68 – 80 O'Connell Street, Caddens
Fauna Management Plan

Caddens Estate Pty Ltd

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Document Tracking

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Abbreviations

Abbreviation	Description
AB	Arborist
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
EGK	Eastern Grey Kangaroo
ELA	Eco logical Australia Pty Ltd
FMP	Fauna Management Plan
HBT	Hollow Bearing Trees
PE	Project Ecologist
SS	Site Supervisor
KMS	Kangaroo Management Strategy
NSW	New South Wales
TEC	Threatened Ecological Community
VMP	Vegetated Management Plan
WSU	Western Sydney University

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1. Introduction

1.1. Purpose of this report

This Fauna Management Plan (FMP) has been prepared by Eco Logical Australia (ELA) on behalf of Caddens Estate Pty Ltd (the applicant). The plan provides management strategies for fauna species within 68-80 O'Connell Street, Caddens (hereafter referred to as the 'subject land').

The FMP adheres to the requirements outlined by Penrith City Council, providing comprehensive measures to avoid and minimise impacts to fauna within the subject land. It specifically addresses the management of the resident Eastern Grey Kangaroo (EGK) population and the protection of hollow-bearing trees (HBTs) within the subject land. The plan includes protocols to safely exclude kangaroo access during development activities and details the vegetation clearing methodology, based on research and specialised knowledge.

1.2. Project description

The applicant proposes to submit a State Significant Development Application (SSDA) which seeks development consent for a mixed-use development (including in-fill affordable housing) comprising a combination of shop-top housing, residential flat buildings and a commercial premises (shop) at 68-80 O'Connell Street, Caddens. The proposed works include site preparation works, excavation, infrastructure, construction of the buildings and associated landscaping works.

Specifically, the SSDA seeks development consent for:

- demolition of an existing at grade car park and structures
- construction of 4 x 4 - 7 storey shop top housing buildings on the E1 Local Centre zoned land (68 O'Connell Street), comprising:
    - 177 residential dwellings
    - ground floor commercial, retail, medical centre and recreation facility (indoor). Fit out and operation of tenancies will be subject to future planning approval.
- construction of a single storey commercial premises (shop) located at the south western corner of the E1 Local Centre zoned land (68 O'Connell Street), comprising two tenancies (which will be subject to future planning approval)
- construction of basement carparking to service the shop top housing and commercial premises located on the E1 Local Centre zoned land (68 O'Connell Street)
- construction of 11 x 4 – 7 storey residential flat buildings on the R4 High Density
- Residential zoned land (80 O'Connell Street), including
    - 305 residential dwellings
    - basement carparking to service the proposed residential flat buildings
- internal roads
- associated infrastructure and services
- retention of Threatened Ecological Community (TEC) area in the north-eastern part of the site
- landscaping and communal open spaces including community park in the north-east,

- communal open spaces throughout and through site links.
- construction of public plaza used for events, markets and community gatherings

The proposal also incorporates 15% affordable housing and seeks to utilise the incentive controls under Chapter 2, Part 2, Division 1, Section 18 of the Housing SEPP to achieve 30% additional building height.

A Clause 4.6 request is submitted as part of this SSDA which addresses the variation from the development standard in regard to building height.

This SSDA also seeks to modify the existing development consent at the site (DA17/0995) pursuant to Section 4.17(5) and Section 4.24(4) of the EP&A Act

The report has been prepared in response to community interest in the fauna present within the land. There are no requirements within the Secretary's Environmental Assessment Requirements (SEARs) dated 14 March 2025 (SSD-80875966) which states an FMP is required.

1.3. Background

The site (also defined as the subject land in this report) is located at 68-80 O'Connell Street, Caddens, within the Penrith City Local Government Area (LGA). It is legally described as Lot 1 and 2 in DP 1268507. The site has an area of 53,941m^2 and is generally rectangular in shape.

The western portion of the site (68 O'Connell Street) currently comprises an approved commercial shopping centre development and associated carpark, commonly known as 'Caddens Corner'. It is zoned E1 Local Centre pursuant to the *Penrith Local Environmental Plan 2010* (PLEP 2010). This portion of the site is subject to a Concept DA (DA17/0995. A portion of 68 O'Connell Street, that is currently used for at-grade carparking, is subject to this SSDA.

The eastern portion of the site (80 O'Connell Street) is a cleared vacant lot, historically occupied by rural residential land uses. It is zoned R4 High Density Residential pursuant to the PLEP 2010. The site itself is not identified as a heritage item; however, it is located to the east of the 'Teacher's residence (former)' (Item 670), a local heritage item which is identified under Schedule 5 of the PLEP 2010.

High biodiversity value land is present at the site at its north-eastern corner, pursuant to the *Biodiversity Conservation Act 2016* (BC Act).

The site is located within the Caddens Release Area within the Penrith *Development Control Plan 2014* (PDCP 2014), and, under the Caddens Release Area Structure Plan, is strategically identified as the precinct centre with adjoining residential areas.

The site is approximately 2.2 kilometres (km) from Werrington Station and 1.8 km from Kingswood Station. It is also well serviced by local buses with stops in proximity to the site along O'Connell Street in both directions.

1.4. Surrounding context

The site is surrounded by established and newly developed low density residential areas of Caddens, Claremont Meadows, Werrington and Kingswood, as envisioned by the Caddens Release Area plan within the PDCP 2014.

A staged residential subdivision for 119 residential lots is located immediately to the north of the site at 46-66 O'Connell Street.

The area is interspersed with a variety of uses, including Western Sydney University (WSU), TAFE NSW and sporting fields.

The subject land is located 5.5 km east of Penrith City Centre and 30 km west from Parramatta CBD

Figure 1: The subject land (Base source: Group GSA)

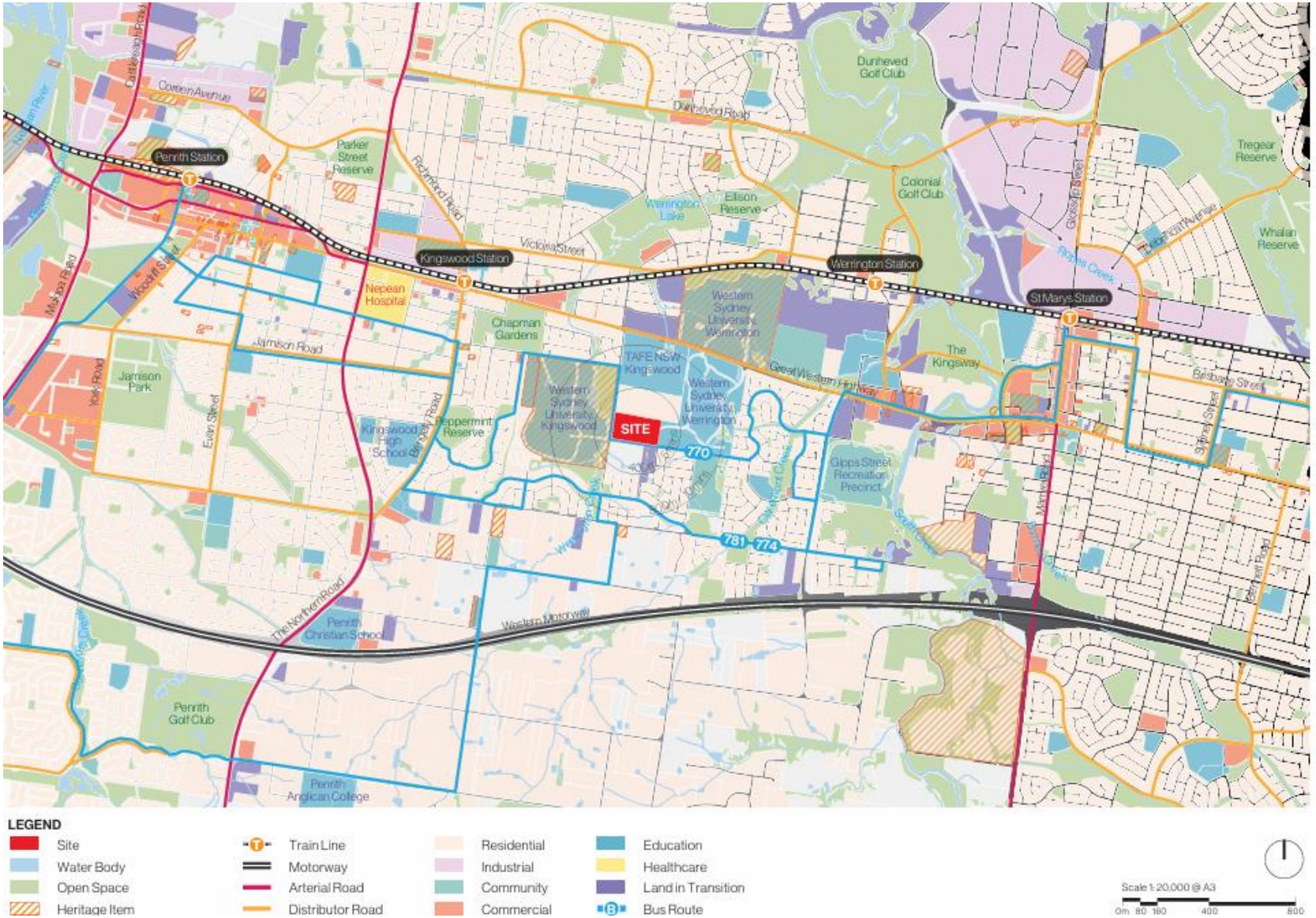

Figure 2: Subject land context (Base source: Group GSA)

1.5. Fauna and habitat within the subject land

ELA is involved in a broader study of the local EGK population and understands that approximately 40 individuals move freely between paddocks, including the current subject land. ELA has recorded EGK sheltering and foraging across the broader landscape, extending north of the Great Western Highway. Other fauna recorded on the subject land include raven nests, arboreal mammals, microbats, Grey-headed Flying-foxes (GHFF), various bird species, and diverse habitat types (ELA 2025).

1.6. Legislative context

Both in New South Wales, and across Australia, EGK are considered common and secure (listed as of 'least concern' under the International Union for Conservation of Nature). In NSW, kangaroos are a 'Protected' species and cannot be harmed under the *Biodiversity Conservation Act 2016* (BC) (Part 2, Division 1 – 2.1).

1.7. Scope and objectives

The overall objective of this FMP is to provide a comprehensive framework to avoid and minimise impacts on all fauna species present on the subject land, with particular emphasis on managing the resident EGK population and protecting hollow-bearing trees (HBTs) within the subject land and adjacent Western Sydney University (WSU) land.

The objectives of the FMP include:

- Kangaroo management objectives
    - Developing and enforcing protocols to safely exclude EGK access to the subject land during development activities, thereby reducing potential harm or displacement of EGK.
    - Conducting kangaroo-specific population surveys to monitor the resident EGK population and assess their utilisation of the subject land prior to work commencement.
    - Providing recommendations for replacement or enhancement of critical habitat features where unavoidable impacts occur.
    - Implementing fencing and exclusion strategies during the construction period to prevent EGK ingress to active development zones.
    - Coordinating and liaising with WSU and other relevant stakeholders to ensure kangaroo management is informed by current research, data, and specialised knowledge.
    - Addressing community concerns by adopting evidence-based kangaroo management strategies aligned with ecological and regulatory requirements.
- Suggestions to co-ordinate and liaise with WSU in relation to the management of the kangaroo population will also form part of the scope. Other fauna management objectives:
    - Conducting pre-construction surveys to identify and document fauna and habitat features across the subject land prior to commencement of works.
    - Implementing robust vegetation clearing methodologies to minimise disturbance and protect key habitat features, especially HBTs.
    - Undertaking pre-clearance surveys and supervised removal of habitat trees to ensure fauna safety and compliance with ecological best practices.

1.8. Preparation and implementation

This FMP has been prepared and reviewed by ELA ecologist/s with over five years' experience in environmental management and a relevant Bachelor of Science degree. The role of the project ecologist, where noted, should be undertaken by a similarly qualified and experienced ecologist.

Figure 3 – Location Map (ELA 2024)

2. Literature review

Relevant scientific literature and management documentation were reviewed in preparation of this document. Given the presence of EGK on the site the literature review sought to ascertain the best practice methods for kangaroo species (Family: *Macropodiformes*) management. The review included white papers, government management plans, and peer-reviewed scientific literature

2.1. Biology and ecology of Eastern Grey Kangaroos

The EGK is common across eastern Australia (Queensland, New South Wales, Victoria and eastern South Australia), being a highly generalist species. They are one of the largest macropods (family *Macropodiformes*), with large sexual dimorphism (females: 20 – 40 kg, ~1 m body length, ~0.8 m tail length; males: 50 – 70 kg, ~1.3 m body length, ~0.8 m tail length). EGK are the largest macropod east of the Great Dividing Range (GDR), with the closely related Western Grey Kangaroo (*M. fuliginosus*) overlapping with the EGK range west of the GDR. The EGK occurs in mobs which vary significantly in size (typically 4 – 50 individuals; (Southwell 1984)), with a fission–fusion social structure (i.e., mobs will join and split over time) (Best et al. 2014). As such, home ranges (around 12 – 40 ha in size) overlap significantly with no evidence of territoriality of habitat. However, EGK maintain social hierarchies, particularly among males, with heavier, larger males dominating mating (Miller et al. 2010).

EGK fluctuate in reproductive success greatly between seasons, influenced by both 'bottom-up' (resource availability) and 'top-down' (predation pressure) process (Robertson 1986; Banks et al. 2000; Poole et al. 2010b; Letnic and Crowther 2013). When conditions are optimal, EGK can breed rapidly, due to several key adaptations:

- Being able to reproduce at any time of the year (though this mostly occurs in late spring and summer);
- A longer than average gestation period compared with other marsupials, resulting in more developed with a higher survival rate; and
- Capabilities for post-partum oestrus, whereby conception can occur immediately after birth, with the newly conceived embryo entering diapause once it reaches the blastocyst stage (Poole and Catling 1974, Poole 1983, Herbert et al. 2006).

These characteristics allow for EGK to have multiple young in succession, with embryonic diapause allowing for rapid increases in population size during optimal conditions (Renfree and Shaw 2000). EGK young are born in a highly altricial state but will remain in the pouch for ~240 – 330 days, resulting in highly developed young upon emergence. Following emergence from the pouch, young will continue to rely on the mother for nutrition and can be weaned when conditions provide for adequate feed (but generally around 18 months of age; (Poole 1975)). Reproduction will commence at around 18 months in females and around 4 years in males (Poole and Catling 1974), with male-only dispersal from the natal home range at around 1 – 2 years after weaning (Russell 1989).

EGK can occur across a wide range of habitat types, but prefer Eucalyptus dominated canopy communities, with dense lateral cover and moderate grass cover (Hill 1981). They are a generalist herbivore, grazing preferentially in grassy woodland habitats (Schmidt et al. 2010) primarily at dawn (up to 2 – 3 hrs after sunrise) and dusk (4 hrs before sunset and 2 – 3 hours after sunset) (displaying crepuscular traits, Kaufmann 1975); though in hot conditions, EGK almost exclusively feed at night (McCullough and McCullough 2000). EGK will spend the remainder of the day sheltering under trees and scrub (Woodward et al. 2006).

2.2. Kangaroo management actions

Across Australia, changes in land use following European settlement have likely expanded suitable habitat for EGK by stabilizing water sources, increasing forest edge habitat preferred by EGK, and enhancing irrigated lands that boost grass biomass, thereby supporting prolonged reproductive periods (Descovich et al., 2016). Historically, kangaroos were considered vermin, with approximately 8 million macropods culled between 1877 and 1907 under a government bounty system, causing severe population declines and leading to regulated harvesting by 1970 (Hrdina, 1977). Contemporary EGK management strategies include culling via shooting, reproductive control, translocation, deterrents, and resource control (Descovich et al., 2016). A description of each of these management actions are provided below.

2.2.1. Culling

Historically, shooting has been the predominant method for controlling kangaroo populations, with approximately 3 million macropods culled annually for both commercial and non-commercial purposes (Descovich et al., 2016). EGK culls are regulated across multiple states using quotas based on annual population estimates, aiming to reduce grazing pressure and crop damage while maintaining viable populations by ensuring reproductive adults can offset mortality (Pople, 2008; Descovich et al., 2015). However, accurate population estimates are challenging due to the species' wide distribution and population fluctuations, potentially resulting in over-harvesting during droughts or under-harvesting in optimal conditions (Pople, 2008). During drought, EGK may pose higher risks to farming due to increased visibility and competition with livestock for limited forage (Pople, 2008). In NSW, commercial take quotas have ranged from 15.5% to 22.8%, translating to 170,800 to 704,010 EGK annually based on 1989–2021 estimates (NSW KMP Quota Report, 2021). The 2020 population estimate for NSW was approximately 4.1 million EGK, with a 15.0% quota allowing 618,092 to be harvested in 2021; population densities vary from 0.12 to 41.8 individuals per km² depending on the region.

Shooting remains the most common lethal control method for both commercial and non-commercial culling, including agricultural conflict mitigation and ecological management, with all lethal control governed by the National Code of Practice for the Humane Shooting of Kangaroos and Wallabies (Descovich et al., 2015). Although culling is sometimes necessary to manage overabundant, malnourished populations, it is generally avoided for ecological and ethical reasons. State guidelines recommend culling only under specific conditions, such as when kangaroos are landlocked by development on unsuitable habitat, populations exceed sustainable numbers, in-situ management is impractical or unsafe, sick or injured individuals require euthanasia, or when individual kangaroos exhibit bold or aggressive behaviour near human communities.

2.2.2. Reproductive Control

Several non-lethal control methods have been employed across Australia, with reproductive control ('fertility control') emerging as a recent and increasingly used approach for managing EGK populations with varying success (Hinds and Tyndale-Biscoe, 1994; Nave et al., 2002; Herbert et al., 2006; Asquith et al., 2006; Kitchener et al., 2009; Tribe et al., 2014). Fertility control targets both males and females through techniques such as surgical sterilisation, hormonal manipulation, and immunocontraception (Nave et al., 2002; Coulson et al., 2008; Herbert et al., 2010; Wilson et al., 2013; Wilson and Coulson, 2016). These methods have been shown to reduce reproductive rates with minimal impact on normal behaviours such as feeding, vigilance, and movement, although they may alter social hierarchies (Poiani et al., 2002). Consequently, fertility control is often considered a more humane alternative to lethal

control, despite inherent risks associated with capture and chemical immobilisation (Tribe et al., 2014; Descovich et al., 2015).

Hormonal contraceptives operate via different mechanisms: synthetic progestins like levonorgestrel inhibit ovulation and are effective for over five years with approximately 87% efficacy, while gonadotrophin-releasing hormone agonists such as deslorelin inhibit ovulation and follicular development, providing 96% effectiveness for around 17 months (Herbert et al., 2006; Herbert et al., 2010; Woodward et al., 2006). Surgical sterilisation offers a permanent reproductive solution for both sexes; however, it is generally impractical for managing large, overabundant populations due to high costs and risks of peri- and post-operative complications (Mosley and Gunkel, 2007; Bauquier and Golder, 2010; Tribe et al., 2014).

2.2.3. Translocation

The intentional translocation of kangaroos to more suitable locations has been widely employed for vulnerable species (Fischer and Lindenmayer, 2000), though it is less commonly used for widespread species like EGK. Translocation is often applied to urban populations that have become or will become isolated due to development, potentially leading to habitat degradation from over-browsing. Due to their fission-fusion social structure, EGKs translocated nearby are likely to interact with familiar individuals, reducing aggressive territorial behaviour compared to other species. Studies of EGKs translocated from development sites in Queensland, tracked via radio telemetry for up to one-year post-release, showed that individuals moved into suitable habitats and established stable home ranges within that period (Higginbottom and Page, 2010). However, translocation can be costly—especially for large populations—and chemical capture and transport pose risks of injury or mortality (Higginbottom and Page, 2010; Tribe et al., 2014; Descovich et al., 2015). Furthermore, in rapidly urbanising areas, finding adequately sized, interconnected green spaces to support translocated mobs is increasingly challenging.

2.2.4. Reduction of habitat suitability

Local over-abundance of EGK can be reduced by decreasing the suitability of habitat to the species. This can be done by either reducing the access to key resources, or by using auditory or olfactory deterrents in areas to discourage EGK from entering or staying in an area. EGK naturally fluctuate substantially with changes to food and water availability. However, in agricultural and urban settings, artificial water sources are often available, regardless of climatic conditions, and food supply increased by irrigating of land or via supplementary feeding of livestock, particularly during drought. The modification of the environment can potentially lead to prolonged periods suitable for EGK reproduction, resulting in population increases.

By removing access to resources, EGK reproduction may stabilise or decrease, or they may move into more suitable area; though these strategies are rarely tested, and some evidence suggest that kangaroo abundance is not correlated with the presence of artificial water sources (Letnic and Crowther 2013). Removing water points and access to edible grasses and herbs can encourage dispersal of EGK and discourage EGK from moving into an area in a cost effective and non-invasive way. Preliminary habitats use surveys during the establishment phase have primarily focused on organisation, planning, and the construction of an effective animal-proof fence (Pedler et al., 2018).

Deterrents can also be used in areas where EGK are unwanted. Ultra-sonic frequency or novel auditory devices have been used to frighten or discourage fauna from areas where they may cause property damage (such as in agricultural areas) or may cause traffic accidents (main roads). Ultra-sonic frequency auditory devices have been shown to have limited effectiveness on kangaroos (Bender 2003) however, with either no response, or rapid habituation to these noises, until no changes in behaviour are observed

(Ramp et al. 2011). Alternative novel sounds, such a conspecific foot thumps, have shown to be more effective in deterring EGK from area (Bender 2004), though their long-term effectiveness is unknown.

Odour deterrents may also be used to discourage kangaroos from entering areas. Of the limited studies available, Parsons and Blumstein (2010) found that after 10 days of dingo odor treatment (using both urine and faeces), many macropods avoided the area entirely. This is most likely to be effective when deterrents are placed at entry / exit locations and would require ongoing management to replenish deterrents.

3. Field surveys

ELA has conducted multiple field surveys targeting resident fauna and habitat within the subject land, these efforts include:

- Fauna habitat surveys were undertaken by ELA Ecologist Belinda Failes for the Biodiversity Development Assessment Report (BDAR 2025a) in 2022.
- Vegetation surveys including fauna habitat searches were undertaken by ELA Restoration Ecologist Andrew Norvill for the Vegetation Management Plan (VMP) in 2023 (ELA 2025b).
- Targeted fauna surveys of the local EGK population were undertaken by ELA Ecologist Jake Webb and Eliott Poulier in February 2024.

The results of all survey efforts provide an overview of the significant fauna habitats present on the subject land and offer a detailed analysis of the local EGK population.

3.1.1. Fauna habitat within the subject land

The field surveys conducted within the subject land, including the VMP area, identified multiple habitat features including four hollow-bearing trees (HBTs) and a raven. Of which, the HBTs are recommended for retention in-situ. One HBT will be removed for the proposed development and requires supervision by a fauna ecologist (refer to Section 4.2.

A remnant patch of vegetation, located in the northern portion of the subject land provides connectivity to the adjoining landscape, supporting habitat for a range of fauna species, including a mob of EGK that frequent the subject land to graze and shelter within the VMP area. However, the vegetation within the subject land is fragmented and does not support a viable population of EGK. Consequently, it is imperative that targeted management measures be implemented prior to any on-ground activities to ensure habitat connectivity and to mitigate potential adverse impacts.

3.1.2. Eastern Grey Kangaroos population analysis

Field surveys to assess the resident EGK population of the local area were undertaken by ELA in February 2024. Methodology comprised of systematic walking transects conducted for two morning sessions (within two hours post-sunrise) and two evening sessions (within two hours pre-sunset). Surveyors recorded demographic data including numbers of males, females, and juveniles. While direct access to adjacent WSU land was precluded, EGK presence on WSU land was documented from vantage points within the subject land and neighbouring areas.

Observations indicated presence of EGKs both within the subject land, indicating utilisation of multiple habitat patches and movement across the landscape. Additionally, EGK were found to prefer habitats dominated by dense native grasses, which provide essential cover and foraging resources. Behavioural data revealed a diurnal pattern of movement, with individuals dispersing onto adjacent eastern lands during daylight hours and returning to vegetated refugia within the subject site during the evening.

The survey outcomes, estimate an average population size of approximately 36.5 individuals across all survey sessions. The population demonstrated a consistent female bias and stable juvenile representation, whereas male numbers exhibited some variability. Recorded interactions, including few instances of sparring among dominant males, do not indicate any evidence of aggressive competition, suggesting a stable social hierarchy and resource availability within the population.

4. Fauna management

Prior to commencing any clearing activities, the developer must undertake the measures outlined in this FMP detailed below in Table 1.

The highest priority is first implementing the Kangaroo Management Strategy (KMS), detailed in Section 4.1, to fully exclude the EGK population from the subject land and work boundary. This exclusion will establish the work area as a safe zone, prioritising the welfare of displaced kangaroos by directing them to suitable alternative habitats.

Once the objectives of the KMS have been achieved, clearing and other works can proceed in accordance with the FMP schedule, detailed in Section 4.2, to manage other potential biodiversity impacts.

Table 1: FMP implementation schedule

Measures	Objective	Timeframe	Responsibility*
Kangaroo Management Strategy	Excluding EGK from work zone during construction activities	Prior to commencement of works	SS, PE
Preclearing survey	Inspect and map fauna habitat Determine number of hollows	One week prior to clearing works	PE
Nestbox installation	Preserve fauna habitat	Prior to clearing works	PE, AB
Exclusion zones	Avoid indirect impacts on the retained vegetation	Prior to clearing works	SS
Phase 1 vegetation Clearing (non-habitat)	Isolate habitat features	Maximum of one week after the preclearing survey	PE
Soft tapping on HBTs	Encourage potential existing fauna to self-relocate.	24 hours before commencement of habitat clearing	SS, PE
Phase 2 vegetation Clearing (HBTs)	Relocate potential existing fauna and cleared habitat.	24 hours after tapping habitat trees Minimum of 48 hours after completion of Phase 1	PE, AB

**SS: Site Supervisor; PE: Project Ecologist; AB: Arborist*

4.1. Kangaroo management strategy (KMS)

The KMS is designed to systematically exclude the resident EGK population, prior to commencement of any works using a phased approach that aligns with their natural behaviour, minimises disturbance, and ensures their continuous welfare. The total implementation time is approximately eight weeks. The strategy comprises the following three phases:

1. Preliminary assessment
2. Exclusion zones
3. Monitoring and maintenance

The KMS is outlined in Table 2 with actions identified in Table 3.

Table 2: KMS implementation schedule

#	Measures	Description	Objective	Timeline	Responsibility*
	Phase 1 – Preliminary assessment				
1	Initial population assessment	EGK count and foraging behaviour survey	Identify optimal timing with minimal disturbance to erect exclusion fencing and map key grazing areas and watering holes.	Prior to any works	PE
2	Habitat management	Vegetation mowing and waterhole infilling	Reduce habitat suitability by managing grazing areas and infilling water sources. Recommend creating alternative favourable habitat features ex situ (e.g., new watering holes) to provide refuges isolated from human activity.	After measure 1. Maintain mowing until completion of phase 2	PE
3	Follow-up population assessment	Repeat EGK count and foraging survey	Assess changes in habitat utilisation to inform phase 2 implementation.	At least 2 weeks after measure 2, and 1 week before commencement of phase 2	PE
	Phase 2 – Exclusion zones				
4	Installation of exclusion fencing	Erect EGK-specific perimeter fencing	Establish physical barriers around the subject land perimeter, maintaining open eastern side for kangaroo movement. Supervise installation and conduct regular inspections.	To be determined post phase 1	PE, SS
5	Guided herding operations	Controlled herding by ecologists	Facilitate slow, coordinated movement of mobs from west to east boundary using a gap-free line. Employ temporary fencing if necessary.	Afte completion of measure 4	PE, SS
6	Access control	Install permanent fencing and access gate	Construct a permanent kangaroo barrier on the eastern boundary and install a two-way gate on Third Avenue for controlled vehicle access.	Same day as measure 5	PE, SS
	Phase 3 – Monitoring and maintenance				
7	Exclusion zone monitoring	Regular inspection of barriers during construction	Ensure exclusion zones remain secure, and kangaroo movement is effectively controlled throughout construction.	Throughout construction period	PE, SS

**SS: Site Supervisor; PE: Project Ecologist; AB: Arborist*

Table 3: KMS actions

#	Measures	Actions
	Phase 1 – Preliminary assessment (approximately four weeks duration)	
1	Initial population assessment	Conduct detailed EGK counts and foraging behaviour surveys during the dry season to establish baseline data and identify key habitat areas for exclusion fencing.
2	Habitat management	Implement vegetation mowing and waterhole infilling to reduce on-site habitat suitability. Explore creation of alternative refuges off-site to encourage natural dispersal.
3	Follow-up population assessment	Repeat population and behaviour surveys three weeks after habitat management to assess changes and inform subsequent exclusion actions.
	Phase 2 – Exclusion zones (approximately three weeks duration, to be confirmed after Phase 1)	
4	Installation of exclusion fencing	Erect EGK-specific perimeter fencing around the subject land, maintaining an open eastern side to allow for controlled movement during herding. Exclusion fencing which should be based on the Guidelines for Managing Overabundent Kangaroos (BCT 2023) and the Catalogue of fence design (DAFF 2025) to meet the following specifications: • Be chain-link (cyclone) fencing or deer mesh (also known as K wire) • Not be ring-lock-style fencing (which is an entanglement hazard) • Be high-tensile, heavy galvanised wire • Be at least 2.0 m high (deer mesh is produced in this size) • Have no barbs, loose or open wires • Be completely free of holes and gaps in, and under, the fence to stop EGK trying to escape, and to stop them being injured. • Temporary fencing will be used dynamically to segment areas and facilitate controlled kangaroo movement during herding. • Prevent gaps at the base of the fencing by: - Having a secured mesh apron - Embedding the fence - Grading the fence line to eliminate dips. - Using crushed rock or concrete footing underneath - Installation and regular inspection will be supervised to ensure barrier effectiveness. Barriers near roadways (Great Western Highway, on southern extent) should be installed first to prevent EGK access and reduce vehicle collision risks
5	Guided herding operations	Qualified fauna Ecologists will conduct controlled herding, moving EGK mobs from the western to the eastern boundary in a coordinated, slow-moving, gap-free line. Temporary exclusion fences will be employed as needed to manage dispersal and isolate cleared zones.

#	Measures	Actions
6	Access control	Herding activities will replicate natural movement based on movement patterns determined in Section 2.3 and Phase 1. Ecologists will systematically guide EGK from west to east, moving slowly and cohesively to reduce stress and allow rest periods. Should EGK disperse unexpectedly, temporary fences will isolate cleared zones, with the process repeated until the subject land is fully vacated. A permanent exclusion fence will then secure the eastern boundary, complemented by a two-way access gate to manage subject land entry without compromising barrier integrity.
	Phase 3 – Monitoring and maintenance (Continuous throughout the entire construction period)	
7	Exclusion zone monitoring	Throughout the construction period, regular inspections and maintenance of all exclusion fences and barriers will be conducted to ensure effective containment of the EGK population and prevent breaches. In the event of any breaches, ecologists/wildlife rescuers will be contacted immediately to safely remove any EGK that have entered the subject land.

4.2. Preclearing survey

The applicant must engage a project ecologist (PE) to undertake a pre-clearance survey of the subject land, including all vegetation that will be cleared and structures to be demolished to identify fauna habitat features. This is to be completed at least one week before commencement of any vegetation clearing activities to identify remaining potential fauna habitats. These surveys aim to delineate key habitat features such as HBTs, patches of large logs with evidence of fauna use.

Habitat features include habitat trees, log piles, stags, dens and burrows. Habitat trees are considered any tree with a hollow > 1 m above ground level, as well as trees harbouring nests or containing decorticating bark. Habitat features should be inspected for signs of fauna occupancy or present fauna from the ground via visual inspections using binoculars for those above eye level and a held torch for those features close the ground. The number of tree hollows identified during the pre-clearance survey will determine the required number of nest boxes.

The location of habitat features will be recorded using a handheld GPS (accuracy of 5-15 m) and marked with high visibility spray paint or flagging tape. Marked habitat features should be left undisturbed until all other vegetation within the subject land is cleared, at which point they may be removed under the supervision of a qualified ecologist.

During the preclearing survey the following details should be recorded:

- Location:
    - Locations of all habitats features within the clearance footprint by GPS and with flagging tape and/or spray paint
- Habitat feature description:
    - Habitat feature ID
    - Type (Hollow, stag, nest, den, burrow (etc.)
    - Tree species / building
    - Number of hollows and size class of each hollow: Small (S) = < 10 cm; Median (M) = 10-20 cm; Large (L) = 20-30 cm; Extra-large (XL) = >30 cm
- Other signs of occupancy (if present), such scratch marks, faeces and nesting material
- Suitable fauna relocation sites within the retained vegetation

4.2.1. Exclusion zones

An exclusion zone is a designated 'no-go' area that is clearly identified and securely fenced to protect native vegetation and fauna habitats, minimize the spread of weeds and disease, and reduce the chance of fauna entering construction zones. These zones also define approved clearing boundaries and areas where temporary fauna exclusion measures are implemented. Exclusion zone fencing should prevent machinery from entering this zone and contain signage along the fencing.

4.2.2. Habitat management

Habitat management can be used to passively reduce habitat usage, particularly in grazing areas and watering holes frequented by the resident EGK population within the subject land. Measures such as clearing grazing vegetation and infilling watering holes within the boundary, combined with enhancing

habitat features off-site—such as creating new watering holes and additional foraging and sheltering habitat can help manage the ingress of kangaroos.

Additionally, supplementing retained vegetation with artificial habitat such as nest boxes provide supplementary breeding habitat and shelter for hollow-dependent fauna when hollow-bearing trees are removed.

4.2.3. Nest box installation

Based on the pre-clearance inspection results, the PE will determine the number of nest boxes required at a ratio of two nestboxes per hollow removed (2:1). The PE will identify target species, and recommend suitable installation areas within the retained vegetation, prior to commencement of clearing activities. Nest boxes should be installed on retained trees within the VMP in the north of the subject land. They should be selected to match the likely target species of the original hollows and installed prior to clearing works to allow fauna to relocate naturally or be safely moved.

Nest boxes should be monitored bi-annually for a minimum period of two years. At the end of the monitoring period, all damaged or missing nest boxes should be replaced

4.3. Clearing supervision

Following the completion of the pre-clearance survey, vegetation classified as non-habitat may be cleared (Phase 1) under ecologist supervision. Additionally, 24 hours before habitat clearing, marked habitat trees should be gently tapped using the bucket of an excavator or loader to encourage resident fauna to self-relocate prior to clearing.

Clearing of habitat features (Phase 2) should begin at least 48 hours after the removal of all other vegetation. Schedule clearing of HBTs outside the microbat breeding season (October–February) and winter torpor period. Habitat trees should be cleared in the following process:

- Prior to commencement of clearing works, all habitat features should be inspected for fauna occupancy.
- HBTs should be felled by an arborist in one to two meter sections, beginning at the top of the crown, roping, sectioning, and lowering the hollow sections to the ground for inspection by the ecologist.
- Felling stags/habitat trees into the zone of disturbance to avoid damaging adjacent vegetation.
- Conducting post-clearing checks to ensure no fauna are trapped or injured, relocating any found to nearby retained habitat.
- If native fauna is identified within the subject land, the Fauna Rescue and Release Procedure found in Appendix A and Appendix B must be adhered to.
- All fauna found during clearing activities will be relocated within the retained vegetation.
- Exercise caution when operating equipment near retained vegetation.
- Distribute logs from felled trees into retained vegetation areas where fire risk is minimal to provide habitat for ground-dwelling fauna. Hollows will be relocated to nearby bushland or VMP area for reuse as hollow-bearing logs.

During habitat clearing supervision, the following details should be recorded for each fauna encounter:

- Habitat feature details: ID, type and location.

- Fauna encountered: species, count, age class and fate.
- Relocation site.

These fauna management procedures are consistent with the BDAR (ELA 2025a) and VMP (ELA 2025b) and adhere to relevant guidelines, including the NSW Department of Planning, Industry and Environment's Code of Practice for Injured, Sick and Orphaned Protected Fauna (OEH 2011) and the Office of Environmental Heritage's Policy on the Translocation of Threatened Fauna in NSW (DPIE 2019).

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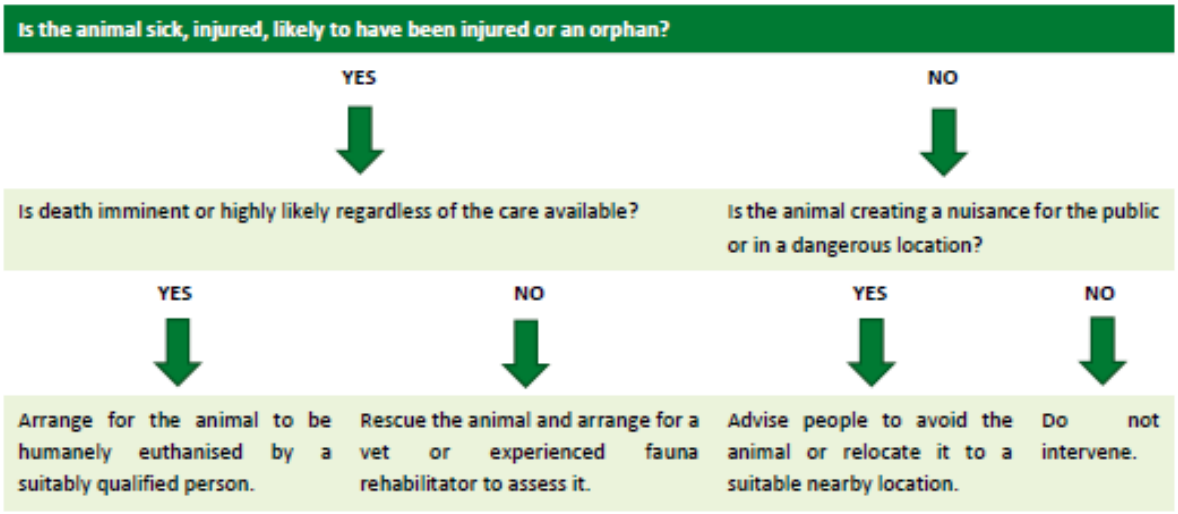
Appendix A : Fauna Rescue and Release Procedure

The following Fauna Rescue and Release Procedure has been prepared in accordance with the NSW Department of Planning, Industry and Environment, 2011, Code of Practice for Injured, Sick and Orphaned Protected Fauna.

NATIVE FAUNA ENCOUNTER

If native fauna is encountered during pre-clearance or clearance surveys, the decision tree outlined in Table A1 should be adhered to.

Table A1: Decision tree on how to respond to a native fauna encounter



RESCUING OF NATIVE FAUNA

If rescuing the animal is chosen to be the most suitable option, the following must be adhered to:

- Assessment of all risks to fauna from environmental hazards and from capture.
- Confirmation that the correct rescue equipment for the type and size of fauna is at hand.
- Confirmation that enough trained personnel for that species and size are present.

TRANSPORTATION OF RESCUED NATIVE FAUNA

When transporting the rescued native fauna to a veterinary surgery or rehabilitation facility such as WIRES, the following must be adhered to:

- Ensure transport methods and container sizers are appropriate for the species, size, strength and temperament of fauna. This may include incorporating padding walls and ensuring no ingestible surfaces are present. Containers must also be designed and positioned so breathing is not restricted.
- Transportation containers are kept as an appropriate temperature for the species (note a range of 25 – 27oC is appropriate for most species and ages;31oC is appropriate for unfurred joeys and 21oC is appropriate for echidnas, platypuses and frogs).

- Transportation containers are well ventilated.
- Ensure containers holding snakes and bats include a visible warning label outlining the danger.
- Ensure transportation containers are not left in the back of uncovered utility vehicles or car boots.
- During transportation, adult fauna should not be fed or watered during trips lasting less than a few hours. The dependent young may require feeding during shorter trips.
- Attain approval by a veterinarian before using medication to facilitate transport.
- Ensuring fauna transport is the sole purpose of the trip.

RELOCATION OF NATIVE FAUNA

If the encountered native fauna does not require rescuing, however, is required to be located outside of the construction site, A suitable environment must be identified prior to relocation, containing appropriate habitat and adequate good resources, as such the following must be adhered to:

- It is occupied by members of the same species.
- Does not place the animal at a high risk of injury.
- It is not outside of an area which the fauna would not normally cross (i.e. brush-tail possums rarely move more than 50 m; however, wombats have a radius of approximately 50 km).

Appendix B : Unexpected Threatened Species Find Procedure

If a threatened flora or fauna species is unexpectedly encountered within the subject land, the following procedure should be followed:

Table B1: Decision tree on how to respond to an unexpected threatened species find

Has a threatened flora or fauna species unexpectedly been encountered?	
YES	
STOP WORK and notify the Site Supervisor and Project Manager. The Project Manager is to notify NSW DCCEEW. Is an impact likely to occur?	
YES	NO
Consult with NSW DCCEEW and obtain approvals, licences or permits as appropriate[1] Recommence works once advice is south and necessary approvals, licenses and permits are obtained.	Recommence work and maintain regular inspections.