging neighbourhoods at Bellvista and Meridan Plains. The local plan area has a variable topography with the north-eastern part located in the coastal plain, the north-western part located on the Mooloolah River flood plain and the central and southern parts dominated by Little Mountain and its foothills.

The Mooloolah River, Currimundi Creek and the northern branch of Lamerough Creek are the main waterways traversing the local plan area and are important environmental, recreation and local character elements.

Whilst the natural landscape has been substantially altered over time to accommodate urban development, a broad mosaic of vegetation still remains in parts of the local plan area. In particular, the steeper hillside areas in the vicinity of Sugarbag Road and protected areas adjacent to Caloundra Road and the Dedicated Public Transport Corridor (CAMCOS), including the Caloundra Conservation Park, Meridan Plains Conservation Park, Jill Chamberlain Conservation Reserve and Sharyn Bonney Conservation Reserve retain areas of dense native vegetation contributing to the character and amenity of the local plan area.

Caloundra Road and Kawana Way are the principal transport routes providing a direct link from the Bruce Highway into Caloundra Town Centre and to Kawana. Caloundra Road is a major gateway to Caloundra from the west, providing a dramatic sense of arrival at Little Mountain with uninterrupted views to the Pumicestone Passage, islands and the ocean.

Several proposed transport corridors traverse the local plan area, including the Dedicated Public Transport Corridor (CAMCOS) (linking the North Coast Rail Line at Beerwah to Maroochydore) and the southern extension of the Multi Modal Transport Corridor (linking Caloundra South with the Sunshine Motorway).

The Caloundra West area supports populations of EGKs, swamp wallabies and potentially red-necked wallabies.

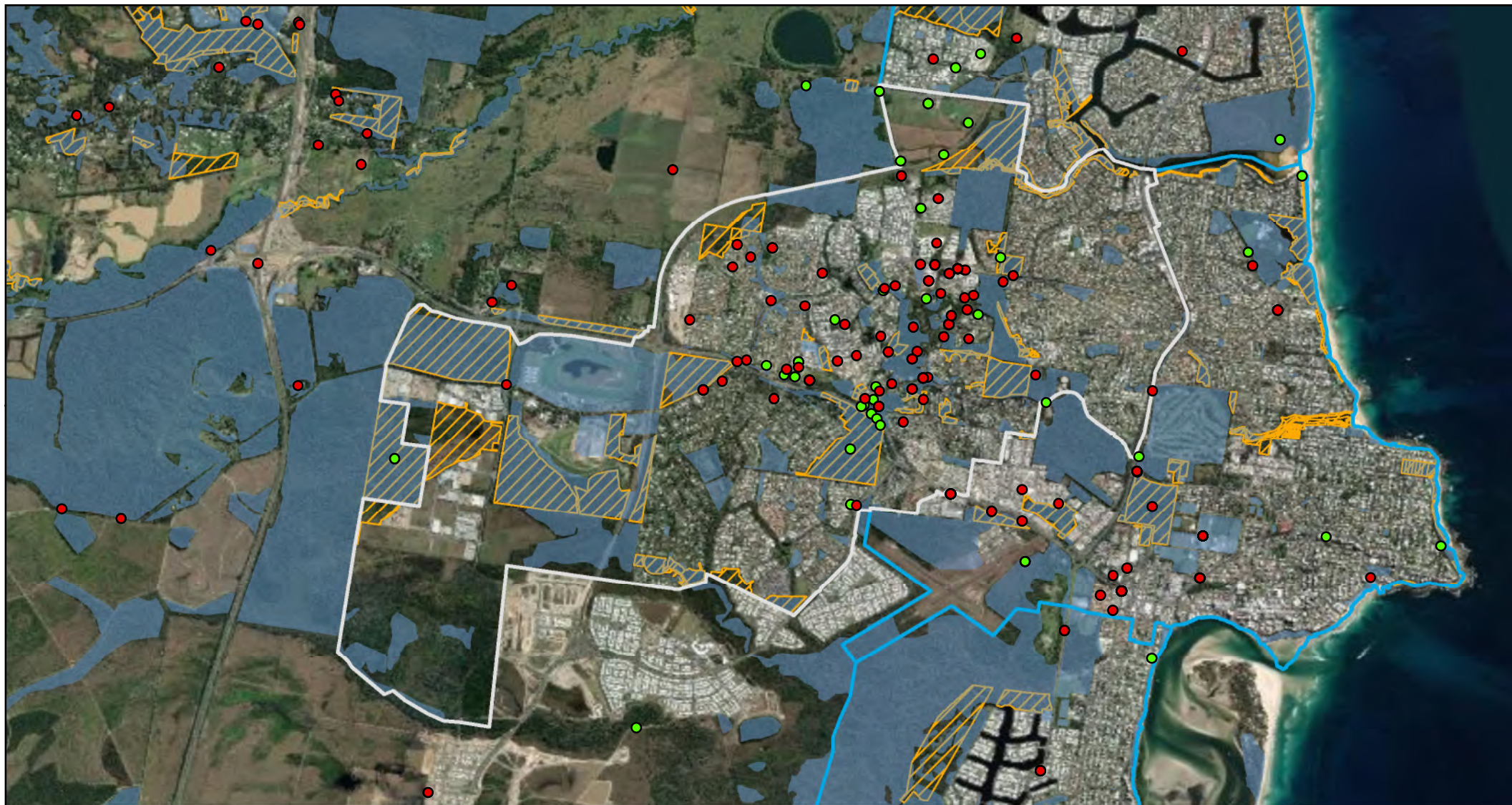


Figure 20: Caloundra West local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Caloundra West local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 6/03/2020



0 385 770 1,540
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.8 Coolum local plan area

The Coolum local plan area is located in the central eastern part of the Sunshine Coast between the coastal communities of Marcoola and Peregian Beach and includes the coastal township of Coolum Beach and surrounding communities of Point Arkwright, Yaroomba, Mount Coolum and The Boardwalk as well as renowned tourism developments such as the Palmer Coolum Resort (Figure 21). The local plan area also includes the Coolum Industry Park, which is identified as a significant industry and enterprise opportunity area for the region. The local plan area has a land area of approximately 1,880 ha.

The local plan area is traversed by Stumers Creek and framed by a picturesque natural setting, including the South Peregian section of the Noosa National Park to the north, rural land to the west, Mount Coolum National Park in the south and the Pacific Ocean in the east. Other significant environmental and landscape features within the local plan area include the Coolum section and part of the Peregian section of the Noosa National Park, Point Perry, Point Arkwright with its mosaic of significant remnant vegetation and rocky shore ecosystem, Emu Mountain and Eurungunder Hill and the Yaroomba parabolic dune which contribute to the character, identity and sense of place of Coolum.

The Sunshine Motorway, Emu Mountain Road, Yandina – Coolum Road, South Coolum Road and David Low Way are major road links within the local plan area.

Coolum and surrounds support populations of EGKs, swamp wallabies, and red-necked wallabies.



Figure 21: Coolum local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Coolum local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 14/12/2020



0 250 500 1,000
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.9 Eudlo local plan area

The Eudlo local plan area is located on the North Coast Rail Line in the central part of the Sunshine Coast (Figure 22). The local plan area comprises the small rural village of Eudlo and the residential areas immediately to the south and north of the village and has a land area of approximately 24 ha.

Eudlo is set within a picturesque rural and natural landscape in the Eudlo Creek Valley approximately halfway between the larger settlements of Mooloolah to the south and Palmwoods to the north.

Whilst some smaller urban lots exist in the local plan area, the residential areas of Eudlo are characterised by large urban lots that contribute to the low-density rural village character.

Rosebed Street, Corlis Avenue and Anzac Avenue are major roads in the local plan area. The North Coast Railway is intended to be upgraded in the future and will result in the railway line shifting further west from the village.

The Eudlo area is known to support populations of EGKs and may also be likely to support populations of red-necked and swamp wallabies.



Figure 22: Eudlo local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Council Reserves
- Eudlo local plan area
- Local plan areas
- Macropod habitat



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0 25 50 100
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.10 Eumundi local plan area

The Eumundi local plan area is located in the northern part of the Sunshine Coast, in the North Maroochy River Valley and on the North Coast Rail Line (Figure 23). The local plan area includes Eumundi's town centre and surrounding residential areas and has a land area of approximately 160 ha.

The local plan area is dominated by a ridge which rises to the west of the town centre and provides a vegetated backdrop to the town. Parts of the local plan area also provide views across the surrounding rural landscape including towards Cooroy Mountain in the north and Mount Eerwah in the west. Towards the east, the land gently slopes towards the North Maroochy River.

The residential areas surrounding the town have larger sized lots to accommodate the topography and which add to the rural town character of the area.

The Eumundi local plan area has good levels of accessibility with direct access to the Bruce Highway, Eumundi-Noosa Road and the North Coast Rail Line. Memorial Drive and Caplick Way are other key road links within the local plan area.

Swamp wallabies and red-necked wallabies have been recorded in the area, and EGKs are also likely to occur.



Figure 23: Eumundi local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Eumundi local plan area
- Local plan areas
- Macropod habitat



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0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.11 Forest Glen/Kunda Park/Tanawha local plan area

The Forest Glen/Kunda Park/Tanawha local plan area is located centrally in the eastern part of the Sunshine Coast and has a land area of approximately 1,600 ha (Figure 24).

Located on the foothills and western slopes of Buderim Mountain, the eastern and central parts of the local plan area are characterised by rolling to hilly terrain dissected by numerous ridgelines, creeks and drainage lines. In contrast, the northern, western and southern parts of the local plan area are relatively flat and form part of the Eudlo Creek and Mountain Creek plains.

A mosaic of native vegetation on the slopes and foothills of Buderim Mountain makes a significant contribution to the character of the local plan area and is also a defining feature of the 'green' appearance of the adjoining Buderim local plan area. Travellers along the Bruce Highway, Mons Road and the Tanawha Tourist Drive also enjoy the scenic qualities offered by this forested landscape setting. This landscape also serves as habitat for a wide range of fauna species as well as a broad corridor for fauna movement.

The large rural residential areas which occupy most of the local plan area offer a rural residential lifestyle in a bushland setting. A small residential estate is located adjacent to Maroochy Road in the northern part of the local plan area.

The Bruce Highway, Maroochy Road, Mons Road, the Tanawha Tourist Drive and Owen Creek Road are the major roads traversing or adjoining the boundaries of the local plan area.

This local plan area and surrounds is known to support EGKs, swamp wallabies, red-necked wallabies, and possibly whiptail wallabies (one past record).



Figure 24: Forest Glen / Kunda Park / Tanawha local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- ▨ Council Reserves

- ▭ Forest Glen / Kunda Park / Tanawha local plan area
- ▭ Local plan areas
- ▭ Macropod habitat



Job number: PR4560
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0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.12 Glass House Mountains local plan area

The Glass House Mountains local plan area is located in the southern part of the Sunshine Coast on the North Coast Rail Line between Beerwah and Beerburrum (Figure 25). The local plan area includes the Glass House Mountains town centre and surrounding residential and rural residential areas and has a land area of approximately 474 ha.

The local plan area is surrounded by a rural and natural landscape dominated by the National heritage listed Glass House Mountains and surrounding rural land used largely for crop farming and forestry. The landform of the local plan area is gently undulating. It is contained within the catchment of Coonowrin Creek, which traverses the local plan area in a south-west, north-east direction. Coonowrin Creek flows to the Pumicestone Passage and is subject to periodic local flooding.

The residential areas within the local plan area are characterised by dwelling houses on large urban and rural residential size lots. Further opportunities for urban residential development are available to the south of Fullertons Road and Coonowrin Road.

Steve Irwin Way is the principal road link providing access to the town of Glass House Mountains and is subject to planned realignment and upgrade. Other major road links within the local plan area include Railway Parade, Coonowrin Road and Sahara Road. Coonowrin Road and Steve Irwin Way are identified haulage routes with heavy vehicles carrying extractive material frequently travelling these routes.

The Glass House Mountains area is known to support EGKs and red-necked wallabies.

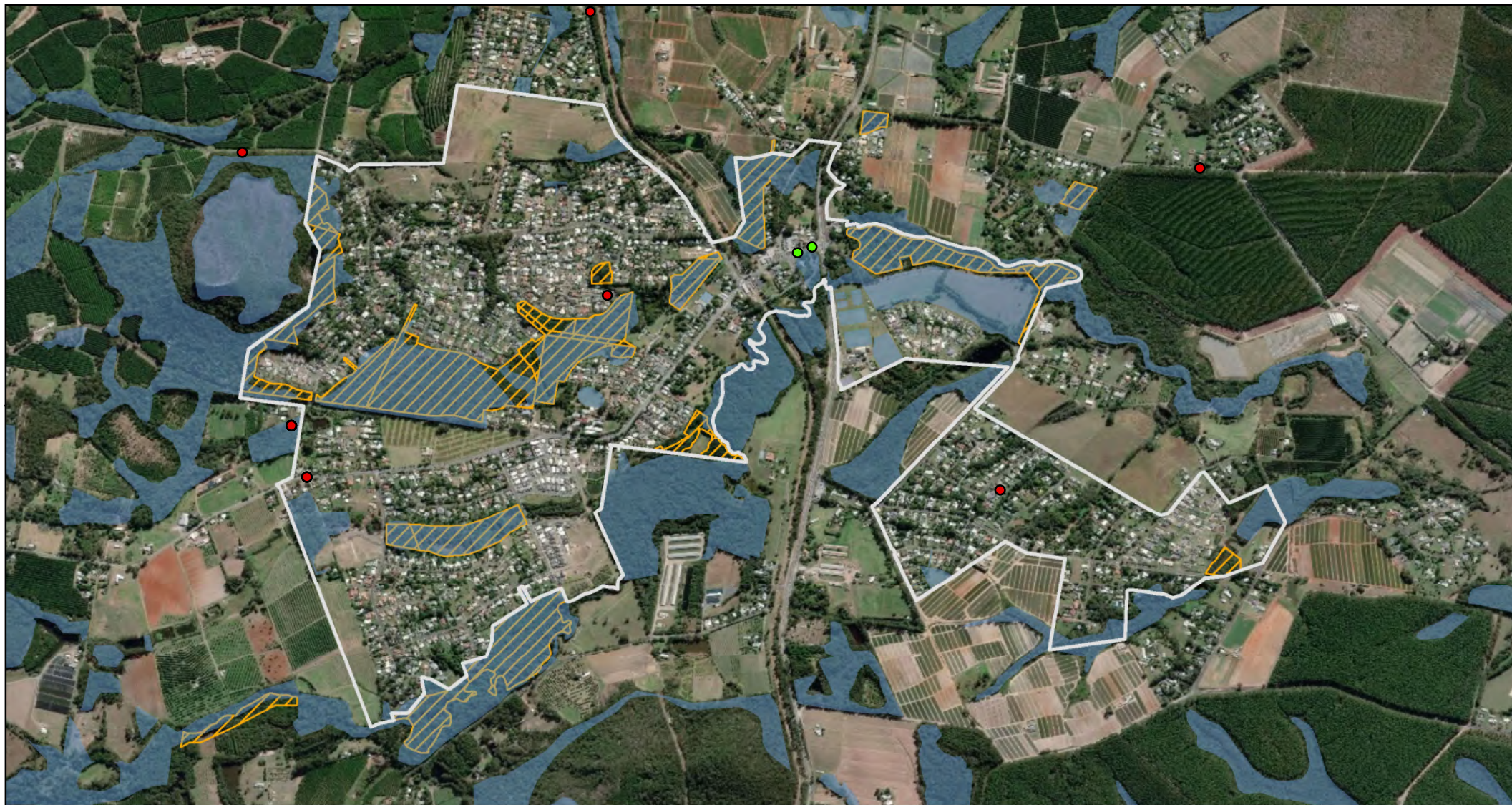


Figure 25: Glass House Mountains local plan area

Sunshine Coast Council
Macropod Conservation Plan

- | | |
|---------------------------------|---|
| ● Dead/injured macropod records | □ Glass House Mountains local plan area |
| ● Live macropod records | ▭ Local plan areas |
| ▨ Council Reserves | ▭ Macropod habitat |



Job number: PR4560
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Author: EK
Date: 6/03/2020



0 175 350 700
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.13 Golden Beach/Pelican Waters local plan area

The Golden Beach/Pelican Waters local plan area is located in the south-eastern part of the Sunshine Coast and takes in a land area of approximately 1,275 ha (Figure 26).

The local plan area is located on a coastal lowland plain on the edge of Pumicestone Passage. Lamerough Creek is the main waterway traversing the local plan area and Bells Creek adjoins the southern local plan area boundary. Except for the large environmental area located immediately to the west of Golden Beach, the local plan area has been largely cleared of native vegetation to accommodate coastal urban development.

Pumicestone Passage is a significant environmental feature for the Sunshine Coast and South East Queensland more generally, and has values protected under State and Commonwealth legislation and international treaties. The State government, through the Environment Protection Policy (Water) 2009 specifically recognises the need to protect and substantially improve the environmental values of Pumicestone Passage and its tributaries.

The local plan area includes the residential communities of Golden Beach and Pelican Waters. Both of these neighbourhoods are generally characterised by houses on conventional sized lots and canal allotments.

Golden Beach Esplanade/Landsborough Parade and Pelican Waters Boulevard are the main roads traversing and providing access to and from the local plan area. The proposed alignment of the Dedicated Public Transport Corridor (CAMCOS) traverses the north-western corner of the local plan area.

The Pelican Waters area, including the Golf Club, is known to support EGKs. Red-necked wallabies have also previously been recorded in the area.



Figure 26: Golden Beach/Pelican Waters local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Golden Beach/Pelican Waters local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
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Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.14 Kawana Waters local plan area

The Kawana Waters local plan area is located in the south eastern part of the Sunshine Coast and includes the coastal urban communities of Kawana Waters, including the established beachside neighbourhoods of Buddina, Minyama, Warana, Wurtulla, Bokarina and Parrearra, that part of Mountain Creek south of the Sunshine Motorway including the community of Hideaway Waters, and the emerging community of Brightwater (Figure 27).

A significant part of the local plan area has, and continues to be, developed as part of the Kawana Waters master planned community (Kawana Waters Community Development Area), including the proposed Kawana Town Centre, Sunshine Coast University Hospital, the Homemaker Centre, the Kawana business village, the Bokarina Beach site and the newer residential areas of Kawana Island, Kawana Forest, Creekside, Birtinya and parts of Parrearra. It also includes Lake Kawana which contributes to the waterside setting of the area and includes a regionally significant rowing course. These areas are subject to Development Control Plan 1 Kawana Waters and do not form part of this local plan code. The local plan area has a land area of approximately 2,485 ha.

The Kawana Waters local plan area is located on a low sand dune system and coastal floodplain within the Mooloolah River catchment. As a result, most of the local plan area is relatively flat and close to sea level. The landform and landscape of the local plan area have been altered over time, with much of the existing development based on canal systems linked to Mooloolah River and Currimundi Lake. The local plan area is framed by a picturesque natural setting including the Mooloolah River National Park and Birtinya Wetlands in the west, the Mooloolah River in the north, Currimundi Creek, Currimundi Lake and Kathleen McArthur Conservation Park in the south (a local heritage place) and Kawana Beach and the Pacific Ocean in the east.

Several proposed transport corridors traverse the local plan area, including the Dedicated Public Transport Corridor (CAMCOS) linking the North Coast Rail Line at Beerwah to Maroochydore, the Sunshine Motorway extension linking Caloundra Road with the Sunshine Motorway, the Coast Connect Priority Public Transport and Bicycle Corridor along the Nicklin Way.

EGK and swamp wallabies have been recorded in the Kawana area, with EGKs known to move between the Mooloolah River National Park and Kawana Way.



Figure 27: Kawana Waters local plan area

Sunshine Coast Council
Macropod Conservation Plan

- | | |
|---------------------------------|---------------------------------|
| ● Dead/injured macropod records | □ Kawana Waters local plan area |
| ● Live macropod records | □ Local plan areas |
| ▨ Council Reserves | ■ Macropod habitat |



Job number: PR4560
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0 250 500 1,000
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.15 Kenilworth local plan area

The Kenilworth local plan area is located in the far western part of the Sunshine Coast adjacent to the Mary River (Figure 28). The local plan area comprises the small rural town of Kenilworth and adjacent urban and rural residential areas as well as rural land immediately surrounding the town. The local plan area has a land area of approximately 183 ha.

The Kenilworth local plan area is set in a rural and natural landscape with the Mary River, Kenilworth Bluff and Kenilworth State Forest key features within this landscape setting. The residential areas of the local plan area are characterised by relatively large urban lots that add to the low density rural character. Rural lands within the local plan area are constrained in the east by flooding and in the west by slope.

Eumundi-Kenilworth Road, Maleny-Kenilworth Road and Kenilworth-Brooloo Road are major road links within the local plan area.

The Kenilworth local area and surrounds supports a number of macropods, including red-necked and swamp wallabies, with records of whiptail wallabies and red-necked pademelons.



Figure 28: Kenilworth local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- ▨ Council Reserves
- ▭ Kenilworth local plan area
- ▭ Local plan areas
- ▭ Macropod habitat



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Date: 6/03/2020



0 100 200 400
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.16 Landsborough local plan area

The Landsborough local plan area is located on the North Coast Rail Line between the towns of Beerwah and Mooloolah in the southern hinterland of the Sunshine Coast (Figure 29). The local plan area includes Landsborough's town centre, the surrounding urban area and adjacent rural residential areas to the north, south and west. The local plan area has a land area of approximately 880 ha.

Situated at the southern entrance to the Blackall Range, Landsborough is framed to the north and west by elevated terrain associated with the Blackall Range escarpment and Mount Mellum. Mellum Creek and adjoining tributaries traverse the local plan area with pockets of remnant vegetation located along the creek corridors.

Beyond the central area, the residential areas are characterised by houses on larger lots in traditional street layouts. The rural residential areas to the north, south and west include lot sizes of 5,000m² or greater.

The major road access into Landsborough from the east is via Caloundra Street from Steve Irwin Way. Maleny Street links Caloundra Street to Landsborough-Maleny Road providing access to Maleny and the Blackall Range. Old Landsborough Road links Landsborough to Beerwah.

The Landsborough local area and surrounds is known to support EGKs, swamp wallabies, and red-necked wallabies.



Figure 29: Landsborough local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Landsborough local plan area
- Local plan areas
- Macropod habitat



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Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.17 Maleny local area plan

The Maleny local plan area is located in the south western part of the Sunshine Coast on the Maleny Plateau, which forms part of the Blackall Range (Figure 30). The local plan area includes Maleny's town centre and surrounding urban and rural residential areas. The local plan area has a land area of approximately 860 ha.

The local plan area is characterised by variable topography with the northern parts having moderate to steep slopes. Obi Obi Creek, which flows to Lake Baroon, traverses the local plan area and is subject to periodic flooding. The local plan area has largely been cleared of native vegetation for urban and rural purposes. Isolated pockets of remnant vegetation remain, predominantly along Obi Obi Creek.

Existing urban residential development in the local plan area is characterised by predominantly low density housing surrounding the town centre, with some medium density housing immediately to the north of the centre. The local plan area also contains two large rural residential areas located to the south and north-east of the town centre.

The principal road link extending through the local plan area is via Maple Street, Beech Street and Macadamia Drive which connect Landsborough-Maleny Road to Maleny-Kenilworth Road. Public transport in the local plan area is currently limited; however, improvements are being made to further service the area.

The Maleny local area and surrounds supports swamp wallabies, red-necked wallabies and red-legged pademelons.



Figure 30: Maleny local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Council Reserves
- Maleny local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
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0 250 500 1,000
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.18 Maroochy North Shore local plan area

The Maroochy North Shore local plan area is situated in the central eastern part of the Sunshine Coast, east of the Sunshine Motorway, north of the Maroochy River and to the south of Mount Coolum (Figure 31). It includes the established communities of Mudjimba, Pacific Paradise, North and South Maroolia, Town of Seaside, Twin Waters and the emerging residential community of Twin Waters West. The local plan area also includes the Sunshine Coast Airport, Airport Industrial Park, as well as a number of tourist resorts at Twin Waters and Maroolia. The local plan area has a land area of approximately 1,885 ha.

The significant environmental values of the Maroochy North Shore local plan area, being the Maroochy River Conservation Park, Mount Coolum National Park, the Maroochy River foreshore, wetlands and waterways (including declared fish habitat areas) and the beach dunal system and foreshore areas provide a natural and scenic setting for residential and tourist development within the local plan area. The local plan area is located on a low sand dune system and coastal floodplain within the Maroochy River catchment. As a result, most of the area is relatively flat and close to sea level.

The Sunshine Coast Airport, located centrally within the local plan area, is a regionally significant facility and “gateway” to the Sunshine Coast’s attractions. The Sunshine Motorway, North Shore Connection Road, Suncoast Boulevard and David Low Way are major road links within the local plan area.

Eastern greys, swamp wallabies and red-necked wallabies have all been recorded in the Maroochy North Shore area.



Figure 31: Maroochy North Shore local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Maroochy North Shore local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.19 Maroochydhore/Kuluin local plan area

The Maroochydhore/Kuluin local plan area is located centrally in the eastern part of the Sunshine Coast and takes in a land area of approximately 1,390 ha (Figure 32).

The local plan area includes the Maroochydhore Principal Regional Activity Centre, established urban neighbourhoods of Maroochydhore and Cotton Tree, the suburban neighbourhoods of Maroochy Waters and Kuluin, the emerging community of Sunshine Cove as well as business and industry areas along Maroochydhore Road, Wisers Road, Sugar Road, Maud Street and Fishermans Road.

Most of the local plan area is situated on a coastal lowland plain that meets the banks of the Maroochy River and the Maroochydhore beachfront. The Maroochy River and the Maroochydhore beachfront are major environmental and character elements that define the coastal setting and character of the local plan area. Except for some small remnants of native vegetation retained in parks and reserves, the local plan area has been largely cleared of native vegetation to accommodate coastal urban development.

The Sunshine Motorway, Maroochydhore Road and Maroochy Boulevard are the principal transport routes within the local plan area. Other major roads include Bradman Avenue, Aerodrome Road, Duporth Avenue, Dalton Drive, Sugar Road, the Esplanade, Sixth Avenue, Main Road and Fishermans Road. The local plan area, and in particular the Maroochydhore Principal Regional Activity Centre, is planned to be serviced by key public transport infrastructure including the Dedicated Public Transport Corridor (CAMCOS), Coast Connect Priority Public Transport and Bicycle Corridor and potential future Sunshine Coast Light Rail Corridor.

Swamp wallabies, EGKs and red-necked wallabies have all been recorded in the Maroochydhore/Kuluin area.



Figure 32: Maroochydoore/Kuluin local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Macropod habitat
- Maroochydoore/Kuluin local plan area
- Local plan areas



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GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.20 Mooloolaba/Alexandra Headland local plan area

The Mooloolaba/Alexandra Headland local plan area is located centrally in the eastern part of the Sunshine Coast to the south of Maroochydore and includes the coastal area from Alexandra Headland to Mooloolaba extending west to the Sunshine Motorway (Figure 33). The local plan area takes in a diverse range of land uses including tourist accommodation and associated services and events, business centres, marine industries, a variety of residential areas, as well as a range of community and sport and recreation uses. The local plan area has a land area of approximately 536 ha.

The highly developed Mooloolaba/Alexandra Headlands area lacks the required type and size of suitable habitat to support macropod species. Alexandra Park Conference Centre, Goonawarra Dve Reserve – check with Ben Green



Figure 33: Mooloolaba/Alexandra Headland local plan area

Sunshine Coast Council
Macropod Conservation Plan

- | | |
|---------------------------------|----------------------------|
| ● Dead/injured macropod records | Mooloolaba/Alexan... |
| ● Live macropod records | ▭ Headland local plan area |
| ▨ Council Reserves | ▭ Local plan areas |
| | ▭ Macropod habitat |



Job number: PR4560
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Author: EK
Date: 6/03/2020



0 230 460 920
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.21 Mooloolah local plan area

The Mooloolah local plan area is located in the southern part of the Sunshine Coast on the North Coast Rail Line between Landsborough and Eudlo (Figure 34). The local plan area comprises the small rural town of Mooloolah and adjacent urban and rural residential areas. The local plan area has a land area of approximately 790 ha.

The Mooloolah local plan area is framed to the west by the Blackall Range, to the south by the tall eucalypts of the Dularcha National Park, Mooloolah Forest Reserve and Tunnel Ridge and to the north by the Mooloolah Range. The local plan area is traversed by the Mooloolah River and South Mooloolah River and their tributaries and has a generally flat to gently undulating landform reflecting its location adjacent to the Mooloolah floodplain. Steeper parts are found on the edges of the local plan area where the land rises around the adjacent ranges.

The local plan area consists of small residential lots focused on Jones Street and the northern side of Paget Street with the remaining residential areas of the town characterised by dwelling houses on larger sized lots. Mooloolah Road/Connection Road is the major road link within the local plan area. Other important local road links include Neil Road, Bray Road and King Road.

The Mooloolah local area and surrounds is known to support EGKs, swamp wallabies and red-necked wallabies.



Figure 34: Moolooloolah local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- ▨ Council Reserves
- ▨ Moolooloolah local plan area
- ▨ Local plan areas
- ▨ Macropod habitat



Job number: PR4560
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Date: 6/03/2020



0 245 490 980
Meters

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.22 Nambour local plan area

The Nambour local plan area is located in the central hinterland of the Sunshine Coast on the North Coast Rail Line and west of the Bruce Highway (Figure 35). The local plan area takes in the town centre and surrounding urban areas of Nambour, which is the largest rural town on the Sunshine Coast. The local plan area has a land area of approximately 1,990 ha.

The local plan area is characterised by variable topography with steeper slopes around the margins of the area and undulating land in the central parts. Petrie Creek, Paynter Creek, Whalleys Creek and Tuckers Creek are the main waterways that traverse the local plan area, with central parts of the local plan area, including the fringes of the town centre, being subject to periodic flooding.

Areas of significant riparian vegetation, open space and natural bushland are contained within the local plan area, with Petrie Creek and tributaries providing an important ecological and open space spine. Bushland parks such as Koala Park and Cilento Bushland Conservation Reserve contain high quality remnant vegetation and contribute to the visually attractive setting of Nambour. Nambour also enjoys significant vistas to the Blackall Range in the west and east along the Petrie Creek floodplain to the coast.

The main north-south road access through the local plan area is via Nambour Connection Road. Bli Bli Road and Petrie Creek Road provide the main road connections between the local plan area and the coastal urban area to the east. Nambour-Mapleton Road provides the main road connection between the local plan area and rural towns and communities to the west. The Bruce Highway passes through the north-eastern corner of the local plan area.

The Nambour local area and surrounds is known to support EGKs, swamp wallabies, and red-necked wallabies.



Figure 35: Nambour local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Nambour local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
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Date: 14/12/2020



0 250 500 1,000
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.23 Palmwoods local plan area

The Palmwoods local plan area is located in the central part of the Sunshine Coast on the North Coast Rail Line immediately south of Nambour and Woombye (Figure 36). The local plan area comprises the rural town of Palmwoods and adjacent residential and rural residential areas. It takes in a land area of approximately 496 ha.

The local plan area is set within a rural and natural landscape on the foothills of the Blackall Range. Paynter Creek forms part of the western boundary of the local plan area and a number of other smaller water courses traverse the local plan area generally in a north-south direction. The local plan area is characterised by an undulating and gently sloping topography and is surrounded by large areas of productive rural land.

The residential parts of Palmwoods are characterised by houses on large suburban lots.

The Palmwoods local plan area is dissected by a number of open space corridors that contain significant areas of remnant vegetation. The local plan area also contains a number of existing sporting facilities and notable parks, such as Kolora Park, with its duck ponds and playground facilities.

The North Coast Rail Line is planned to be subject to re-alignment and duplication, with the proposed new alignment through Palmwoods shifting the rail line and station to the east and freeing up existing rail land for alternative uses and potential improvements to the town centre. The realignment of the rail line also impacts upon opportunities for residential expansion in northern and southern parts of the local plan area with these Sunshine Coast Planning Scheme 2014 (Amended 24 August 2020 Page 7-290) areas intended to be predominantly retained for rural uses until the upgrade is completed and associated infrastructure and access issues can be resolved. Major road links within the local plan area include Palmwoods-Montville Road, Woombye-Palmwoods Road, Eudlo Road and Chevallum Road.

Swamp wallabies are the only recorded macropods in the Palmwoods local area and surrounds.



Figure 36: Palmwoods local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Palmwoods local plan area
- Local plan areas
- Macropod habitat



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Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.24 Peregian South local plan area

The Peregian South local plan area is located in the central eastern part of the Sunshine Coast, west of Peregian Beach and immediately west of the Sunshine Motorway (Figure 37). The local plan area includes the emerging communities of Peregian Springs/Coolum Ridges comprising a number of residential neighbourhoods, a local (full service) activity centre, a number of smaller local centres, schools and large areas of open space including the Peregian Springs Golf Course and several environmental parks. The local plan area has a land area of approximately 597 ha.

The local plan area is located on coastal lowlands within the core conservation area of the National Wallum Estate and is bounded on three sides by adjuncts of the Noosa National Park. The protection of the extensive environmental parks and interconnected system of remnant vegetation corridors protecting and linking key natural conservation areas present in and surrounding the local plan area is an important factor in supporting the long-term viability of these state and national reserves.

The established residential parts of the local plan area are characterised by dwelling houses on residential lots of varying sizes surrounding a large private golf course.

Major road links within the local plan area include the Sunshine Motorway, Emu Mountain Road and Peregian Springs Drive.

EGKs are known to occur in the Peregian South local area and surrounds.



Figure 37: Peregrine South local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Peregrine South local plan area
- Local plan areas
- Macropod habitat



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Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.25 Sippy Downs local plan area

The Sippy Downs local plan area is located in the central part of the Sunshine Coast, along the Sunshine Motorway, bordered to the west by the Bruce Highway, to the south by Sippy Creek and the Palmview declared master plan area and to the east by the Mooloolah River National Park (Figure 38). The local plan area includes the proposed Sippy Downs Town Centre, the University of the Sunshine Coast, the communities of Chancellor Park and Bellflower located to the south of the Sunshine Motorway and the Stringybark Road area north of the Sunshine Motorway. The local plan area takes in a land area of approximately 775 ha.

The northern part of the local plan area is well vegetated and provides a bushland setting at the base of the Buderim escarpment and along Mountain Creek. The wallum heathland and open eucalypt woodlands of the Mooloolah River National Park, and remnant riparian vegetation along Sippy Creek provide an attractive landscape setting and natural edge to the local plan area in the east and south. The Chancellor Lakes system also provides an important open space link through the local plan area.

The proposed Sippy Downs Town Centre, located adjacent to the University of the Sunshine Coast, is a major regional activity centre and is intended to provide significant retail, commercial and community activities to service the needs of its resident population as well as the needs of surrounding communities, including the emerging community of Palmview located to the south of the local plan area. The proposed Sippy Downs Business and Technology Sub-precinct is located adjacent to the proposed Town Centre core and the University of the Sunshine Coast and is intended to support a broad range of science and technology based businesses and industries and maintain a strong nexus with the University.

The Stringybark Road area in the northern part of the local plan area, currently comprises a small local business area and primarily low density and rural residential development, with small areas of multi-unit residential development. Parts of this area are intended to be redeveloped for medium density dwellings and low density residential development, given its proximity to the proposed Sippy Downs Town Centre.

The Sunshine Motorway is the major road link within the local plan area, traversing the local plan area in an east-west direction. Other key local road links include Sippy Downs Drive, University Way, Crosby Hill Road, Claymore Road, Dixon Road and Stringybark Road.

The Sippy Downs area supports the second highest number of macropods records in the data for all the local plan areas. A formerly large population of EGKs centred around the University has severely diminished under increasing urbanisation pressures.

Working in partnership with University of Sunshine Coast, council has installed virtual fencing along Sippy Downs Drive and the initiative appears to be successful in mitigating road related impacts on the population. The virtual fencing is also allowing kangaroos to safely cross to habitat areas on the northern side of Sippy Downs Drive. These remaining habitat areas are crucial for the remaining kangaroo population and careful consideration should be given to the open space design of future development on Sippy Downs Drive and the surrounding area.



Figure 38: Sippy Downs local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Sippy Downs local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.26 Woombye local plan area

The Woombye local plan area is located in the central hinterland of the Sunshine Coast immediately to the south of Nambour. Situated between the North Coast Rail Line and Nambour Connection Road, the local plan area includes Woombye's business centre and adjacent residential areas (Figure 39). The local plan area has a land area of approximately 230 ha.

The local plan area is characterised by variable topography with the established urban areas in the north comprising gently undulating land and the developing southern area generally comprising steeper slopes, particularly adjacent to Pine Grove Road and Woombye-Palmwoods Road. Parts of the local plan area are subject to periodic flooding from Paynter Creek which is located immediately to the west and traverses the local plan area north of the town centre.

The North Coast Rail Line, which forms the western boundary of the local plan area, is proposed to be realigned and duplicated. The planned upgrade includes provision for station improvements and a new road overpass extending from Blackall Street to Back Woombye Road. The preferred future use of surplus rail land arising from the proposed upgrade of the rail line will also be an important consideration.

The major vehicle access into Woombye is via Blackall Street from Nambour Connection Road in the east. Taintons Road provides access to the southern part of the local plan area via Woombye-Palmwoods Road.

The area surrounding the small Woombye planning area has recorded swamp wallabies, EGKs, red-necked wallabies, whiptail wallabies and red-necked pademelons.



Figure 39: Woombye local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Woombye local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree

4.27 Yandina local plan area

The Yandina local plan area is located in the central part of the Sunshine Coast and is traversed by the Bruce Highway and the North Coast Rail Line (Figure 40). The local plan area comprises the rural town of Yandina and adjacent urban areas as well as industrial estates in the northern and southern parts of the town. The local plan area has a land area of approximately 396 ha.

Yandina is located on undulating land and set within a rural and natural landscape with the prominent Mount Ninderry to the east, Parklands Forest Reserve to the south and Wappa Dam and the Mapleton Forest Reserve in the west. The local plan area is traversed by the South Maroochy River in an east-west direction and bordered to the northeast by the North Maroochy River. The local plan area is surrounded by large areas of productive agricultural land.

The Yandina local plan area has good access to the Bruce Highway via Yandina Coolum Road and Fleming Street. Further connections to the east are provided by Ninderry Road, to the north by Ben Williams Road, to the west by Old Gympie Road and Cooloolabin Road and south by the Nambour North Connection Road.

The Yandina local area and surrounds is known to support EGKs, swamp wallabies and red-necked wallabies.



Figure 40: Yandina local plan area

Sunshine Coast Council
Macropod Conservation Plan

- Dead/injured macropod records
- Live macropod records
- Council Reserves
- Yandina local plan area
- Local plan areas
- Macropod habitat



Job number: PR4560
Revision: 2
Author: EK
Date: 14/12/2020



0 100 200 400
Metres

GCS GDA 1994
Datum: GDA 1994
Units: Degree



Figure 41 Eastern grey kangaroo Image credit: J. O'Connor

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Appendix 1 GIS datasets

Spatial data layers used for this purpose are list in Table 5.

Table 5 List of spatial data layers used in GIS analyses

GIS Layer Name	Source	Reference
AZWH_Rescues_2003to2018_20190125_1126	AZWH	AZWH, 2018
DeadAnimalRequests_2010_2016_20190125	SCC Dead Animal Request	SCC, 2016
DeadAnimalRequests_2016_2018_20190125	SCC Dead Animal Request	SCC, 2018
Wilvos_SC_FaunalImpacts_Geocoded_Prj_20181116	Wilvos	Wilvos, 2018
WRC_SC_FaunalImpacts_Geocoded_Prj_20181119_0810	WRC	WRC, 2018
KangarooStatistics_JoinedLocalities_Pts_20181019	SCC Kangaroo Statistics	SCC, 2018
EGK_Survey_July2019	SCC	SCC, 2019
EGKSurvey_AdditionalDataPoints_July2019	SCC	SCC, 2019
Locs_SCC_2014_2015	Beth Brunton	Brunton, 2015
Surveys_2020.01.13	ALA	ALA, 2020
FaunaSurveyRecords_ByER_20190123	SCC ER Fauna Survey	SCC, 2017
FeralAnimalObservations_20181207	SCC Feral Animal Observations	SCC, 2018
FeralAnimalTrappingResults_20181207	SCC Feral Animal Trapping	SCC, 2018
SC_Registered_Dogs	SCC	SCC, 2015
Road Hierarchy Functional	SCC	SCC, 2018
Rail_network	Department of Natural Resources, Mines and Energy	NRME 2020
Local Government Areas	Department of Natural Resources, Mines and Energy	NRME 2020
Vegetation management regional ecosystem map	Department of Natural Resources, Mines and Energy	NRME, 2019
Biodiversity Corridors	SCRC	SCC, 2020
Dedicated Public Transport Corridor (CAMCOS)	SCRC	SCC, 2020
Priority Development Area (Maroochydore City Centre)	SCRC	SCC, 2020
Priority Development Area (Caloundra South)	SCRC	SCC, 2020
Declared Master Planned Area (Palmview)	SCRC	SCC, 2020
Land within Development Control Plan 1 - Kawana Waters	SCRC	SCC, 2020
Sunshine Coast Planning Scheme	SCRC	SCC, 2020

Appendix 2 GIS analysis methods

Figure 6: Macropod occurrence clusters

All occurrences of macropods across the Sunshine Coast region, including live and dead records, were combined to create the data set 'macropod occurrences'. The Kernel Density tool in ArcGIS (version 10.4) was used to calculate the density of these point features to reveal areas of macropod clusters.

The Kernel Density tool calculates this by first fitting a curved surface over each point (i.e. macropod occurrence) and assigning values to each curved surface. The surface value is highest at the macropod occurrence location (assigned a value of one) and decreases with further distance from the location. A matrix of cells (raster cells) are then laid over the full extent of the map, and the density of each raster cell is calculated and assigned a colour based on the density value. This calculation is done by adding the values of all curved surfaces that overlay the centre of each raster cell, giving each raster cell one value. The output value is a measure of points per km²; i.e. number of macropod occurrences per km².

In this analysis, the data is displayed as a cluster map, assigning high-density cells to red and low-density cells to blue. Visually, the cluster map shows six major cluster locations which are numbered on the map (though not in order of density).

Limitations

Macropod hotspot maps were created based on available databases from SCC, Australia Zoo Wildlife Hospital, Wildlife Volunteers Association Inc (WILVOS), Wildlife Rehabilitation Centre (WRC), Atlas of Living Australia (ALA), Elizabeth Brunton (University of Sunshine Coast), Queensland Parks and Wildlife Service (QPWS), and DES. These combined databases provided 2,302 records from which hotspots were created from. However, there are likely many sightings of dead/alive macropods that have not been recorded across the Sunshine Coast region. It is also important to consider that there may be a spatial bias in the data collected, i.e. more records in areas with higher human population (urban areas). These factors do not necessarily mean that the hotspot locations identified are inaccurate; rather that there may be more locations with potentially unidentified hotspots.

Figure 7: Threats to macropods - roads

Vehicle strike is a key threat to macropods on the Sunshine Coast. Existing roads in close proximity to macropod hotspots are particularly high risk and should be identified to implement appropriate mitigation measures.

A major transport layer was created including arterial, sub-arterial, highway and motorway roads, along with Queensland's rail network. This major transport layer was overlayed with the macropod occurrence heatmap (see latter section for further description) to identify areas of high risk for macropods.

Figure 8: Threats to macropods - future development

Encroaching development is a major threat to macropods as it reduces the number and size of foraging and sheltering sites. Development also creates impermeable barriers which prevent macropod movement. It is therefore important to ensure that future development plans consider areas of high macropod occurrence.

The macropod occurrence heatmap was overlayed with all future development layers, including; Priority Infrastructure Areas, Priority Development Areas (Maroochydore City Centre, Caloundra South), Declared Master Planned Area (Palmview), Land within Development Control Plan 1 (Kawana Waters), future roads And the Dedicated Public Transport Corridor.

Figure 9 Threats to macropods – predators

To minimise predation on macropods by domestic dogs, requires minimising potential contact between the dogs and macropods. It is therefore important to identify areas where existing high dog ownership densities coincide with macropod occurrence hotspots, in order to direct appropriate actions on the ground to minimise dog predation on macropods. The aforementioned areas were identified by overlaying the SCRC Registered Dog Ownership database with the macropod occurrence heatmap to provide a visual representation of overlap between the two. Wild dog records from ALA ('common dog', 'dingo', 'dingo, domestic dog', 'dog', 'feral dog', 'wild dog'), SCC feral animal trapping results ('wild dog'), and SCC feral animal observations ('dog') were also overlayed onto this map.

Limitations

It is important to note that Council believe dog registration within the LGA to be around 70% of all dogs owned, so this map may be an underrepresentation of the abundance of dogs in the region. In addition, this database was provided in 2015 for the Koala Conservation Plan (Ecosure, 2015) and there may have been changes in ownership since. Despite this, the general trends in ownership at a regional scale are likely to be the same.

Figure 10: Macropod habitat

The remnant vegetation (RE) type associated with each macropod occurrence (with a five-metre buffer) was classified as macropod habitat. In total, 55 RE's were identified through this classification and a layer was created to include all of these areas across the SCC region. Public areas with large expanses of foraging habitat, including golf courses, gardens, ovals, showgrounds and other recreational areas (such as parks) were also defined as possible macropod habitat. These recreational areas and RE types were combined to create the layer 'macropod habitat'.

Limitations

Preferred macropod habitat was selected based on the overlap between macropod records and RE mapping. This method relies on the accuracy of macropod GPS records, which in some cases may be flawed. The five-meter buffer was added to mitigate this limitation, though

it should still be considered when interpreting maps.

The macropod records represent a combination of available data from a number of sources. However, there are likely many sightings of dead/alive macropods that have not been recorded across the Sunshine Coast region, meaning that some RE's may not have been identified as preferred macropod habitat when they should have been. This limitation would mainly impact more remote areas (i.e. not urban) where sightings are likely to be underreported. However, Figure 6 shows that the majority of land towards the west of the Sunshine Coast region has been identified as preferred macropod habitat, suggesting that this limitation may not have impacted the analysis.

Table 2 Roads associated with macropod deaths and injuries (Top 10 LGA wide)

Due to a lack of consistency and detail between data sets, most data sets did not specify how macropods were killed or injured. We assumed that any macropod death or injury that occurred within five meters of a road was likely the result of a car-related incident. In order to identify the most dangerous roads for macropods, a five-meter buffer was placed on all roads in the SCC region, and all macropod deaths and injuries that occurred within these areas were extracted (n = 753). Analysis in R Studio (Version 1.2.5019) was then used to identify the top 10 roads associated with the most macropod deaths and injuries.

Appendix 3 Regional ecosystems inhabited by macropods

RE	Description	Vegetation Management Act class	Biodiversity status	No. of macropods occurrences
12.1.2	Saltpan vegetation including grassland, herbland and sedgeland on marine clay plains	Least concern	No concern at present	1
12.1.3	Mangrove shrubland to low closed forest on marine clay plains and estuaries	Least concern	No concern at present	7
12.11.1	Simple notophyll vine forest often with abundant Archontophoenix cunninghamiana (gully vine forest) on metamorphics +/- interbedded volcanics	Least concern	No concern at present	1
12.11.10	Notophyll vine forest +/- Araucaria cunninghamii on metamorphics +/- interbedded volcanics	Least concern	No concern at present	1
12.11.10/ 12.11.2	Notophyll vine forest +/- Araucaria cunninghamii on metamorphics +/- interbedded volcanics; <i>Eucalyptus saligna</i> subsp. <i>saligna</i> or <i>E. grandis</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> tall open forest on metamorphics +/- interbedded volcanics	Least concern; Least concern	No concern at present; No concern at present	1
12.11.14	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> , <i>Corymbia intermedia</i> woodland on metamorphics +/- interbedded volcanics	Of concern	Of concern	2
12.11.2	<i>Eucalyptus saligna</i> subsp. <i>saligna</i> or <i>E. grandis</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> tall open forest on metamorphics +/- interbedded volcanics	Least concern	No concern at present	1
12.11.3	<i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> +/- <i>E. microcorys</i> , <i>Lophostemon confertus</i> , <i>Corymbia intermedia</i> , <i>E. acmenoides</i> open forest on metamorphics +/- interbedded volcanics	Least concern	No concern at present	1
12.11.3/12.11.14	<i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> +/- <i>E. microcorys</i> , <i>Lophostemon confertus</i> , <i>Corymbia intermedia</i> , <i>E. acmenoides</i> open forest on metamorphics +/- interbedded volcanics; <i>Eucalyptus crebra</i> , <i>E. tereticornis</i> , <i>Corymbia intermedia</i> woodland on metamorphics +/- interbedded volcanics	Least concern; Of concern	No concern at present; Of concern	1
12.12.1	Simple notophyll vine forest usually with abundant Archontophoenix cunninghamiana (gully vine forest) on Mesozoic to Proterozoic igneous rocks	Of concern	Of concern	1
12.12.1/12.12.16	Simple notophyll vine forest usually with abundant Archontophoenix	Of concern; Least	Of concern; No concern at	4

RE	Description	Vegetation Management Act class	Biodiversity status	No. of macropods occurrences
	cunninghamiana (gully vine forest) on Mesozoic to Proterozoic igneous rocks; Notophyll vine forest on Mesozoic to Proterozoic igneous rocks	concern	present	
12.12.12	<i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> , <i>E. crebra</i> +/- <i>Lophostemon suaveolens</i> woodland on Mesozoic to Proterozoic igneous rocks	Of concern	Of concern	34
12.12.12/12.12.15	<i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> , <i>E. crebra</i> +/- <i>Lophostemon suaveolens</i> woodland on Mesozoic to Proterozoic igneous rocks; <i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i> , <i>E. siderophloia</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> open forest on Mesozoic to Proterozoic igneous rocks	Of concern/Least concern	Of concern; No concern at present	1
12.12.14	<i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> +/- <i>Lophostemon confertus</i> , <i>Syncarpia glomulifera</i> , <i>Eucalyptus acmenoides</i> woodland to open forest usually on rocky near coastal areas on Mesozoic to Proterozoic igneous rocks	Of concern	Of concern	1
12.12.15	<i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i> , <i>E. siderophloia</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> open forest on Mesozoic to Proterozoic igneous rocks	Least concern	No concern at present	48
12.12.15a	<i>Eucalyptus grandis</i> and/or <i>E. saligna</i> tall open forest +/- vine forest understorey. Other canopy species include <i>E. microcorys</i> , <i>E. acmenoides</i> , <i>Lophostemon confertus</i> , <i>E. siderophloia</i> , <i>E. propinqua</i> , <i>Corymbia intermedia</i> . Occurs in wet gullies on Mesozoic to Proterozoic igneous rocks.	Least concern	No concern at present	15
12.12.16	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks	Least concern	No concern at present	4
12.12.2	<i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks especially granite	Least concern	No concern at present	20
12.12.2/12.12.15	<i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks especially granite; <i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i> , <i>E. siderophloia</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> open forest on Mesozoic to Proterozoic igneous rocks	Least concern; Least concern	No concern at present; No concern at present	1
12.12.2/ 12.12.2a	<i>Eucalyptus pilularis</i> tall open forest on Mesozoic to Proterozoic igneous rocks especially granite; <i>Eucalyptus grandis</i> , <i>E. tereticornis</i> open forest. Occurs in gullies on Mesozoic to Proterozoic igneous rocks.	Least concern; Least concern	No concern at present	3

RE	Description	Vegetation Management Act class	Biodiversity status	No. of macropods occurrences
12.2.12	Closed heath on seasonally waterlogged sand plains	Of concern	Of concern	5
12.2.14	Foredune complex	Least concern	No concern at present	1
12.2.7	<i>Melaleuca quinquenervia</i> or rarely <i>M. dealbata</i> open forest on sand plains	Least concern	No concern at present	31
12.2.9	<i>Banksia aemula</i> low open woodland on dunes and sand plains. Usually deeply leached soils	Least concern	No concern at present	2
12.3.11	<i>Eucalyptus tereticornis</i> +/- <i>Eucalyptus siderophloia</i> , <i>Corymbia intermedia</i> open forest on alluvial plains usually near coast	Of concern	Of concern	12
12.3.13	Closed heathland on seasonally waterlogged alluvial plains usually near coast	Least concern	No concern at present	18
12.3.14	<i>Banksia aemula</i> low woodland on alluvial plains usually near coast	Of concern	Of concern	1
12.3.14a	<i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> woodland to open forest. Other canopy species may include <i>Corymbia intermedia</i> , <i>C. gummifera</i> , <i>Eucalyptus latisinensis</i> , <i>E. tindaliae</i> and <i>Melaleuca quinquenervia</i> . Occurs on Quaternary alluvial plains in near coastal areas.	Of concern	Of concern	1
12.3.1a	Complex notophyll vine forest. Occurs on Quaternary alluvial plains and channels in areas of high rainfall (generally >1300mm). Riverine wetland or fringing riverine wetland.	Endangered	Endangered	9
12.3.2	<i>Eucalyptus grandis</i> tall open forest on alluvial plains	Of concern	Of concern	21
12.3.4	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> woodland on coastal alluvium	Of concern	Of concern	3
12.3.5	<i>Melaleuca quinquenervia</i> open forest on coastal alluvium	Least concern	No concern at present	19
12.3.5/12.3.1a	<i>Melaleuca quinquenervia</i> open forest on coastal alluvium; Complex notophyll vine forest on alluvial plains	Least concern; Endangered	No concern at present; Endangered	1
12.3.5/ 12.3.4	<i>Melaleuca quinquenervia</i> open forest on coastal alluvium; <i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> woodland on coastal alluvium	Least concern; Of concern	No concern at present; Of concern	10
12.3.6	<i>Melaleuca quinquenervia</i> +/- <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i> , <i>Corymbia intermedia</i> open forest on coastal	Least concern	No concern at present	1

RE	Description	Vegetation Management Act class	Biodiversity status	No. of macropods occurrences
	alluvial plains			
12.3.7	<i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> +/- <i>Melaleuca</i> spp. fringing woodland	Least concern	Of concern	4
12.5.2a	<i>Corymbia intermedia</i> , <i>Eucalyptus tereticornis</i> woodland. Occurs on complex of remnant Tertiary surfaces +/- Cainozoic and Mesozoic sediments usually in coastal areas with deep red soils.	Endangered	Endangered	4
12.5.3	<i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> woodland on remnant Tertiary surfaces	Endangered	Endangered	8
12.8.14	<i>Eucalyptus eugenioides</i> , <i>E. biturbinata</i> , <i>E. melliodora</i> +/- <i>E. tereticornis</i> , <i>Corymbia intermedia</i> open forest on Cainozoic igneous rocks	Least concern	No concern at present	1
12.8.19	Heath and rock pavement with scattered shrubs or open woodland on Cainozoic igneous hills and mountains	Of concern	Of concern	1
12.8.3	Complex notophyll vine forest on Cainozoic igneous rocks. Altitude <600m	Least concern	No concern at present	3
12.8.3/12.8.8	Complex notophyll vine forest on Cainozoic igneous rocks. Altitude <600m; <i>Eucalyptus saligna</i> subsp. <i>saligna</i> or <i>E. grandis</i> tall open forest on Cainozoic igneous rocks	Least concern; Of concern	Least concern; Of concern	12
12.8.8	<i>Eucalyptus saligna</i> subsp. <i>saligna</i> or <i>E. grandis</i> tall open forest on Cainozoic igneous rocks	Of concern	Of concern	3
12.8.8/12.8.3	<i>Eucalyptus saligna</i> subsp. <i>saligna</i> or <i>E. grandis</i> tall open forest on Cainozoic igneous rocks; Complex notophyll vine forest on Cainozoic igneous rocks. Altitude <600m	Of concern; Least concern	Of concern; No concern at present	1
12.9-10.1	Tall open forest often with <i>Eucalyptus resinifera</i> , <i>E. grandis</i> , <i>E. robusta</i> , <i>Corymbia intermedia</i> on sedimentary rocks. Coastal	Of concern	Of concern	10
12.9-10.14	<i>Eucalyptus pilularis</i> tall open forest on sedimentary rocks	Least concern	No concern at present	41
12.9-10.14/ 12.9-10.1	<i>Eucalyptus pilularis</i> tall open forest on sedimentary rocks; Tall open forest often with <i>Eucalyptus resinifera</i> , <i>E. grandis</i> , <i>E. robusta</i> , <i>Corymbia intermedia</i> on sedimentary rocks. Coastal	Least concern; Of concern	No concern at present; Of concern	3
12.9-10.14/ 12.9-10.14a	<i>Eucalyptus pilularis</i> tall open forest on sedimentary rocks; Open forest of <i>Eucalyptus grandis</i> , <i>Lophostemon confertus</i> , <i>E. microcorys</i> , <i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i> +/- <i>E.</i>	Least concern; Least concern	No concern at present; No concern at present	2

RE	Description	Vegetation Management Act class	Biodiversity status	No. of macropods occurrences
	<i>pilularis</i> . Occurs on Cainozoic and Mesozoic sediments especially sandstone in wet gullies and southern slopes.			
12.9-10.14/ 12.9-10.16	<i>Eucalyptus pilularis</i> tall open forest on sedimentary rocks; Araucarian microphyll to notophyll vine forest on Cainozoic and Mesozoic sediments	Least concern; Of concern	No concern at present; Of concern	6
12.9-10.14a	Open forest of <i>Eucalyptus grandis</i> , <i>Lophostemon confertus</i> , <i>E. microcorys</i> , <i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i> +/- <i>E. pilularis</i> . Occurs on Cainozoic and Mesozoic sediments especially sandstone in wet gullies and southern slopes.	Least concern	No concern at present	2
12.9-10.16	Araucarian microphyll to notophyll vine forest on Cainozoic and Mesozoic sediments	Least concern	No concern at present	8
12.9-10.17d	Open forest generally containing <i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> or <i>E. major</i> , <i>Corymbia intermedia</i> . Other characteristic species include <i>Lophostemon confertus</i> , <i>Eucalyptus microcorys</i> and <i>E. acmenoides</i> or <i>E. portuensis</i> .	Least concern	No concern at present	13
12.9-10.17d/ 12.9-10.17a	Open forest generally containing <i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> or <i>E. major</i> , <i>Corymbia intermedia</i> . Other characteristic species include <i>Lophostemon confertus</i> , <i>Eucalyptus microcorys</i> and <i>E. acmenoides</i> or <i>E. portuensis</i> ; <i>Lophostemon confertus</i> or <i>L. suaveolens</i> dominated open forest usually with emergent <i>Eucalyptus</i> and/or <i>Corymbia</i> species. Occurs in gullies and southern slopes on Cainozoic and Mesozoic sediments.	Least concern	No concern at present	9
12.9-10.4	<i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> woodland on sedimentary rocks	Least concern	No concern at present	13
12.9-10.7a	<i>Eucalyptus siderophloia</i> , <i>Corymbia intermedia</i> +/- <i>E. tereticornis</i> and <i>Lophostemon confertus</i> open forest. Occurs on Cainozoic and Mesozoic sediments in near coastal areas.	Of concern	Of concern	19
estuary	-	-	-	2
non-rem	-	-	-	1,957

Appendix 4 Macropod occurrence in local plan areas

		Dead/injured									Alive									
Area no.	Local plan area	EGK	Swamp wallaby	Whiptail wallaby	Black-striped wallaby	Red-necked wallaby	Red-legged pademelon	Red-necked pademelon	Euro	Un-known macropod	EGK	Swamp wallaby	Whiptail wallaby	Black-striped wallaby	Red-necked wallaby	Red-legged pademelon	Red-necked pademelon	Euro	Un-known macropod	Total macropod count
1	Beerburum Local Plan Area	1				2					1									4
2	Beerwah Local Plan Area	18	3	2		3			2	5	8									41
3	Blackall Range Local Plan Area		5			3				14									2	24
4	Caloundra Local Plan Area	35	7			8				16	11									77
5	Caloundra West Local Plan Area	47	1			4				44	22	1							5	124
6	Glass House Mountains Local	4	1								9								2	16
7	Golden Beach/Pelican Waters Local Plan Area	34				1				24									4	63
8	Kawana Waters Local Plan Area	10	1							8	12								6	37
9	Landsborough Local Plan Area	13	3			1				12	5									34
10	Maleny Local Plan Area		3			20	3			9										35
	Mooloolaba/Alexandra																			
11	Headland Local Plan Area	3	2							2									1	8
12	Mooloolah Local Plan Area	4	4								1									9
13	Sippy Downs Local Plan Area	72	1							18	44								5	140
14	Bli Bli Local Plan Area	1	2			1				11	1									16
15	Nambour Local Plan Area	3	4			1			1	20	1	1								31
16	Palmwoods Local Plan Area									2										2
17	Yandina Local Plan Area	5	2			2				1	3								3	16
18	Eumundi Local Plan Area		1			1				5										7
19	Kenilworth Local Plan Area																			0
20	Peregian South Local Plan Area	4								1	1								1	7
21	Coolum Local Plan Area	24	3			1				48	23	1							5	105
22	Maroochy North Shore Local Plan	28	9			1				33	21								3	95
23	Maroochydoore/Kuluin Local Plan	8	2			2				2	3								2	19
	Forest Glen / Kunda Park /																			
24	Tanawha Local Plan Area	11	3	1		3				17	1								1	37
25	Buderim Local Plan Area	69	9	1		5				64	36	1							6	191
26	Woombye Local Plan Area									2										2
27	Eudlo Local Plan Area																			0

Appendix 5 Road markings and signs

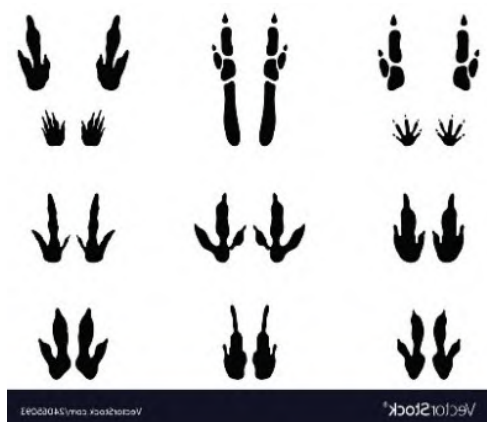


Figure 42 Vector stock image



Figure 43 Artwork by Roadsworth (Peter Gibson 2019
<https://www.livemaster.com/topic/3270490-article-painted-worlds-by-roadsworth>)



Figure 44 Artwork by Roadsworth



Figure 45 Linda Powers designed Sand dollars and Sea Shells crosswalk in Lompoc (Source: Lompoc Record April 22 2016)



Figure 46 Wildlife Awareness Monitors (Brisbane City Council 2020:
<https://www.brisbane.qld.gov.au/traffic-and-transport/roads-infrastructure-and-bikeways/road-and-intersection-projects/wildlife-awareness-monitors>)



Figure 47 Slow for Speed Awareness Monitors (BCC 2020)Figure 48 Wildlife Awareness Monitors (Brisbane City Council 2020:
<https://www.brisbane.qld.gov.au/traffic-and-transport/roads-infrastructure-and-bikeways/road-and-intersection-projects/wildlife-awareness-monitors>)

Appendix 6 Living with Kangaroos

An engaged and educated community will go a long way towards conserving macropods. An effective information package should aim to extend across multiple sources including Council programs, events and presentations, surveys, websites, social media, hard media distributed to residents in hotspots and critical corridors.

You can help protect our macropods by:

- always maintaining a safe distance when watching kangaroos
- never feeding kangaroos
- slowing down on local roads, especially between dusk and mid-morning when macropods are most active
- never allowing your dog to roam unattended or harass wild animals
- run sighting wire: soft white nylon wire, with plastic around it, along the top of the fence, so the kangaroos can see where the top of the fence is
- put water out for the kangaroos in summer.

To deter kangaroos or wallabies from gardens and lawns in residential areas, landholders are recommended to:

- fence their property
- limit access to water on the property
- increase the coverage of other vegetation to reduce available grazing area
- planting agapanthus, citronella varieties, lavender and rosemary bushes around your veggie patch may help keep the wallabies away
- plants with oily or fragrant foliage or high oil content (including some which have fragrant foliage) include species of *Eremophila*, *Prostanthera*, *Westringia*, *Eriostemon*, and *Myoporum* appear almost totally unpalatable to 'roos
- use motion--activated security lights which may deter night-time grazing.

Aggressive kangaroos

Kangaroos are mostly docile but can respond quickly and unpredictably if threatened. However, the risk of being injured by a kangaroo is very low. Kangaroo defensive behaviour may occur where:

- a person standing straight and tall is seen as a sparring partner or threat to dominant males, mothers and their offspring
- an animal feels cornered or startled
- female kangaroos are weaning their young (OEH 2012).

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	07/02/2020	Sunshine Coast Macropod Conservation Plan Draft	Emily Hatfield Senior Wildlife Biologist	Jess Bracks Principal Wildlife Biologist	Jess Bracks Principal Wildlife Biologist
01	09/03/2020	Sunshine Coast Macropod Conservation Plan Draft R1		Julie O'Connor SCC	Emily Hatfield Senior Wildlife Biologist
02	16/11/2020	Sunshine Coast Macropod Conservation Plan Draft R3		Ellie Kirke Wildlife Biologist Emily Hatfield Senior Wildlife Biologist	Jess Bracks Principal Wildlife Biologist
03	11/02/2021	Sunshine Coast Macropod Conservation Plan Draft R4		Ellie Kirke Wildlife Biologist	Emily Hatfield Senior Wildlife Biologist
04	11/03/2021	Sunshine Coast Macropod Conservation Plan Draft R5		Julie O'Connor SCC	Emily Hatfield Senior Wildlife Biologist
05	19/03/2021	Sunshine Coast Macropod Conservation Plan Draft R6	Emily Hatfield Senior Wildlife Biologist		

Distribution List

Copy #	Date	Type	Issued to	Name
1	19/03/2021	Electronic	Sunshine Coast Council	Julie O'Connor
2	19/03/2021	Electronic	Ecosure	Administration

Citation: Ecosure, 2020, *Macropod Conservation Plan*, Report to Sunshine Coast Council, Burleigh Heads

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PR4560-DE.Macropod Conservation Plan.DR6



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