

Eden Estates - Koala Analysis

1.0 Introduction

As part of detailed ecological surveys conducted by AEP over several years since 2020 within the Eden Estates land holdings (the “site”) at Newcastle Link Road, BAM compliant surveys including scat searches, diurnal and nocturnal surveys, songmeters and camera traps found no evidence of the presence of Koala on the site.

Recent detection dog surveys carried out by AEP in 2025 within the site found scats of similar age appearance in four locations in the western portion of the site to the north of the Link Road, indicating (past) presence of Koala on the site. On the back of this detection, Eden Estates commissioned Thermal Drone surveys targeting Koala over their entire land holdings. The Thermal Drone surveys carried out in 2025 detected what has been deduced to be a single young male Koala in several locations in the western portion of the site to the north of the Link Road.

At the request of Eden Estates, AEP have undertaken preparation of this Koala Analysis Report, which documents the survey works undertaken to date on site and the results, a detailed literature review on Koala ecology, lifecycle, habitat requirements and movement patterns. Taking all of this information into account, and considering other relevant information such as past local records of Koala, and the available habitat and linkages that will remain east of the M1 Motorway once all approved development and vegetation clearing occurs along the Link Road, analysis has been undertaken of the recent Koala record on the site and what the future holds for Koala habitat and occupation in the immediate area.

2.0 Koala Survey Effort and Results

AEP has conducted extensive survey effort over several years to detect Koalas or signs thereof within the site. Required fauna survey techniques were informed by the *Koala Habitat Protection Guideline – Implementing State Environmental Planning Policy (Koala Habitat Protection) 2019* (DPIE, 2020), and *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DPE, 2022).

Koala surveys were initially scoped with reference to DECC 2004 draft guidelines and SEPP44. Subsequently following commencement of surveys, State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2019 (SEPP 2019) came into effect on 1 March 2020 and replaced SEPP No 44 – Koala Habitat Protection (SEPP 44). Survey for the species was rescoped on the basis of the new SEPP and accompanying survey guidelines. However, SEPP (Koala Habitat Protection) 2020 was introduced in November, replacing SEPP 2019 and largely reinstating SEPP 44. In March 2021, SEPP (Koala Habitat Protection) 2021 came into effect, replacing SEPP 2020 but maintaining the essence of SEPP 44.

The Biodiversity and Conservation SEPP commenced on 1 March 2022 which included Chapter 4 – Koala Habitat Protection 2021. The current SEPP continues to reference the Koala SEPP 2019 survey guidelines. Furthermore, *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DPE, 2022) were released on 17 June 2022. For the most part these differing requirements are commensurate with the Koala SEPP 2019 survey guidelines.

Survey methods employed included the following:

- Identification and mapping of Plant Community Types (undertaken by Bell and Sims from Eastcoast Flora Survey), including any PCTs that contained preferred Koala feed trees;
- Review of NSW BioNet records of Koala within the last 20 years in the locality;
- Spot Assessment Technique (SAT) surveys following Phillips & Callaghan (2011), using a grid-based systematic approach, with a grid spacing of 250m;
- Passive acoustic recording using songmeters, during peak breeding season (September to November);
- Passive acoustic recording using songmeters, outside of peak breeding season;
- Spotlighting on sets of two (2) consecutive nights in areas of suitable habitat which were not fully covered by the probable radius of songmeter recording, during peak breeding season (September to November);
- Call playback during peak breeding season (September to November);
- Opportunistic observations during all other phases of field work over a five-year period.

The survey effort for Koala within the site is considered compliant with SEPP 2019, DPE 2022 and SEPP 2021, since SEPP 2019 survey guidelines were more comprehensive than those referred to in SEPP 2021, and DPE guidelines are for the most part commensurate with SEPP 2019.

No sign of Koala or presence on site was found by the above surveys. Koala survey effort is shown in **Attachment A – Figure 1**.

2.1 Nocturnal Surveys

Spotlighting surveys were conducted in April to September 2020, November 2020 and January to February 2021. Additionally, call playback was used during nocturnal surveys from April to September 2020. Nocturnal surveys specifically targeted areas where Song Meter probable recording radius did not completely cover the site.

Nocturnal surveys did not identify any sign of Koalas within the site.

2.2 Acoustic detection

Acoustic detection was conducted over 278 nights from March to September 2020. Song Meters were deployed at nine (9) different locations within the site, reflective of the BAM survey guidelines of Spring and Summer for Koala. Song Meters were also placed at an additional 42 separate locations targeting additional threatened species, including Koala.

No species-specific vocalisation consistent with Koala was recorded.

Song Meter survey dates and operating times are shown in **Table 1** and **Table 2**.

Table 1 – Targeted Koala Song Meter Survey Dates and Operating Times

Location	Survey unit	Date		Nights (Sept to Nov only)	Time		Hours (Sept to Nov only)
		Start	Finish		Start	Finish	
K1	4	22/10/2020	20/11/2020	29	18:00	6:00	348
K2	6	22/10/2020	20/11/2020	29	18:00	6:00	348
K3	2	29/10/2020	16/11/2020	18	18:00	6:00	216
K4	3	29/10/2020	16/11/2020	18	18:00	6:00	216
K5	8	16/11/2020	22/11/2020	6	18:00	6:00	72
K6	5	16/22/2020	9/12/2020	14	18:00	6:00	168
14	5	1/09/2020	13/09/2020	12	17:00	7:00	168
14	5	18/09/2020	29/09/2020	11	17:00	7:00	168
30	6	26/08/2020	29/09/2020	29	17:00	7:00	406
		Total		166			2,110

Table 2 – General Song Meter Survey Dates and Operating Times

Location	Strata	Start	Finish	Total nights	Start Time	Finish Time	Total duration
1	8	23/03/2020	29/03/2020	6	18:30	7:00	75
2	6	23/03/2020	4/04/2020	12	18:30	7:00	150
3	6	29/03/2020	5/04/2020	7	18:30	7:00	87.5
4	2	3/04/2020	10/04/2020	7	18:30	7:00	87.5
5	7	5/04/2020	11/04/2020	6	17:00	7:00	84
6	6	11/04/2020	18/04/2020	7	17:00	7:30	101.5
7	5	19/04/2020	26/04/2020	7	17:00	7:00	98
8	4	19/04/2020	26/04/2020	7	17:00	7:00	98
9	3	19/04/2020	26/04/2020	7	17:00	7:00	98
10	6	28/05/2020	11/06/2020	14	17:00	7:00	196
11	6	28/05/2020	11/06/2020	14	17:00	7:00	196

Location	Strata	Start	Finish	Total nights	Start Time	Finish Time	Total duration
12	3	28/05/2020	11/06/2020	14	17:00	7:00	196
13	3	28/05/2020	11/06/2020	14	17:00	7:00	196
14	5	15/06/2020	25/06/2020	10	17:00	7:00	140
14	5	25/06/2020	30/06/2020	6	17:00	7:00	84
14	5	1/07/2020	31/07/2020	31	17:00	7:00	434
14	5	1/08/2020	31/08/2020	31	17:00	7:00	434
14	5	1/09/2020	13/09/2020	12	17:00	7:00	168
14	5	18/09/2020	29/09/2020	11	17:00	7:00	168
15	Outside boundary	23/06/2020	29/06/2020	6	16:00	8:00	96
16	3	23/06/2020	29/06/2020	6	16:00	8:00	96
17	5	23/06/2020	1/07/2020	8	16:00	8:00	128
18	Outside boundary	25/06/2020	3/07/2020	8	17:00	8:00	120
19	3	6/07/2020	8/07/2020	2	16:00	8:00	32
20	3	8/07/2020	18/07/2020	10	17:00	8:00	150
21	3	3/08/2020	6/08/2020	3	0:00	7:00	21
22	3	5/08/2020	11/08/2020	6	17:00	7:00	84
23	3	5/08/2020	11/08/2020	6	17:00	7:00	84
24	3	5/08/2020	11/08/2020	6	17:00	7:00	84
25	8	11/08/2020	14/08/2020	3	17:00	7:00	42
26	6	11/08/2020	14/08/2020	3	17:00	7:00	42
27	8	11/08/2020	14/08/2020	3	17:00	7:00	42
28	8	11/08/2020	14/08/2020	3	17:00	7:00	42
29	8	12/08/2020	14/08/2020	2	0:00	7:00	14
30	6	14/08/2020	21/08/2020	7	17:00	7:00	98
30	6	26/08/2020	29/09/2020	34	17:00	7:00	476
31	8	14/08/2020	21/08/2020	7	17:00	7:00	98
32	7	14/08/2020	16/08/2020	2	17:00	7:00	28
33	7	14/08/2020	18/08/2020	4	17:00	7:00	56
34	3	14/08/2020	20/08/2020	6	0:00	7:00	42
35	3	14/08/2020	21/08/2020	7	17:00	7:00	98
36	8	21/08/2020	26/08/2020	5	17:00	7:00	70
37	2	26/08/2020	2/09/2020	7	17:00	7:00	98
38	2	26/08/2020	2/09/2020	7	17:00	7:00	98
39	4	26/08/2020	2/09/2020	7	17:00	7:00	98
40	3	4/09/2020	10/09/2020	6	17:00	7:00	84
41	4	4/09/2020	10/09/2020	6	17:00	7:00	84
		Total		403			5,582.5

2.3 Koala SATs

A total of 94 Koala Spot Assessment Technique (SAT) grid surveys were conducted in May to June 2020.

SAT surveys did not identify any signs of Koala, including any scats or scratch markings on tree trunks within the site.

2.4 Koala Detection Dog

Detection dog surveys were conducted by AEP in June and July 2025, covering approximately 15% of the site as per the methodology described in the BAM (2020).

Scats were found at four locations, initially by the detection dog, and subsequently additional scats proximate to the location where the Drone identified the Koala (see below). Additionally, scratches on tree trunks consistent with Koala were also identified in a number of locations by the Ecologist handling the detection dog. Once Koala presence had been confirmed, detection dog surveys were ceased and a Thermal Drone survey was recommended.

Table 3 shows the start time and duration of GPS tracked transects for the detection dog surveys.

Table 3 – GPS data for Koala Detection Dog Transects

Start Date	Start Time	Duration (mins)
9/06/2025	8:28:00	132
10/06/2025	15:22:00	111
12/06/2025	9:09:00	225
16/06/2025	11:05:00	245
17/06/2025	14:34:00	165
18/06/2025	9:10:00	165
22/06/2025	9:18:00	178
24/06/2025	11:08:00	109
26/06/2025	9:32:00	210
8/07/2025	13:08:00	118

2.5 Thermal Drone Survey

Following identification of Koala presence on site by detection dog surveys, Conservation Leaders Pty Ltd were engaged to conduct a Thermal Drone survey targeting Koala across the entirety of Eden Estates land holdings in July 2025.

Drone survey resulted in the confirmed presence of an individual Koala in the western portion of the site to the north of the Link Road. It was concluded by visual observation and photography that there was a high likelihood that the two (2) observations made at different times were of the same individual Koala, and morphology suggested that this individual was a young adult male Koala (Conservation Leaders Pty Ltd, 2025).

3.0 Literature Review

3.1 Local Records

3.1.1 Sugarloaf State Conservation Area Koala Population

Thermal Drone surveys were conducted in 2022 within several reserves across NSW. This included the Sugarloaf State Conservation Area, which is to the west of the M1 Motorway within the Lower Hunter Region.

This survey identified an estimate abundance of 290 individual Koalas, highlighting a viable local population in the Newcastle / Hunter Region (Ryan et al, 2025).

3.1.2 Neighbouring Approved Development

One (1) individual Koala was observed in 2023 on two (2) separate occasions during nocturnal spotlighting surveys within the approved development to the immediate west of the site. This individual was thought to probably be an immature male travelling between populations (MJD Environmental, 2023) (Refer **Attachment A – Figure 2**).

3.1.3 BioNet Records 2005 – 2025

The majority of local records of Koala over the last 20 years occur to the west of the M1 Motorway, within and in bushland contiguous with the Sugarloaf State Conservation area as detailed above. Review of records east of the M1 Motorway and to the north of the West Wallsend / Edgeworth centres can be summarised as either isolate records of single animals in bushland or as roadkill. Some records were noted from areas that have since been mostly cleared and developed as residential subdivisions. (Refer **Attachment A – Figure 2**).

NSW BioNet Atlas records in close proximity to the site (within 2.5km and in the last 20 years) are not indicative of records at a frequency or level consistent with occupation of the area by a resident population. The vast majority of records within the locality occur in the Sugarloaf State Conservation Area and Heaton State Forest to the west of the M1 Motorway (Refer **Attachment A - Figure 2**). Additional records are also present within connected bushland to the north of these areas. Several BioNet atlas records of roadkill or Koala vehicle strikes have been reported along various points of the Motorway suggesting (attempted) dispersal from west to east across the Motorway.

3.2 Koala Dispersal Ecology

Koalas display dispersal behaviour due to competition for space and resources. Dispersal is documented as mainly occurring from June to December, with a peak in September prior to the annual breeding season. Dispersal aids as a mechanism to connect sub-populations for gene dispersal (Dique, 2003). It has been observed within various Koala populations of a male bias for dispersal, particularly within the sub-adult male group (approximately 2-3 years age group). This age group have been reported to disperse from their natal home range to establish in new breeding ranges (“source” and “sink” theory) (Morman et al, 2018). Dispersal is considered important amongst Koala populations as they display polygynous mating behaviour, where strong social pressures and increased sexual behaviour from dominant adult male Koalas forces juvenile and sub-adults to move outside their natal home range (Dique, 2003). Koala populations of higher density show a greater likelihood of sub-adult dispersal, the distance of which varies depending on available resources (Jiang, 2023).

Thompson (2006) conducted a study in South-East Queensland and observed newly weaned Koalas staying within a small component of their natal range over the first year of life and dispersing further away over the following 2-to-3-year period, establishing home ranges close to where they were born. The average distance for juvenile and sub-adult dispersal ranged between 400-1600m annually

(Thompson, 2006). Morman et al (2018) observed maximum dispersal distances for Koalas to reach ranges of 16.8km to 20.3km.

It has been well studied that in areas where there is an abundance of food and shelter resources there is a high degree of home range overlap between males and females, with individuals living in higher densities than areas where there are limited resources (Thompson, 2006). Female Koalas typically have an overlapping home range with 3-5 males in areas where food and shelter resources are not limited (Thompson, 2006). Native Forest along sections of the Newcastle Link Road is relatively intact and offers suitable habitat for Koalas, however, the limited sightings of Koala within this area over the last five (5) years during ongoing detailed ecological surveys suggests that it does not form part of an established and permanently occupied home range as is the case to the west in Sugarloaf State Conservation Area.

Review of the NSW BioNet Atlas records within the locality and the results of the Thermal Drone survey in 2022 demonstrate that there is a notable presence and persistence of Koalas within the Sugarloaf State Conservation Area, which also has connectivity to a wider range of contiguous bushland habitat areas to the north, south and west. The M1 Motorway to the east acts as a notable movement barrier from Sugarloaf to the forest habitat remaining east of the M1. Whilst Koalas will readily seek to cross roadways, it can pose a dangerous journey, particularly when attempting to cross a four lane Motorway. The majority of Koala mortality is linked to roadkill, along with dog attacks and disease, and is recognised as a key threat to Koala populations (Lunney et al, 2022). This is reflective through several NSW BioNet Atlas records of Koala vehicle strikes having been reported along various points of the Motorway within the local area, suggesting historically Koalas have attempted to cross between habitat along either side of the Motorway. Additionally, research highlights that male koalas aged less than 5 years are more likely to cross roads than female koalas, particularly if they have initially been observed within 100m of that road (Lunney et al, 2022). T

It is reasonable to assume that the immature male observed within the site has dispersed from the resident local population of Koalas to the west of the M1 motorway. Such movement would either have involved crossing the actual Motorway, or potentially using underpasses within this area; Richmond Vale Rail Tunnel, Minmi Firetail Underpass and Stockrington Road which all pass under the Motorway.

4.0 Current and Future Habitat Connectivity

The latest Eden Estates Concept Plan proposes to retain approximately 335ha of native vegetation, with the majority of such lands to be managed primarily for conservation purposes under a Biodiversity Stewardship Agreement. This includes the area where the recent Koala sightings occurred, and the suitable Koala habitat therein. The remainder of the site is proposed to be rezoned for residential development and associated uses.

At present, there are intact forest linkages from the Eden Estates site west to the M1 Motorway, with Minmi Road (two lanes) and cleared powerline easements the only notable breaks in that connection. However, much of this area has been previously approved for residential development, and clearing of vegetation has commenced in some areas. The approved developments are to be largely cleared, with only minor vegetated areas remaining as thin linear strips along drainage lines. These areas are also fragmented by proposed roads connecting the approved developments to a wider road network. Limited connectivity from Eden Estates to Blue Gum Hills Regional Park will exist upon completion of approved development to the west, aside from a thin forested link that remains with Summerhill Waste Facility land. Future land use proposals on this site have heralded removal of this section of vegetation

Overall, following clearing of approved development sites along the Link Road, much of the available habitat, and more crucially, viable habitat linkages, will be removed. The effect of such is that Eden Estates land will become largely isolated from the occupied habitat expanse occurring to the west of the M1 Motorway, which would significantly restrict any potential future Koala movement between these two areas (Refer **Attachment A – Figure 3**).

5.0 Analysis Findings

Given the various survey methodologies employed deployed from 2020 until 2024 to meet all relevant survey guidelines that are designed to detect Koala presence, the lack of any sign of Koala during that period would indicate that Koalas were not in all probability likely to have been present on the Eden Estates land during that period. In saying that, given the size of the site and the noted difficulty in detecting Koala through on-ground field surveys, it cannot be categorically stated that Koala(s) were not present on the site during this period.

Given the absence of any suitable remaining Koala habitat and known resident populations therein to the north, south and east of the site, the observed sub-adult male Koala has most likely dispersed from the known population west of the M1 Motorway. That dispersal journey, whilst feasible, faces notable risks including crossing the M1 Motorway which is a four-lane highway with high-speed traffic. Continued movement for any Koalas to the east of Eden Estates land is unlikely, given forest habitat ends once suburbia is reached. Movement south is risky as it involves crossing the Link Road, which is a four-lane road with a central concrete barrier separating east and west bound traffic along the majority of the road. Aside from the possibility of a Koala crossing at the unfenced roundabout, there is no viable habitat connectivity to the Eden Estates land south of the Link Road.

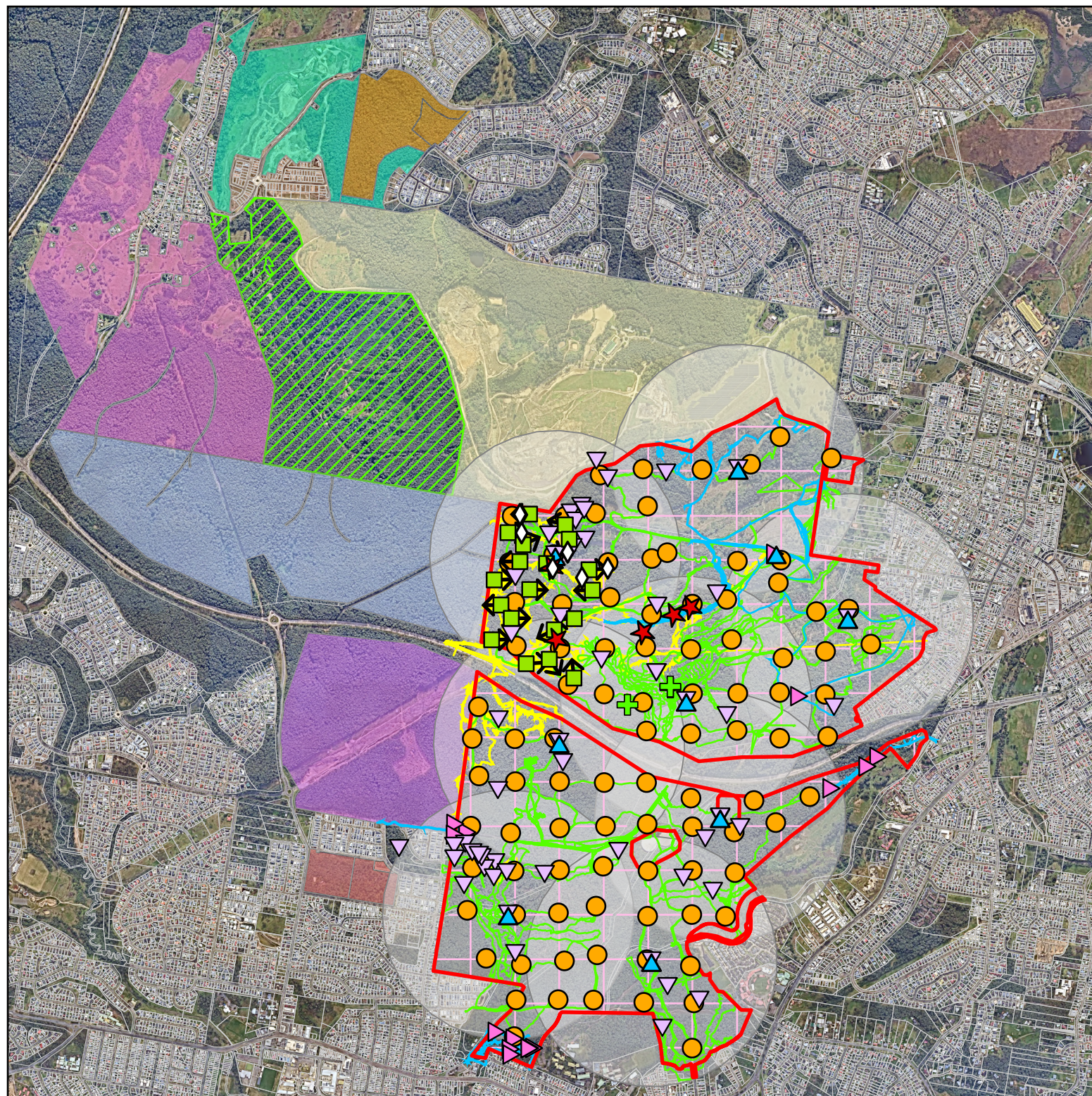
Forest vegetation within the Eden Estates site (approx. 500ha) is more than enough to support the foraging of a single Koala. However, as per the detailed literature review summary above, this dispersing juvenile male may choose to stay, given that the site is unoccupied by mature male Koalas that may force dispersal to occur. However, once the juvenile male Koala reaches sexual maturity, it is likely to seek mating partners, which would mean dispersing back to the west where the only viable habitat linkages remain. The return of juvenile males to their natal range to claim territory from adult males who have died or to compete with territorial males is common (Thompson, 2006).

The possibility of dispersal of a female Koala from the Sugarloaf State Conservation Area population across the M1 Motorway to the east and on to the Eden Estates land was considered, but based on the literature indicating there is less chance of a female undertaking such a dispersal movement, and also the fact that such movement relies on a successful crossing of the M1 Motorway, such an event is considered unlikely.

Based on the review of all available Koala records and a literature review, when applied to the Eden Estates Koala record it is considered most likely that the juvenile male Koala will move westward through current connecting habitat in search of breeding partners at some point in the future. In that regard, the presence of the single sub-adult male Koala in the Eden Estates land is likely to be temporary. As described above, the previous approval of large-scale clearing of forest on approved development sites to the west will in effect largely cut existing habitat linkages eastward to Eden Estates land, and significantly limit any potential Koala movement akin to the likely movement pattern surmised above.

6.0 References

- Anderson Environment & Planning (2024). *Biodiversity Certification Assessment Report for Planning Proposal at Multiple lots, land off Newcastle Link Road, NSW*. Draft Report prepared for Eden Estates (Newcastle) Pty Ltd.
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- Ryan, S. A., Southwell, D. M., Beranek, C. T., Clulow, J., Jordan, N. R., & Witt, R. R. (2025). Estimating the landscape-scale abundance of an arboreal folivore using thermal imaging drones and binomial N-mixture modelling. *Biological Conservation*, 111207.
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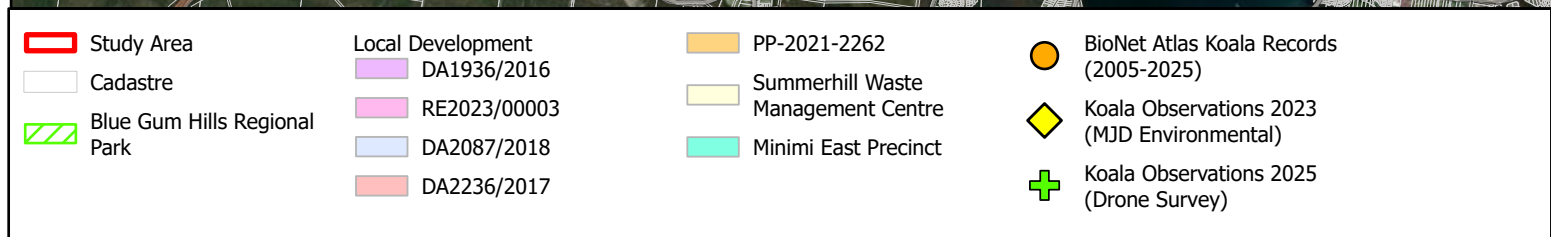
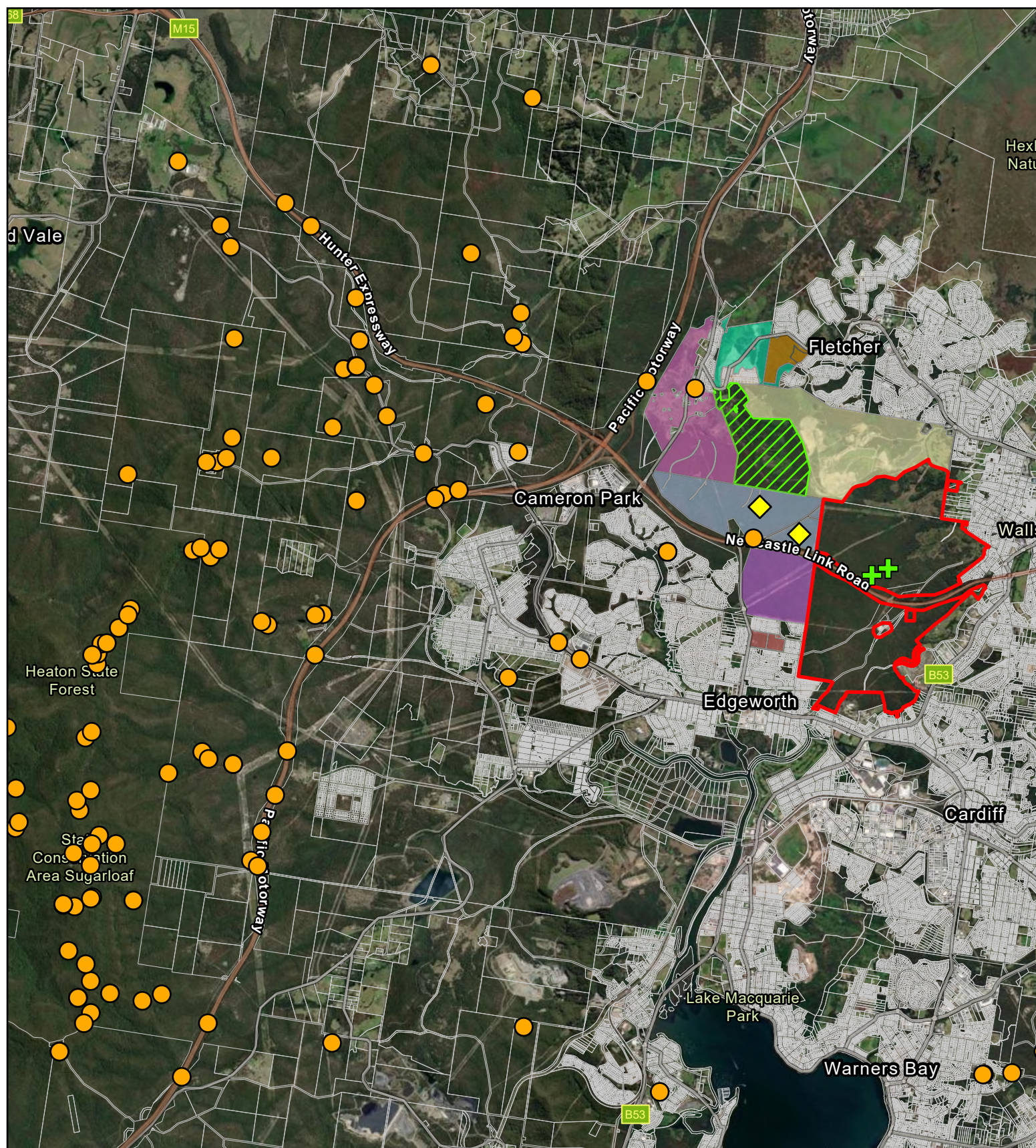


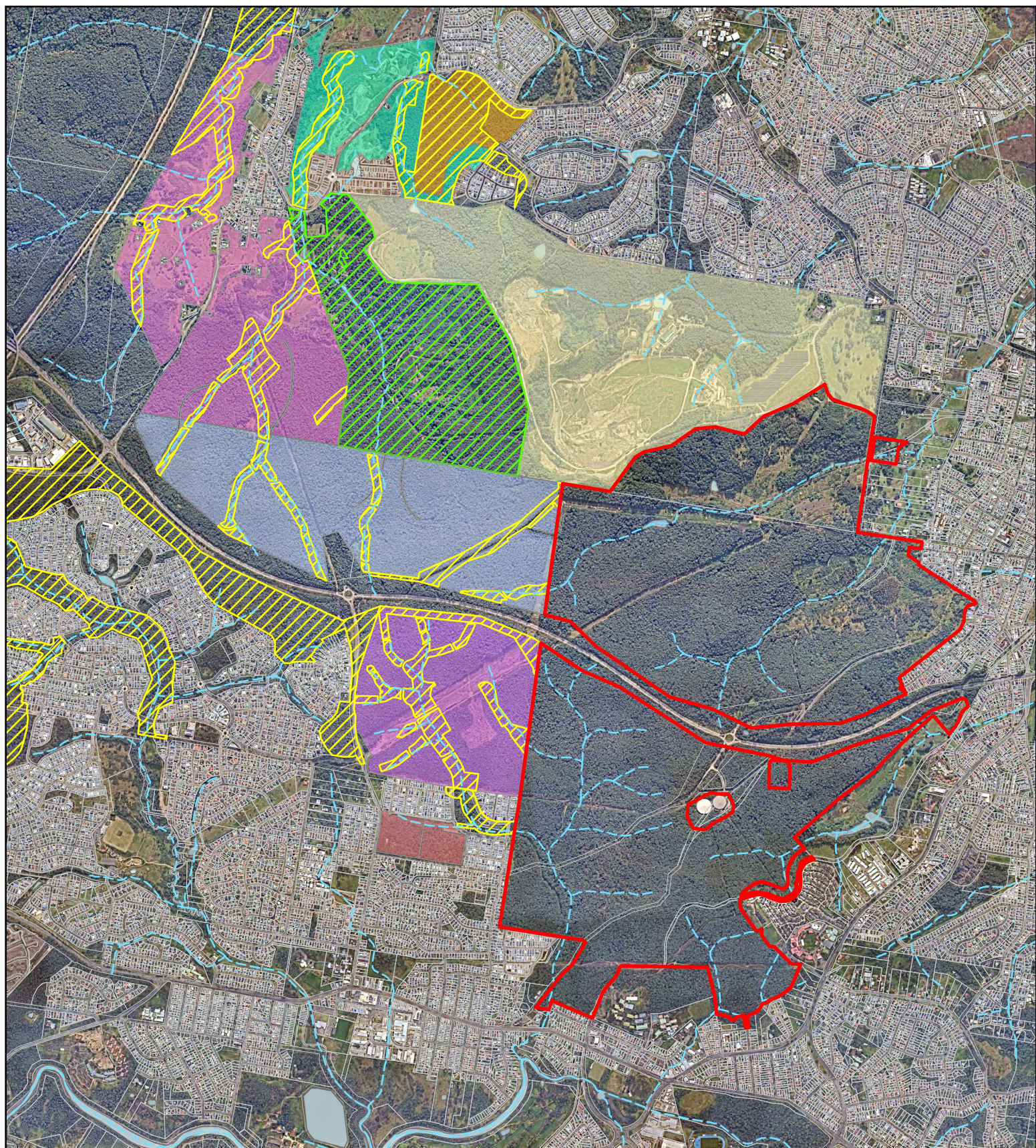
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| Study Area | Summerhill Waste Management Centre | ▲ Koala Song Meter Deployment |
| Cadastre | Minimi East Precinct | ▼ Other Song Meter Deployment |
| Blue Gum Hills Regional Park | — Nocturnal Survey | Song Meter Recording Radius |
| Local Development | — Spot Assessment Technique (SAT) Survey | + Drone Survey Koala Detection |
| DA1936/2016 | — SAT Survey Grid | Dog Detection Transect Start |
| RE2023/00003 | — Koala Detection Dog Survey | → Detection Dog Transect Direction |
| DA2087/2018 | ● Koala SAT Survey (Central Point Tree) | ★ Koala Scat |
| DA2236/2017 | ▶ Call Playback | ◇ Koala Scratches |
| PP-2021-2262 | | |

Figure 1 - Survey Effort

0 510 1,000
m
Scale: 1:30,000







- | | | |
|---------------|-------------------------------|------------------------------------|
| Study Area | C2 Environmental Conservation | DA2087/2018 |
| Cadastre | Blue Gum Hills Regional Park | DA2236/2017 |
| NSW HydroArea | Local Development | Minimi East Precinct |
| NSW HydroLine | DA1936/2016 | PP-2021-2262 |
| | RE2023/00003 | Summerhill Waste Management Centre |

Figure 3 - Future Habitat Connectivity and Local Development

Address: Newcastle Link Road, Wallsend, NSW
Client: Eden Estates (Newcastle) Pty Ltd
AEP Ref: 1971 | Date: 22 August 2025

Imagery: ESRI
Spatial Reference: GDA2020 MGA Zone 56

0 510 1,000
m
Scale: 1:30,000



Disclaimer: While reasonable care has been taken to ensure the information on this map is accurate and up-to-date, errors or omissions may still occur. Please verify the accuracy of all information before use. Note that boundaries are not survey accurate and do not scale off this plan.

State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 4 Koala Habitat Protection

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BC SEPP) commenced on 1 March 2022. The State Environment Planning Policy (Koala Habitat Protection) 2021 was one SEPP that was consolidated within the BC SEPP 2021 under Chapter 4 Koala Habitat Protection. No policy changes were made as part of the consolidation nor did the legal effect of the existing SEPPs, with section 30A of the *Interpretation Act 1987* applying to the transferred provisions. The consolidation was undertaken in accordance with section 3.22 of the *Environmental Planning and Assessment Act 1979*.

The land which comprises the Study Area has no approved Koala plan of management. According to the BC SEPP 2021, the policy applies if:

4.9 Development assessment process—no approved Koala plan of management for land

(1) This clause applies to land to which this Policy applies if the land—

- (a) has an area of at least 1 hectare (including adjoining land within the same ownership), and*
- (b) does not have an approved Koala plan of management applying to the land.*

Review of the information identified that the Study Area comprises approx. 558ha and does not have an approved Koala plan of management. Therefore, Chapter 4 of the BC SEPP applies. As a result, additional assessments are required to satisfy the Development Assessment Process.

However, despite subclauses (3) and (4), the council may grant development consent if the applicant provides to the council –

- a. information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application –*
 - i. does not include any trees belonging to the Koala use tree species listed in Schedule 3 for the relevant Koala management area, or*
 - ii. is not core Koala habitat,*

Site inspections identified that trees belonging to the Koala use tree species listed in Schedule 3 for the relevant Koala management area occur on site.

In regards to identifying the site as core Koala habitat, core Koala habitat is defined as;

- a. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable Koala habitat and where Koalas are recorded as being present at the time of assessment of the land as highly suitable Koala habitat, or*
- b. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable Koala habitat and where Koalas have been recorded as being present in the previous 18 years.*

Highly Suitable Koala Habitat is defined as – Where trees within any PCT are the regionally relevant species of those listed in Schedule 3 for the relevant Koala management area.

Koala Investigation Results

As Koala feed trees were identified on site, additional assessments were undertaken to determine if Koalas were present on site and to determine if the site was core Koala habitat as per the definitions above.

Survey effort for Koalas included:

- Targeted searches including nocturnal searches (April-Sept 2020, Nov 2020, Jan-Feb 2021);
- Spot Assessment Technique surveys using a grid-based systematic approach (250m spacing) (Phillips & Callaghan 2011; DPIE 2020f; DPE 2022b) (May-June 2020);
- Spotlighting and call playback (Apr-Sep 2020, Nov 2020, Jan-Feb 2021);
- Passive Song Meter recording (Mar-Sep 2020);
- Detection Dog survey (June-July 2025); and
- Thermal Drone survey (July 2025).

The survey effort for Koala within the Subject Site is compliant both with the BAM and BC SEPP.

Evidence of Koala scat was detected during detection dog surveys in 2025. Thereafter, Thermal Drone surveys identified a single young male Koala in several locations on consecutive nights in the western portion of the site to the north of Link Road. A Koala Analysis Report was prepared to determine occupation in the immediate area through a detailed literature review and assessment of past local records of Koala and current and future habitat connectivity.

Desktop assessment of local records in BioNet Atlas showed four (4) Koala records, three (3) within 2.5km west of the Subject Site in 2015, 2019 and 2020 and an additional record within 1km to the west of the Subject Site from 2023. These are the only BioNet records within the last 18 years.

Therefore, a Tier 2 Assessment has been undertaken.

Tier 2 Assessment

Part A: Presence of highly suitable Koala Habitat

Determine the PCT (using suitable methods) and if PCT have Schedule 3 listed trees an assessment must be undertaken to determine Koala presence.

PCTs identified within the Study Area are listed in **Table 4** of the BCAR. Trees listed under Schedule 3 of the SEPP occur throughout the site. Therefore, the site is deemed to have highly Suitable Koala Habitat and a Tier Two assessment is required. Targeted Koala surveys were undertaken on site to achieve a comprehensive and compliant survey effort.

Assess BioNet for records - All records within set distance (2.5km OR 5km) in the last 18 years apply. = Core Habitat. Requiring a Part B Assessment to determine Koala presence.

An assessment of BioNet showed four (4) records within 2.5kms of the Study Area within the last 18 years.

Part B Assessment

i) Koala Presence – Spot Assessment Technique, Nocturnal Survey, Call Playback and Songmeter

Table A: Survey Effort

Survey Effort			
Survey type	Actual Survey Period	Survey UOM	Survey Effort
Songmeter	Sept-Nov 2020	Night	278
Spotlighting	Apr-Sept 2020 Nov 2020 Jan-Feb 2021	Person-hour	199.25
Call Playback	Apr-Sept 2020 Sept 2020	Person-hour	86.5
SAT Survey	May-June 2020	250m grid survey	94
Detection dog survey	June-July 2025	100m transects	27.5
Thermal Drone Survey	July 2025	Grid-based survey	N/A

Further detail on survey effort is available in **Appendix D**. Koala scat was identified from detection dog surveys in July 2025, and thereafter a single juvenile male Koala was detected as a result of Thermal Drone surveys.

ii) Koala Records

As stated above, three (3) records area within 2.5km west of the Subject Site in 2015, 2019 and 2020 and an additional record within 1km to the west of the Subject Site from 2023. All records are isolated with only the 2023 record detected in bushland, the remining three (3) were wildlife rehab database records and can be assumed to be wildlife rescue records.

Records within these maximum distances must only be considered after a careful examination of the broader landscape. That is, within areas of contiguous habitat or between areas of habitat with connectivity. For example, a record from 2.5km from the subject site must not be used if natural or artificial landscape features would prevent Koalas from the area with the record ever moving to the site (e.g. due to large rivers, roads, fences or built up areas).

Table B: Koala Assessment

Principles	Criteria	Assessment
Introduction	Describe the nature of the proposed development.	It is proposed to rezone and subsequently develop the Subject Site for residential, public recreation, commercial and general mixed-use purposes. The majority of retained lands (circa 335ha) will be managed under a BSA. Details of native vegetation occurring within the Study Area and proposed to be impacted within the Subject Site are provided in Table 4 of the BCAR.
	Define how the SEPP applies to the proposed development.	Refer above to Tier 1 and Tier 2 Assessment.
Koala habitat values – addressing criteria 1 and 2	Describe the site area, including the general environment and condition, location and extent of the development area and any other areas that may be directly or indirectly impacted by the proposed development.	The site occurs as a former mining site which has been rehabilitated, and otherwise vacant bushland. The land is subject to various types of disturbance (human incursions, rubbish dumping and environmental weed infestation). The location of the proposed development is shown on Figure 1 of the BCAR. Consideration was given to potential indirect impacts via the identification of a 30-meter buffer around the Subject Site. A comprehensive assessment of direct and indirect impacts is provided in Section 2.0 of the BCAR.
	Provide details of Koala survey as undertaken in accordance with Appendix C. This should include details of the results of the Koala surveys, including how the site area meets the definition of core Koala habitat and mapping that shows habitat areas and Koala records within the site area and adjoining areas.	Details of Koala surveys are provided in Appendix D of the BCAR and in the Koala Analysis Report. Surveys included SAT surveys (using a 250m grid), spotlighting, call playback, passive acoustic recording, detection dog surveys and thermal drone surveys. Scat was identified from detection dog surveys in 2025. Shortly thereafter, a single Koala was detected as a result of the thermal drone survey. Given that surveys only detected a single koala despite extensive survey effort over a number of years, and taking the aforementioned other local records into account, it is considered that the site does not form part of the core occupied area of the local population, but rather is a currently connected

Principles	Criteria	Assessment
		habitat area that is available for dispersal of individuals. Vegetation proposed to be retained within the Study Area (circa 335ha) is sufficient to support the single Koala detected, and includes the area where the single juvenile male koala was recorded. However, local approved developments to the west along the Link Road will when cleared and developed effectively remove habitat corridors within the locality, isolating the Subject Site in future from the documented local population occurring west of the M1 Motorway in the Sugarloaf State Conservation Area. (Refer to the Koala Analysis Report).
	Describe the site context (including mapping showing habitat that might be associated with vegetation in the adjoining landscape and records within the vicinity of the site area) and provide an analysis of the Koala habitat values (including how Koalas might use the site area and the relative importance of the site area to a local Koala population).	Nine (9) PCTs were identified within the study area; PCT 1539 – Grey Myrtle sheltered gully dry rainforest in gullies of the Sydney Basin; PCT 1543 - Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley; PCT 1573 – Sydney Blue Gum - Lilly Pilly mesic tall open forest of coastal ranges and tablelands escarpment; PCT 1584 – White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley; PCT 1588 – Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast; PCT 1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter; PCT 1619 – Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands; PCT 1621 – Smooth-barked Apple open forest on coastal lowlands of the Central Coast; and PCT 1737 – Typha Rushland. As mentioned above four (4) BioNet Atlas records within 2.5km in land to the west exist. Three of the records are Wildlife Rehab database records within the Cameron Park area. Given that surveys only detected a single koala despite extensive survey effort over several years, it is

Principles	Criteria	Assessment
		considered that the site does not form part of the core occupied area of the local population, but rather is a currently connected habitat area that is available for dispersal of individuals. Bushland proposed to be retained within the Study Area is sufficient to support the occupancy of a single Koala.
Measures taken to avoid impacts to Koalas – addressing criteria 3, 4, 5, 6, 7 and 8	Describe the site selection process, including how Koala habitat was taken into account and any avoidance outcomes achieved through this process.	Targeted surveys only detected a single koala despite extensive survey effort over a number of years. It is considered that the site does not form part of the core occupied area of the local population, but rather is a currently connected habitat area that is available for dispersal of individuals (namely juvenile males). Bushland proposed to be retained within the Study Area is sufficient to support the occupancy of a single Koala.
	Describe how the proposed development avoids or minimises direct impacts to Koala habitat and habitat function within the site area.	The avoid and minimise process has been undertaken throughout an iterative design process, and the proposal includes protection of 335ha of habitat managed under a BSA throughout the Study Area. The outlook for continued function of the site as Koala habitat into the future is considered dire. Local approved developments to the west along the Link Road will when cleared and developed effectively remove habitat corridors within the locality, isolating the Subject Site in future from the documented local population occurring west of the M1 Motorway in the Sugarloaf State Conservation Area. (Refer to the Koala Analysis Report).
Analysis of potential impacts – addressing criteria 9	Identify the residual direct impacts to Koalas and Koala habitat within the site area, including the nature and extent of impacts and the likely implications for the viability of a local Koala population.	The proposed development will remove areas of suitable Koala Habitat, however 335ha of habitat will be retained and managed for conservation. As per above, the ability of Koalas to physically access this area into the future appears highly unlikely. As such, it is considered unlikely that any activity on the Subject Site will have notable implications on the viability of the local koala population as the site is unlikely to be accessed by Koalas into the future.
	Identify the relevant potential indirect impacts to Koalas and Koala habitat within the site area and adjacent habitat areas, including the nature and extent of	Likely impacts associated with the proposed development include the clearing of approx. 222ha of native vegetation and related habitat,

Principles	Criteria	Assessment
	potential indirect impacts and the likely implications for the viability of a local Koala population.	increased noise and light spill from urban development, vehicle strikes and potential human incursions into stewardship lands. Whilst the proposed retained bushland within the Study Area is sufficient enough to support the occupancy of a dispersing Koalas, accessing the site will become extremely difficult due to approved clearing and development occurring to the west.
Plan to manage and protect Koalas and their habitat – addressing criteria 10, 11, 12 and 13	Describe the management measures that will be implemented as part of proposed construction and operations to manage the direct and indirect impacts identified. These measures should be outcomes focussed and include performance targets.	Retained bushland within the Study Area is to be managed and maintained under a Biodiversity Stewardship Agreement. Areas proposed for clearing and development will be subject to pre-clearing surveys for koalas and native fauna in general, and all clearing will be supervised by Ecologists.
	Describe any compensatory measures that will be delivered, including an analysis of the suitability of these measures against criteria 9 and 10.	Koala biodiversity offset credits will be incurred for any suitable Koala habitat removed. Retained vegetation will be placed under stewardship management, improving habitat conditions should Koalas physically be able access the site in the future.
	Outline a plan for monitoring, adaptive management and reporting against the key outcomes and performance targets.	Not Applicable – a single Koala detection is not evidence of a local Koala population present within the site. Individual is likely to disperse from the site back to the west in search of a breeding partner once sexually mature as per the Koala Analysis Report, assuming that habitat linkages remain in that direction.

Conclusion

Field surveys identified that the site contained highly suitable Koala habitat, which meant further assessment was required. Detailed Koala surveys were undertaken on site and a single juvenile male Koala was detected. Desktop assessment showed that there are only four (4) records of a Koala from 2015, 2019, 2020 and 2023 within the 2.5km of the Study Area. All records can be summarised as either isolated records of single individuals in bushland (with available information confirming such were juvenile males), or wildlife rescue records. Such occurrences appear consistent with the documented dispersal of juvenile male koalas from the occupied population centre west of the M1 Motorway in the Sugarloaf State Conservation Area and surrounds. Records east of the M1 Motorway are not at a level that would indicate the area is regularly occupied by a viable breeding koala population.

Whilst likely that the single individual detected within the site will disperse from the site in future to seek a mate, the proposed retention of more than half of the lands, within which the majority will be managed under a BSA, indicates that mobility and foraging will be preserved within the site should the individual remain. As determined within the Koala Analysis Report, habitat connectivity within the locality to the immediate west will be severely compromised in future as clearing and development of approved

subdivisions therein occurs. The subject site is likely to become effectively isolated from the known local population west of the M1 Motorway within the Sugarloaf State Conservation Area.

Therefore, based on the information presented herein, it was concluded that the Study Area does not constitute Core Koala Habitat as per the SEPP definition of “*where Koalas are recorded as being present*”, indicating multiple Koalas are to be recorded as indicative of a local population. The chances of additional koalas dispersing into the subject site from the west will become increasingly unlikely over time as existing habitat linkages are cleared and cut under existing development approvals.

As such, it is considered that no viable local Koala population is at risk of notable direct or indirect impacts resulting from the proposed rezoning.