Appendix H

Koala habitat mapping letter

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Please provide your name, contact information, and a detailed description of the issue you encounter or the format you require.

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27 October 2023

Commercial-in-Confidence

[redacted]
Nature Positive Regulation Division
Environment Assessments Queensland
Department of Climate Change, Energy, the Environment and Water

Dear Carl

Logan and Gold Coast Faster Rail Project - Koala habitat mapping approach

During our meeting on 13 September 2023, the Queensland Department of Transport and Main Roads (TMR) requested advice from the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) on the mapping of koala (*Phascolarctos cinereus*) habitat in the area to be impacted by the Logan and Gold Coast (LGC) Faster Rail Project (the Project) (herein, the area to be impacted by the Project is referred to as the Project Area). DCCEEW requested submission of a letter outlining the approach to koala habitat mapping to allow the DCCEEW assessing officers to consider the approach in more detail and provide informed advice to TMR.

As you are aware, detailed field investigations are ongoing in the Project Area and in surrounding areas, and are being completed by ecologists from AECOM and subcontractor's to AECOM (E2M Consulting and BAAM Ecological Consultants) engaged by TMR. Each area of impact is being surveyed in detail to understand the ecological features and habitat values present. While the survey effort is extensive, the team have encountered challenges when defining koala habitat; specifically, where there are barriers to movement and highly developed urban areas.

In the broader Project region, koala habitat generally consists of:

- Large patches of eucalypt forests and woodlands, with varying levels of connectivity, likely to represent core foraging and breeding habitat
- Smaller and/or more isolated patches of eucalypt forests and woodlands, with varying levels of connectivity, likely to represent foraging and breeding habitat
- Patches of non-eucalypt vegetation, which may provide shelter and dispersal habitat
- Small strips of vegetation and isolated trees, including food tree and non-food tree species, which may represent shelter and dispersal habitat.

Where vegetation patches are larger and have higher levels of connectivity, mapping koala habitat is more straight forward. Where the area becomes increasingly developed and more fragmented, with increased threats and with existing barriers to movement, however, mapping habitat becomes more challenging. The following sections detail our proposed approach for mapping koala habitat in the Project Area. We request that DCCEEW review the proposed approach contained in the following section and provide advice as to the acceptability of the approach.

Please let us know if you have any questions.

Kind regards,

[redacted]
AECOM Australia Pty Ltd
[redacted]

cc: [redacted]

1.0 Background – the Logan and Gold Coast Faster Rail Project

TMR need to double the number of Beenleigh and Gold Coast train services over the next 20 years to support the growing population and rail patronage demand between Brisbane, Logan and the Gold Coast. The rail line between Kuraby and Beenleigh is currently a key capacity bottleneck on the rail corridor and TMR is proposing to duplicate 20km of existing rail corridor between Kuraby and Beenleigh Station from two to four tracks, with associated station and rail system upgrades, to relieve the bottleneck.

The proposed action includes eight station upgrades, a station relocation, new pedestrian bridges, upgrades to rail systems, a new rail maintenance access road, local road network alterations and removal of a rail level crossing, amongst other works.

2.0 Background – koala

The koala is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The species is known to occur from north-eastern Queensland to the south-east corner of South Australia and is widespread in coastal and inland areas (DAWE 2022, DCCEEW 2023). The range of the koala, in relation to the combined populations of Queensland, New South Wales and the Australian Capital Territory, extends from approximately the latitude of Cairns to the New South Wales-Victoria border. The species' distribution is not continuous within its range with a number of populations isolated by cleared land or unsuitable habitat (DAWE 2022). The distribution of koalas is influenced by altitude (limited to <800 m ASL), temperature and, at the western and northern ends of the range, leaf moisture (Munks, Corkrey, and Foley 1996).

3.0 Koala habitat

The koala inhabits a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus* (Martin and Handasyde 1999). Koalas have a specialised diet, feeding on the leaves of select species of *Eucalyptus, Lophostomen, Corymbia, Angophora* and occasionally *Melaleuca* and *Leptospermum* (Martin and Handasyde 1999; Moore and Foley 2000). Consequently, koalas are reliant on stands of forest and woodland that support those key food-tree species. Shelter (non-food) tree species are also used to rest and assist in thermoregulation (Crowther et al. 2013; Briscoe et al 2015).

DCCEEW (2023a), state that koala habitat will often include:

- forests or woodlands, especially with a higher proportion of feed tree species, and may include remnant or non-remnant vegetation
- roadside and railway vegetation and paddock trees
- safe intervening ground for travelling between trees and patches to forage, shelter and reproduce
- access to vegetated corridors or paddock trees to facilitate movement between patches.

4.0 Koala habitat in the Project Area

The koala is assumed to be present in the Project Area. There are numerous historic koala records surrounding the Project Area, field surveys have identified:

- Indicators of koala presence in the form of scratch marks on trees,
- Tree species that are considered to be Locally Important Koala Habitat Trees (LIKHT) or trees that are regularly browsed by koalas in the South-East Queensland Koala Management Bioregion are present (Youngenbob et al, 2021). These species include *Eucalyptus acmenoides*, *Eucalyptus crebra*, *Eucalyptus fibrosa*, *Eucalyptus propinqua*, *Eucalyptus resinifera*, *Eucalyptus tereticornis* and *Eucalyptus tindaliae* (Youngenbob et al, 2021).
- Koalas have been observed via infrared drone surveys in Karrawatha Forest and Gould Adams Park, in areas adjacent to the Project Area.

The National Recovery Plan for the koala (Department of Agriculture, Water and Environment (DAWE) 2022) and the Conservation Advice for the koala (DAWE 2022b) highlight the need to consider the following factors when identifying habitat for the koala:

- whether the habitat is used during periods of stress (examples: flood, drought or fire)
- whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, social behaviour patterns)
- whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements
- the landscape patch size, form and spatial configuration within the context of the wider landscape.

In this context, both remnant vegetation (undisturbed) and non-remnant vegetation (formerly cleared) can be high quality koala habitat and non-remnant vegetation should be given the same consideration as remnant vegetation when determining whether it is koala habitat. The potential utility to koalas should not be downgraded simply on the basis of whether the vegetation has regrown or has never been disturbed (Youngenbob et al 2021).

Potential koala habitat occurs in a complex matrix in the Project Area, aligned with the above consideration factors, and can be classified into the functional habitat types described in **Table 1**.

Table 1 Koala habitat types within the Project Area

Habitat type	Description	Presence in the Project Area
Breeding and foraging habitat	Areas where LIKHT are present.	Large and small areas of remnant, non-remnant and high-value regrowth vegetation (including forests and woodlands where logging has altered tree species composition or plantation vegetation), windbreaks, narrow strips along linear infrastructure, riparian areas, vegetation associated with schools and isolated trees in suburban streets and residential properties.
Shelter habitat	Areas that do not support LIKHT but where trees are present (native and exotic species) that could be used for shelter, rest or thermoregulation (Crowther et al. 2013; Briscoe et al 2015).	Primarily urban parks, schools, streetscapes and in residential and commercial properties.
Dispersal habitat	The intervening ground matrix facilitating dispersal between areas of habitat, includes hardstand areas (roads, carparks, rail corridor), areas with no vegetation (bare earth verges and plots) and areas with grass only.	Roads, rail corridor, carparks, farmland, school sports fields and sporting ovals.
Not habitat	Areas that could not be used to move between areas of habitat and that do not contain trees or other vegetation.	Buildings

Beyond the simplified habitat categories outlined above, the complex nature of the Project Area requires consideration of the interrelationships between koala movement in the region, habitat types and values, dispersal opportunities, barriers, and threats.

5.0 Koala movement and barriers and obstacles to movement

Koalas have adapted to the urban context despite the presence of threats such as dogs, roads and trains. However, the average koala density in areas where habitat resources are more scattered is likely to be lower than in areas that support larger extents of high-quality habitat (Rhodes et al, 2015). In addition, it is likely that koalas in urban areas have larger home ranges comprising multiple core-use areas with koalas moving between these areas frequently (Whisson et al., 2020; Rus et al., 2021).

Studies considering koala movement in high-density (urban) areas and in proximity to linear infrastructure found that:

- Koalas are relatively sedentary and movement increases in spring when young dispersing males move distances of up to 10 km in urban south-east Queensland (Dique et al. 2003) and 16 km in rural south-east Queensland (White 1999),
- For the rest of the year koalas move relatively slowly within home ranges that vary between 8 ha and 135 ha (Ellis et al. 2002; Goldingay and Dobner 2014),
- Habitat loss and fragmentation leads to increased dispersal and larger home range size, as individuals need to travel further to access the required resources (Whisson et al., 2020, Rus et al., 2021).
- Urban koalas make frequent, short movements each day (one to two times per day for distances up to 70m) (Whisson et al, 2020),
- Urban koalas follow more direct movement pathways and demonstrate an increased willingness to cross open areas at ground level to move between isolated patches of vegetation (Rus et al 2020),
- In the context of a contiguous landscape with high levels of habitat connectivity, large open area are expected to receive low levels of utilisation by koalas, as they will preference the safer, connected pathway,
- It is not considered that there is a minimum spatial extent associated with koala habitat as backyards and street trees were observed to support koala (Youngenbob et al., 2021),
- Where connectivity is not maintained between patches of habitat, smaller, isolated patches of habitat may be functionally lost (Youngentob et al., 2021),
- Rail lines acted as a home-range boundary for some koala (de Oliveira et al., 2014),
- Some koala crossed rail lines during exploratory movements beyond their home range (de Oliveira et al., 2014),
- Koala were observed using rail corridors and streetscape vegetation as movement pathways to travel between vegetation patches (de Oliveira et al., 2014; Whisson et al., 2020),
- Fencing associated with rail infrastructure (i.e. standard high-security chain-mesh fencing with top and bottom rails) was assumed to provide more of a barrier to movement than roads or rail lines themselves (de Oliveira et al., 2014),
- Some koala had roads within their home range and while some only occasionally crossed these roads, some crossed roads frequently (de Oliveira et al., 2014),
- Some structures, such as noise walls (i.e. fencing consisting of brick, metal sheeting, Perspex or timber with no gaps between palings, creating a smooth unclimbable surface to koalas), are considered to be unclimbable to koalas and are therefore likely to be a barrier to movement with koala encountering noise walls likely to be funnelled either side of these barriers or return the way they came to the barrier (Department of Environment and Science, 2022),
- Koala exclusion fencing has been designed specifically for the purpose of preventing fauna movement and is installed in locations where fauna movement is likely to create a risk to human safety and / or animal survival, with designs adjusted to maximise impenetrability to the target species (Department of Environment and Science, 2022).

On the basis of the above findings, it is considered that road and rail corridors themselves are not a barrier to movement, although they may be an obstacle to koala movement, and therefore that road and rail corridors should still be considered shelter or dispersal habitat for koala (depending on the vegetation presence and the presence of actual barriers to movement).

Noise walls and fauna fencing, however, is considered a barrier to movement and should be considered when assessing koala movement within areas where these structures are present.

6.0 Project Area assessment

As outlined in **Section 5.0**, the way in which koalas move through different landscape types, influences their use of habitat. The Project Area is highly urbanised with a central rail corridor running through the Project Area along with a vast network of roads, residential areas, industrial areas and commercial areas. Within this land use context, there are large and small areas of high value forage habitat mixed with shelter habitat and dispersal areas along with non-habitat areas. Some areas that only support individual scattered trees in residential backyards are a considerable distance from patches of forage or shelter vegetation with barriers to movement of the koala between these vegetation patches and the scattered trees.

It is necessary to assess each patch of vegetation in the context of the broader landscape, movement patterns, koala dispersal pathways, barriers to movement and habitat connectivity to determine whether koalas would realistically use some of these areas and therefore, whether these areas should retain the classification as habitat.

AECOM have undertaken a detailed assessment of the Project Area, based on the above information regarding koala movement patterns and considering the broader landscape. The following sections identify areas within the Project Area that are not considered to meet the definition of habitat for koala, based on the landscape context, movement patterns, dispersal pathways, barriers to movement and/or connectivity.

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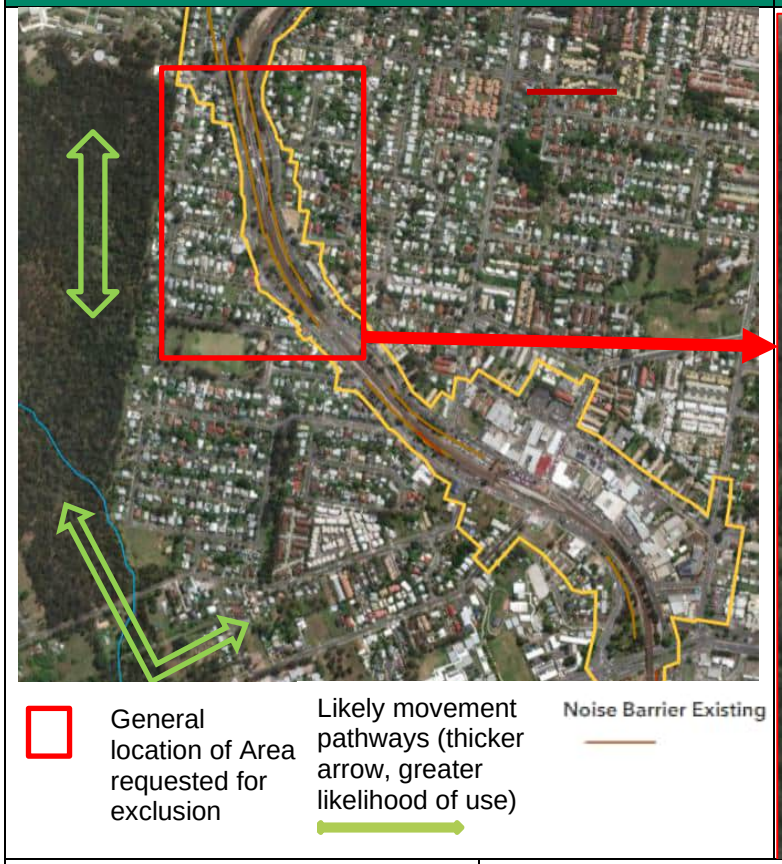
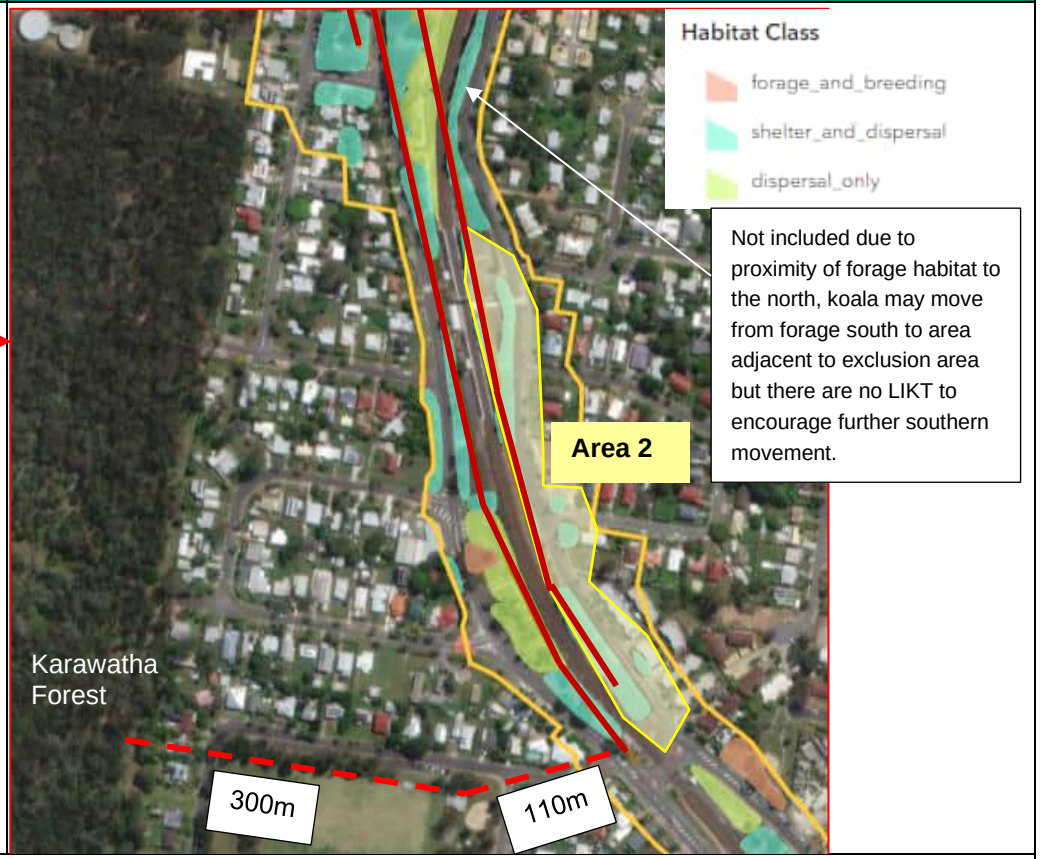
6.1 Area 1 – Kuraby, St Patrick Avenue (https://maps.app.goo.gl/u1p9ihcFTCogdticA) to Allingham Street (https://maps.app.goo.gl/rm676PSbmc8pB8HC7) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications and area requested for exclusion from habitat calculations
	
Justification for exclusion from habitat classification	• Area is across rail corridor and on the other side of an existing noise barrier from an area likely to be used for forage and breeding. • Even if moving from a core area (i.e. the park around Springs Creek) across the rail corridor, koala movement would be blocked by the noise walls.

6.2 Area 2 – Woodridge, Barkala Street (https://maps.app.goo.gl/QSFAM3iR8jMRYFCY6) to Trinder Crossing (https://maps.app.goo.gl/3d8xpEEXJ3HuNsu78) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications
	

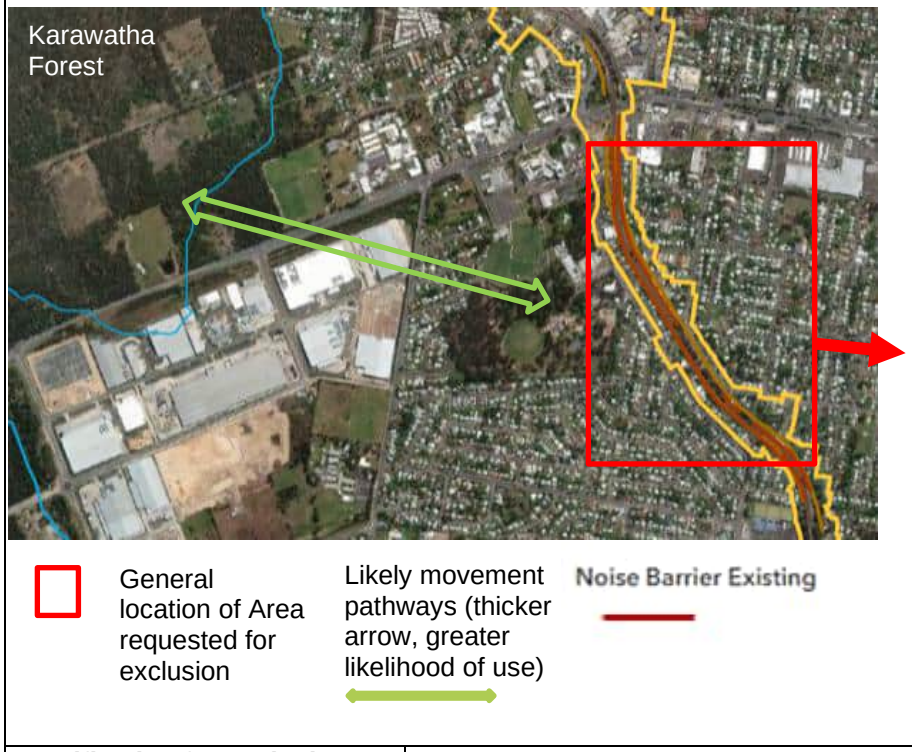
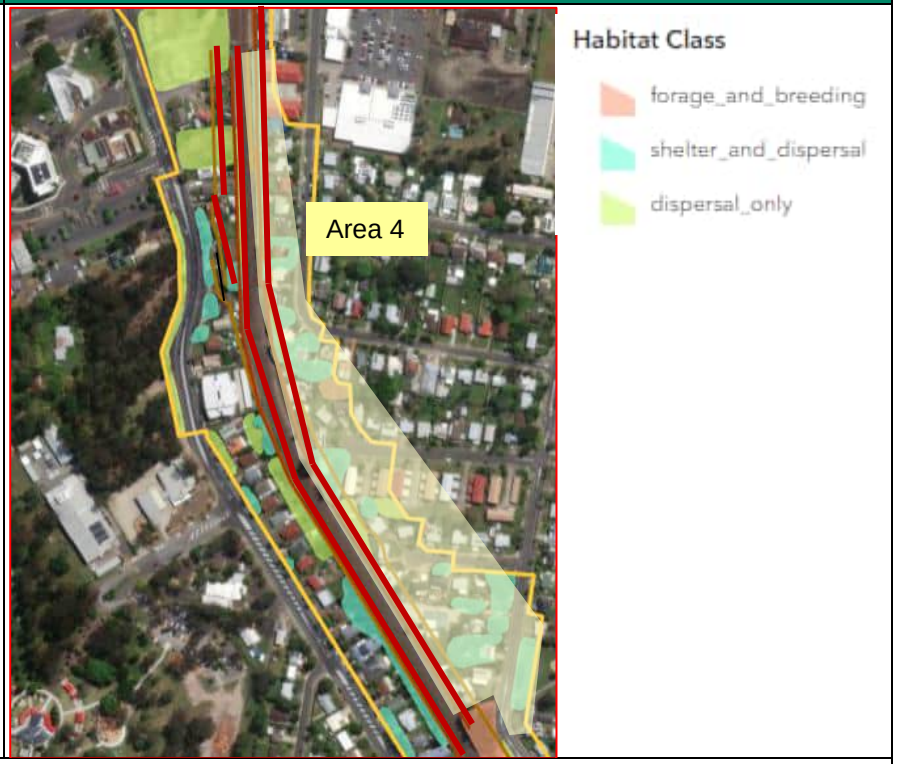
Justification for exclusion from habitat classification	• Koala movement is blocked by two noise walls. • Area is across the rail corridor and on the other side of a noise barrier from an area likely to be used for forage and breeding (Karawatha Forest). • Koala would need to travel 300m through non-core area, possibly along a line of street trees in which case it would then need to cross 110m with no trees to reach the nearest patch of shelter habitat adjacent to a noise wall.

6.3 Area 3 – Woodridge, North Road (https://maps.app.goo.gl/Nhzan6Ra4QNJBaCy7) to Carmody Street (https://maps.app.goo.gl/QnneMSN1eahtwstk6) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications
	

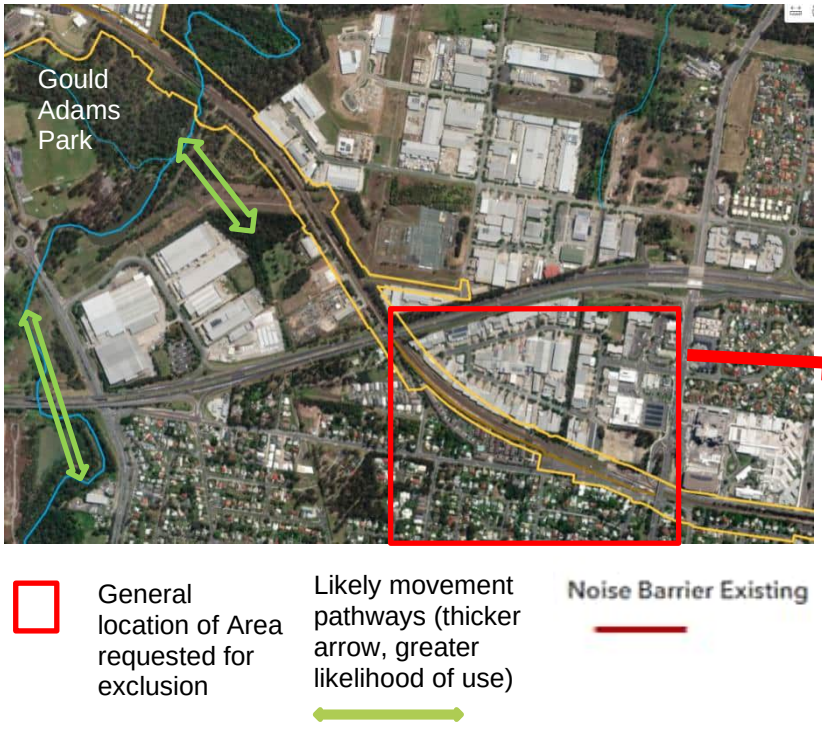
Justification for exclusion from habitat classification	• Koala movement is blocked by two noise walls. • Area is high-density and high-traffic with no forage resources that could attract koala and result in use of vegetation for shelter or dispersal purposes. • Koala would need to move from a good forage area, through 120m with limited vegetation to streetscape vegetation, and then 420m to reach edge of the excluded area. The koala would then need to cross two main roads and a train station to get into a high-density commercial district with no forage habitat present.

6.4 Area 4 – Logan, McDonalds Logan Central (https://maps.app.goo.gl/Ai5dF7Cs3P61iKEz8) to Kingston, Mayes Avenue (https://maps.app.goo.gl/vBuzZY41AqZx4hEN9) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications
	

Justification for exclusion from habitat classification	• Koala movement and entry to this area is blocked by two noise walls. • Area is high-density and high-traffic with no forage resources that could attract koala and result in use of vegetation for shelter or dispersal purposes.

6.5 Area 5 – Meadowbrook, Logan Motorway (https://maps.app.goo.gl/fpaqjUEEi1h3oHjU6) to Armstrong Road (https://maps.app.goo.gl/jeQL9zS1JqWrKS75A) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications
	

Justification for exclusion from habitat classification	• Koala movement and entry to this area is blocked by a noise wall. • Area is high-density and high-traffic with no forage resources that could attract koala and result in use of vegetation for shelter or dispersal purposes.

6.6 Area 6 – Beenleigh, Spanns Road (https://maps.app.goo.gl/SUd173bXXYs11BGh8) to Logan River Road (https://maps.app.goo.gl/94rEx37Nyvyu5nJa7) – requested for exclusion from habitat classification

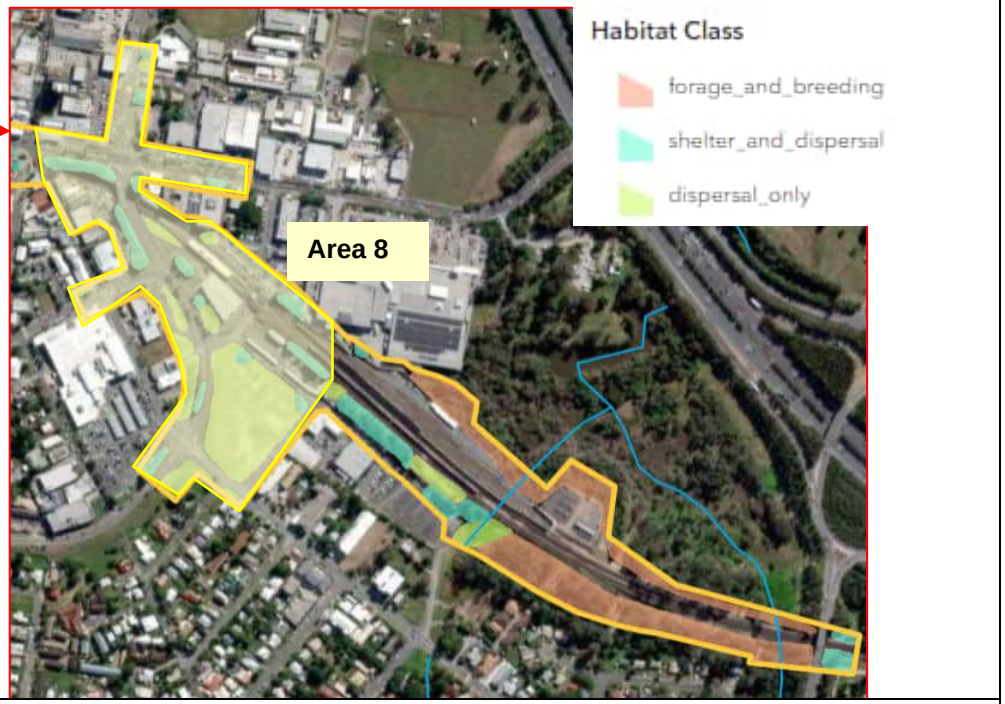
Figure of area in landscape context	Figure of area showing habitat classifications
	
Justification for exclusion from habitat classification	• Koala movement and entry to this area is blocked by a noise wall. • Area is high-density and high-traffic with no forage resources that could attract koala and result in use of vegetation for shelter or dispersal purposes.

6.7 Area 7 – Beenleigh, Logan River Road (https://maps.app.goo.gl/mBBmpyFyz3jBXoih8) to James Street (https://maps.app.goo.gl/hMiAPN6cP9ANZvWF9) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications
	

Justification for exclusion from habitat classification	• Koala movement and entry to this area is blocked by one to two noise walls. • Area is high-density and high-traffic with no forage resources that could attract koala and result in use of vegetation for shelter or dispersal purposes.

6.8 Area 8 – Beenleigh, Kent Street (https://maps.app.goo.gl/xFe22YkPmxZCS49c7) to Intercity Circuit (https://maps.app.goo.gl/UDmw2WFYXNooxUwv8) – requested for exclusion from habitat classification

Figure of area in landscape context	Figure of area showing habitat classifications
	
Justification for exclusion from habitat classification	• Area is high-density and high-traffic with no forage resources that could attract koala and result in use of vegetation for shelter or dispersal purposes.

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7.0 Conclusion

The Logan and Gold Coast Faster Rail project is considering the impacts from the Project on matters of national environmental significance as defined under the EPBC Act. One of the species the Project is assessing is the koala, Endangered under the EPBC Act. It has been determined that there is habitat for the koala within the Project Area and that this includes forage, shelter and dispersal habitat.

The National Recovery Plan, Conservation Plan and other DCCEEW guidance do not currently differentiate between habitat in an urban, peri-urban, rural or contiguous high-value vegetation context. It is accepted that urban areas, like those where the Project is located, provide habitat for koala and that koala have adapted their home range sizes and movement patterns in response to high-density urban environments and the fragmentation of resources required for their survival.

It is also noted, however, that barriers and obstacles exist within the urban environment that will affect koala movement and dispersal pathways. This includes noise walls and areas at a distance from high-quality vegetation patches with limited connectivity to patches.

On this basis, 8 areas within the Project Area have been identified that are considered to not meet the classification as habitat when considering the context of the broader landscape, movement patterns, koala dispersal pathways, barriers to movement and habitat connectivity.

It is requested that DCCEEW consider the identified areas, their landscape context and the justification for removal of these areas from habitat consideration for the koala for the purpose of calculating habitat presence for the Logan and Gold Coast Faster Rail project.

8.0 References

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