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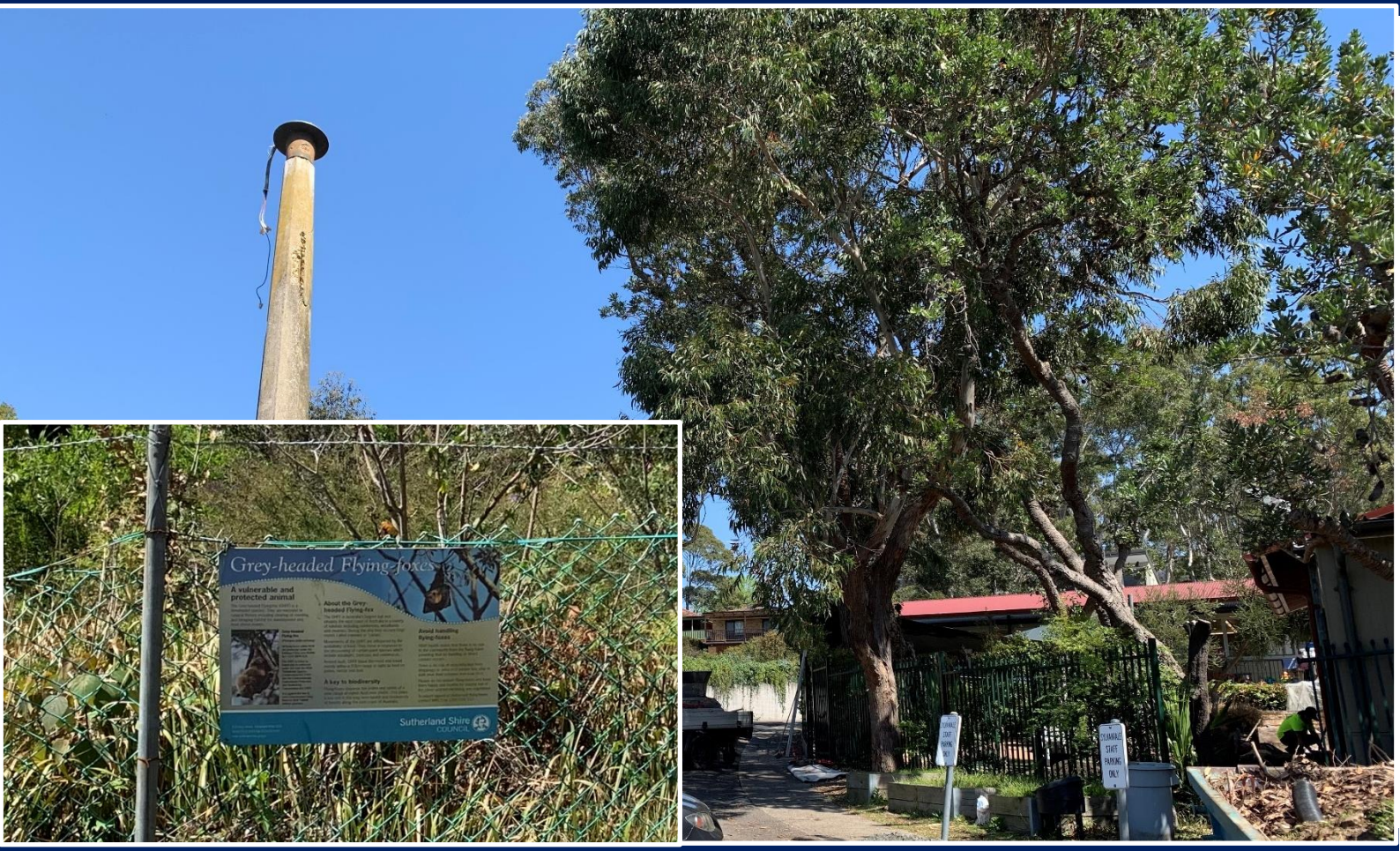
Grey-headed Flying-fox Fauna Management Plan



Lot 1142 // DP 752064 and Lot 1 // DP 225581, 147 Garnet Road, Kareela, NSW 2232

Proposed rezoning and future development

Prepared for: Wynne Planning

17 August 2022 Version: 1.6 –Final

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PREPARED FOR	Wynne Planning			
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Glossary and abbreviations

Abbreviation	Description
APZ	Asset Protection Zone
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DoE	Commonwealth Department of the Environment (now DAWE)
DoEE	Commonwealth Department of the Environment and Energy (now DAWE)
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GHFF	Grey-headed Flying-fox
ha	hectares
LGA	Local Government Area
mm/cm/m/km	millimetres/centimetres/metres/kilometres
NFFMP	National Flying-Fox Monitoring Program
SSLEP	Sutherland Shire Local Environment Plan

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1 Introduction

This Fauna Management Plan (FMP) has been undertaken for the proposed rezoning and future development of Lot 1142 // DP 752064 and Lot 1 // DP 225581 (147 Garnet Road), Kareela, New South Wales, hereafter referred to as the study area (**Figure 1.1**).

The subject site is situated within the study area and includes the area that will be directly impacted by the proposed rezoning and potential future development, including the Asset Protection Zone (APZ). *Pteropus poliocephalus* (Grey-headed Flying-fox (GHFF)) have been observed roosting in a registered camp in an adjacent lot to the southeast (Ecoplanning 2020; DAWE 2020) (**Figure 1.2**). Numbers of GHFF in the camp are frequently in the 2,500 to 10,000 range, however, most records during 2019 were in the 500 to 2,500 range (DAWE 2020). Camp numbers are known to fluctuate and there are records noting that at certain times of the year the camp can be empty. During an inspection of the camp on 17 March 2022, GHFF were observed roosting between 5 m and 10 m above ground level, with the resident population numbers on the day of the survey between 90 and 140 individuals. However, a more recent inspection of the camp (12 August 2022) failed to record any individuals or evidence of recent use.

The purpose of this plan is to identify measures and detail a clear set of protocols that will minimise potential impacts to the GHFF during demolition, construction and operation that will be undertaken for the above project to maintain the quality and integrity of the camp (DECC 2007). Measures have also been proposed that will reduce the likelihood of disturbance of residential areas by the GHFF. Measure have been proposed for the two possible scenarios; GHFF present at the time of demolition and construction and, GHFF absent at the time of demolition and construction.

This FMP has been prepared in consideration of the following relevant plans and strategies regarding the GGFH:

- Commonwealth of Australia (CoA) (2015) Referral guideline for management actions in Grey-headed and Spectacled Flying-fox camps
- Office of Environment and Heritage (OEH) (2018) Flying-fox camp management policy 2015
- Commonwealth of Australia (CoA) (2017) Draft National Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*).

This FMP will:

- identify times of year when the GHFF may be more susceptible to disturbance
- nominate start and end times for workers
- describe appropriate monitoring of the camp during time when excessive dust or noise will be generated
- preferentially retain winter flowering *Eucalyptus* sp. and *Corymbia* sp.
- include triggers for stop work
- outline a monitoring program (**Appendix A** and **B**)
- propose mitigation measures which will be incorporated into the building and landscaping design to minimise disturbance from resident to the GHFF and vice versa.

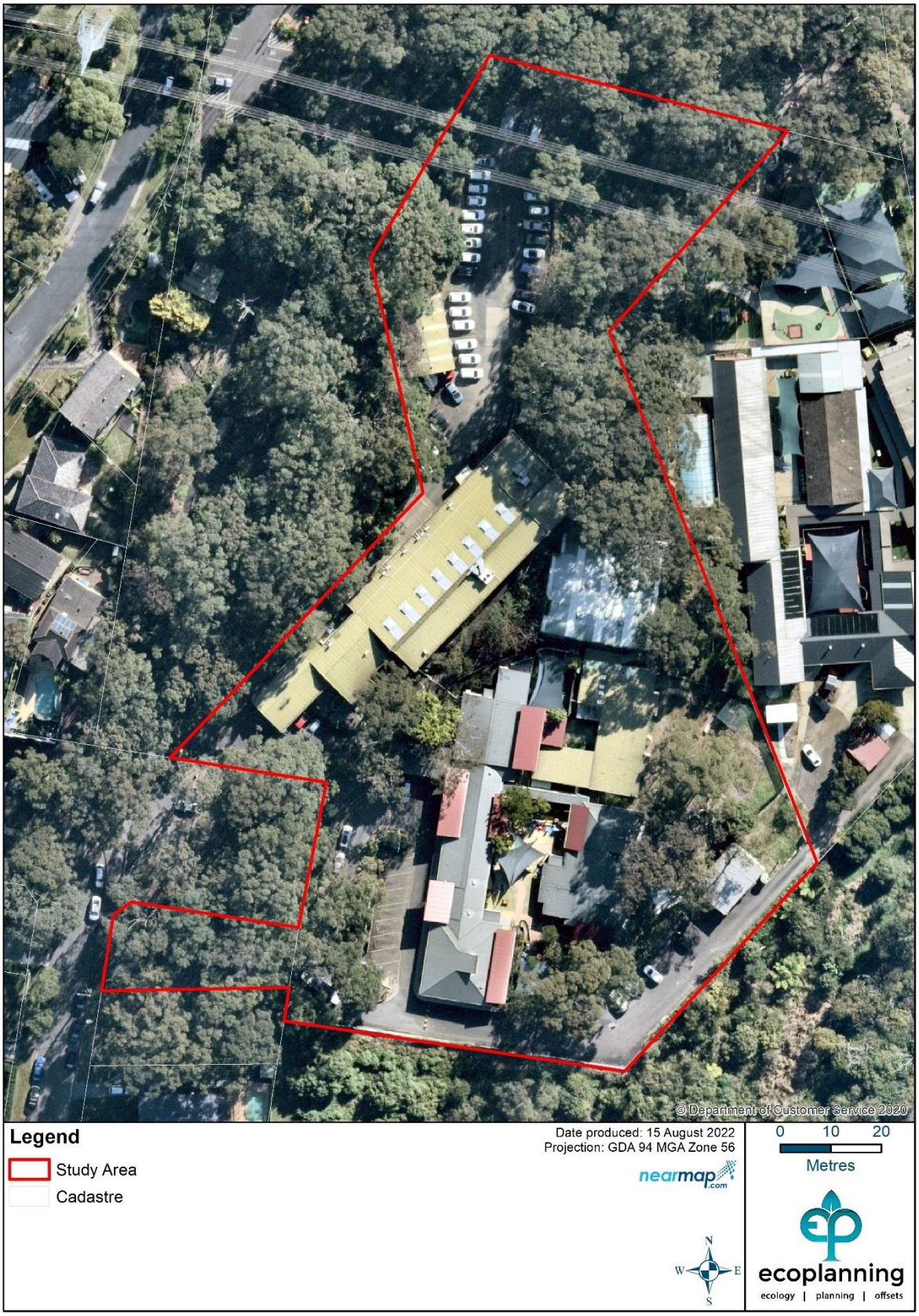

Figure 1.1: Study area

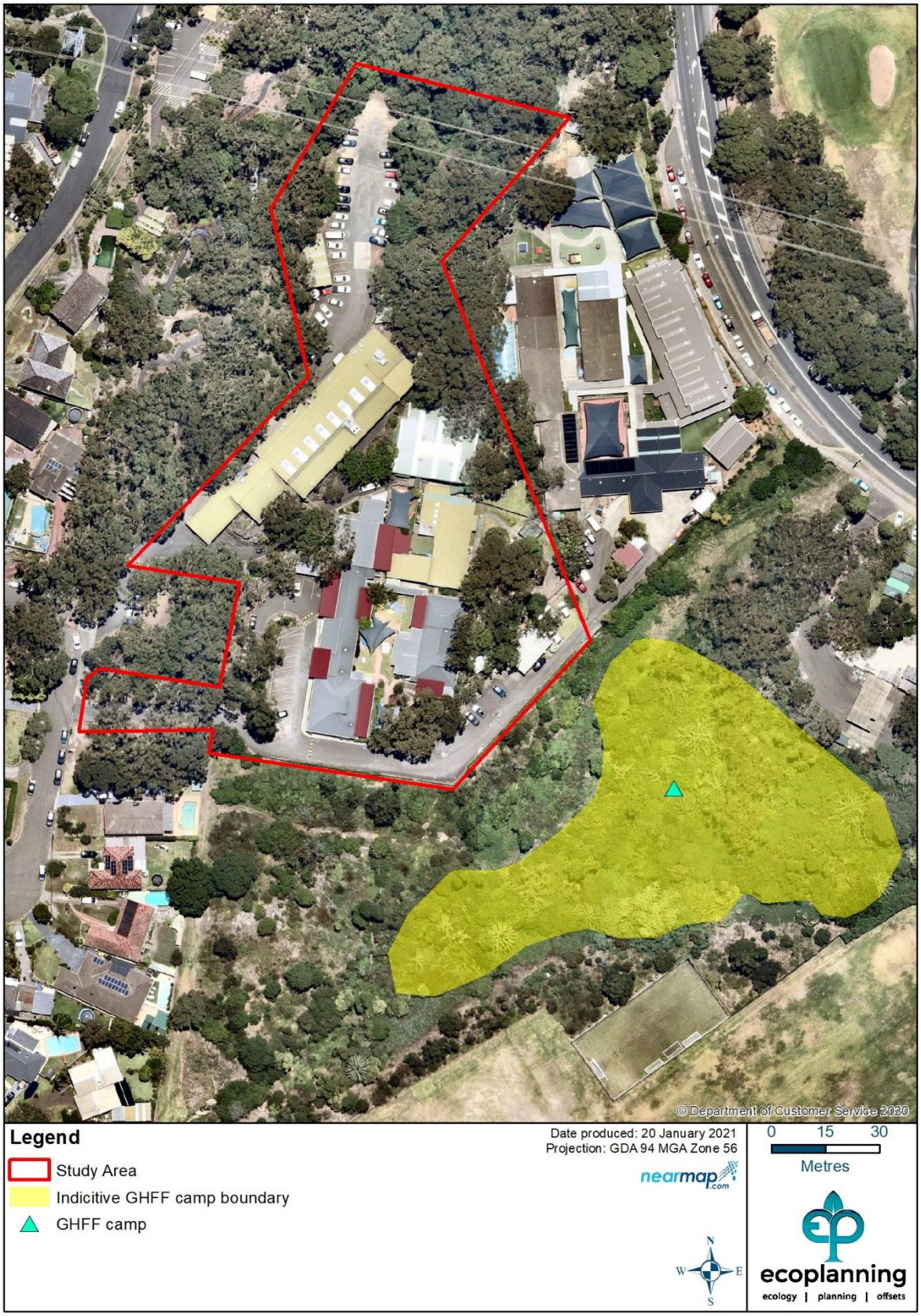

Figure 1.2: Grey-headed Flying-fox camp in relation to the study area

2 Description of the project and study area

The proposed development includes the rezoning of the study area to R2 Low Density Residential with the provisions of R3 Medium Density Residential applying to height and floor space ratios. The proposal includes the development of residential units on part of the study area and the retention and continued operation of the Childcare Centre in its current position (**Figure 1.1**).

The study area comprises 1.46 hectares (ha) of land, is situated in the Sutherland Shire Local Government Area (LGA) and is currently zoned as SP2 Special Purpose Infrastructure under the Sutherland Shire Local Environmental Plan (SSLEP) (2015). The central portion of the site is mostly occupied by buildings, roads and carparking areas, while on the boundaries of the site, native vegetation is present. A Childcare Centre is located in the southern portion of the study area.

The subject site is situated within the study area and includes the area that will be directly impacted by the proposed rezoning and potential future development, including the Asset Protection Zone (APZ).

The proposed rezoning and future development will remove up to 0.48 ha of fauna habitat (i.e. structural complexity, leaf litter, outcropping rock) within the study area. This provides potential shelter, forage and roosting habitat for a suite of fauna, including birds, bat and arboreal mammal species. A GHFF camp is present adjacent to the study area on Council land.

The area within 5 km of the subject site includes urban areas, recreational open space and remnant bushland. Adjoining the study area is residential development on the western boundary, a council reserve to the south, Joseph Banks Native Plants Reserve to the north and Bates Drive Public School to the east. Native vegetation within 5 km of the study area is primarily associated with the Royal National Park to the south and steep valleys in the west. Vegetation within the study area has been validated by Ecoplanning (2020) as Coastal Enriched Sandstone Dry Forest (**Figure 2.1**).

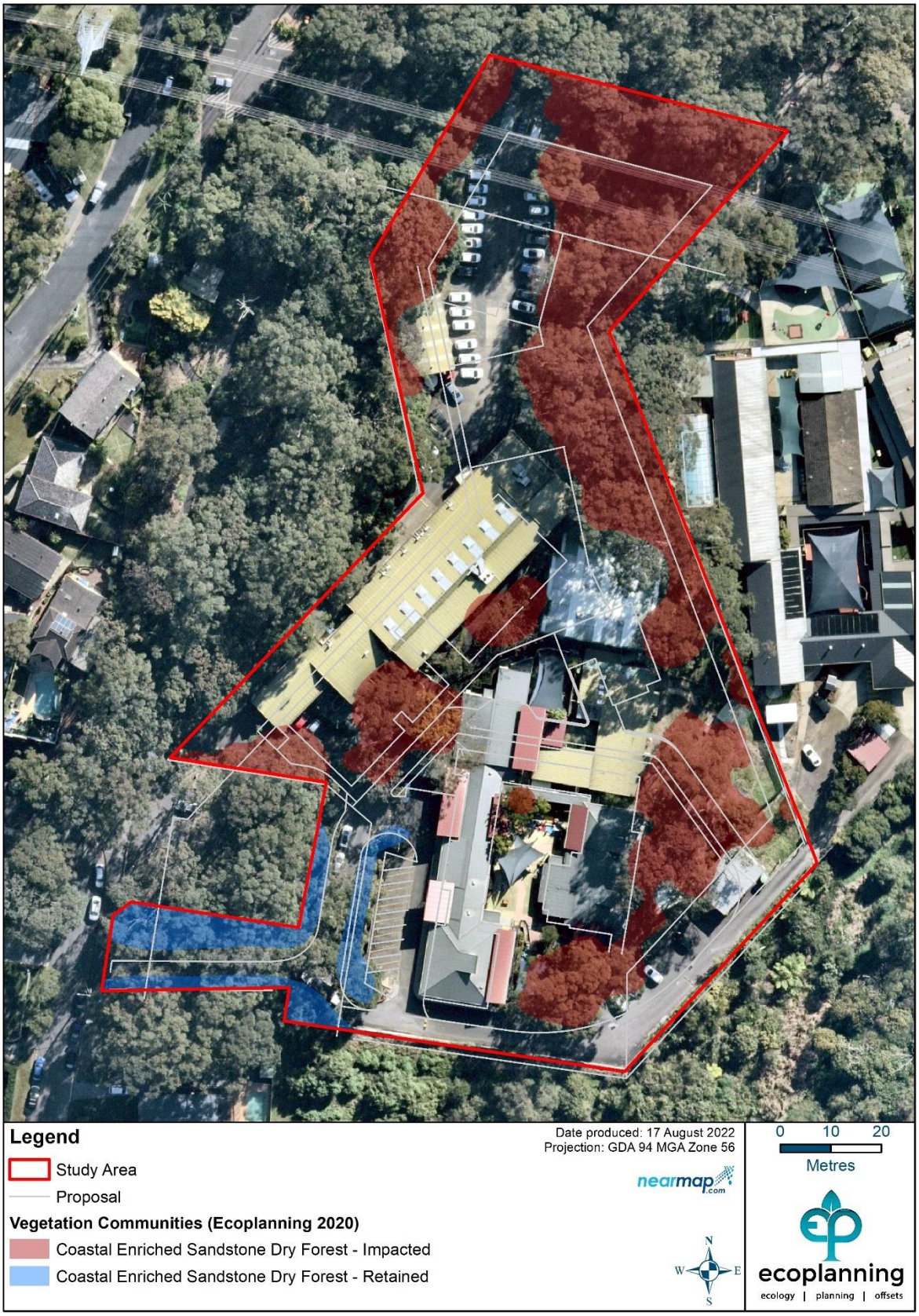

Figure 2.1: Validated vegetation map and impacts

3 Management measures

This section outlines the proposed management measures to be undertaken before and during demolition and construction. **Appendix C** lists particular external construction activities that apply to Zone A of the study area (refer to zone map in **Appendix D**). **Table 3.1** and **Table 3.2** outline the actions and triggers for the period prior to demolition and construction and the period of demolition and construction, respectively. Given the vagrant nature of GHFF, there is the possibility that the camp map be vacant at the commencement of demolition and construction. Consequently, a set of measures applicable to this scenario have been provided in **Table 3.3**.

Table 3.4 outlines the mitigation measures that will operate during the operational phase of the project. It should be noted that some of these measures, such as design features, the use of specific building materials and the installation of specific lighting, will be installed during the construction phase. However, the effect of the mitigation measure occurs during the operational phase.

Specialist lighting (Lighting, Art, Science 2020) and noise (Koikas Acoustics 2020) reports were commissioned as part of the preparation of the FMP to determine the current and perceived future noise and lighting levels at the site and develop appropriate mitigation measures. After-construction lighting has been determined to represent one third of the current vertical illuminance in the non-curfew time and less than one tenth in the curfew time (Lighting, Art, Science 2020).

The noise assessment concluded that future domestic noise sources emanating from the new building development is unlikely to impact the GHFF colony and that the proposed building development can be sufficiently insulated against noise generated by the nearby GHFF colony through the use of standard building materials and will satisfactorily reduce noise and meet the nominated noise criteria (Koikas Acoustics 2020).

Further, given the presence of a nearby school and childcare centre (located closer to the GHFF colony than the proposed development), it is not expected that domestic noise sources from the subject site will exceed those that are existing from the childcare centre. As such, it is unlikely that future domestic noise sources will impact on the GHFF colony (Koikas Acoustics 2020).

Typical construction noise levels to the nearby GHFF colony were determined. It is anticipated that GHFF will be impacted by construction activities during the daytime when the GHFF are roosting. A number of acoustic mitigation measures have been proposed including moveable screens, exhaust silencers, conducting high-noise generating activities outside sensitive periods (Koikas Acoustics 2020). The suite of noise mitigation measures to be used during construction will be determined at the DA stage and in consultation with Council.

The main potential impact to the GHFFs in the Kareela camp would come from production of noise and dust when GHHFs are more vulnerable (pregnancy, birth and before young can fly). Consequently, the key management measures proposed involve the prohibiting of demolition during October and November and avoidance of any demolition during the months of the year that coincide the GHFFs more vulnerable period (September to March). In addition, start and

end times for workers are proposed which minimise potential impacts on returning and departing GHFFs and monitoring by a qualified ecologist is proposed throughout the works.

The acoustic assessment concluded that noise from the GHFF colony is not significant and naturally ventilated rooms are expected to achieve the 'open windows' noise criteria commonly adopted for external noise intrusion assessments (Koikas Acoustics 2020).

It was observed by Koikas Acoustics (2020) that noise impacts during the dusk exodus of the colony was predicted to be of a higher noise level, as most of the colony left at once. In the morning period when the GHFFs returned, it was more staggered and will therefore have a lower noise impact, despite the occurrence during a more noise sensitive period.

Disturbance from GHFF returning to their habitat is considered less intrusive than their departure, as the GHFFs tend to return in smaller groups, over a longer period. The noise period for departing GHFF is during dusk which is a period when most people are undertaking noisy domestic activities and therefore unlikely to be perceived as intrusive to their ambient sound amenities (Koikas Acoustics 2020).

Typically, windows and doors would be shut during the early morning return period for GHFF. However, air conditioning will be installed as part of the proposal for those occasions where it may be required as an alternative to open windows and doors.

The following definitions are important for the understanding and implementation of this management plan:

- **Heat Stress** - heat stress is more likely to occur when maximum temperatures are above 28 degrees Celsius, with low humidity and high winds (CoA 2015; DoEE 2017)
- **Food Stress** - food stress occurs when large numbers of low body weight individuals are reported by wildlife cares (WIRES) in the area (CoA 2015)
- **Population Stress** - when 1.5% of the national population has been reduced in the year prior to the proposed action, determined by checking the National Flying-Fox Monitoring Program (NFFMP) (http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring).

General mitigation measures that should be considered as part of impact assessments for future developments include:

- Increase spacing between powerlines to avoid potential electrocution of GHFFs (DoEE 2017).
- Avoid planting new vegetation species within the study area that would encourage the GHFF to use the study area and, therefore, be more susceptible to other negative impacts
- Future landscape planting of the study area should use flora species characteristic of Coastal Enriched Sandstone Dry Forest (Ecoplanning 2020)
- Implementation of noise and lighting mitigation measures to reduce disturbance to the GHFF camp.

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Table 3.1: Mitigation measures prior to demolition and construction

Stage: Prior to demolition and construction	**Objectives: Establish protected areas so that disturbance to the camp during demolition and construction is minimised.**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Engage an ecologist for the implementation of this FMP with knowledge and experience relevant to the management of flying foxes.	N/A	Landowner/Developer	Prior to commencement of works	CoA (2015), OEH (2016)
Avoid the degradation of the quality of habitat within the GHFF camp by implementation of a VMP for the study area which aims to control weeds, in particular Lantana (*Lantana camara*) and Lady of the Night (*Cestrum parqui*)	Study area	Landowner/Developer	Prior to commencement of works	OEH (2018), OEH (2016)
Install protective fencing around retained winter-flowering *Eucalyptus*, *Corymbia* and *Ficus* species, which provide potential foraging habitat for the GHFF.	Study area	Landowner/Developer	Prior to commencement of works	OEH (2018)
Do not stockpile materials, or vehicle or allow pedestrian access, within the protective fencing.	Identified protected areas	Landowner/Developer/Ecologist	Prior to commencement of works	N/A
Inform all workers about this FMP and the mitigation measures.	N/A	Landowner/Developer/Ecologist	Prior to commencement of works	OEH (2018)
Install signage at entrance to the study area and on the border between the study area and the GHHF camp with information on the GHFF, timing and noise restrictions from this FMP, direction to not touch GHFF and to call WIRES if injured, orphaned or dead GHFF are observed.	Study area	Landowner/Developer	Prior to commencement of works	OEH (2016)

Stage: Prior to demolition and construction	**Objectives: Establish protected areas so that disturbance to the camp during demolition and construction is minimised.**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Prepare leaflet and communicate with neighbours regarding the project and FMP.	Study area	Landowner/Developer/Ecologist	Prior to commencement of works	OEH (2018)
Replace barbed wire with normal wire on fences surround the study area.	Study area	Landowner/Developer/Ecologist	Prior to demolition	CoA (2017), ELA (2013)
Determine if the national population is in a period of stress according to the NFFMP.	N/A	Ecologist	Prior to commencement of works	CoA (2017), OEH (2018)
Liaise with Sutherland Shire Council staff to understand the “normal” behaviour of the GHFF camp.	N/A	Ecologist	Prior to commencement of works	N/A
Liaise with Sutherland Shire Council staff regarding current monitoring of the Kareela GHFF camp	N/A	Ecologist	Prior to commencement of works	N/A
Ecologist to inspect camp to see if GHFF present and determine whether measures in **Table 3.2** or **Table 3.3** apply.	GHFF camp	Ecologist	Three days prior to commencement of works.	N/A

Table 3.2: Mitigation measures during demolition and construction if GHFF present

Stage: During demolition and construction	**Objectives: Minimise disturbance to the resident camp population particularly in times of stress**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Demolition and external construction (as defined in **Appendix C**) must not be undertaken in Zone A (refer to Zone Map in **Appendix D**) during the key breeding period when GHFF are birthing young. Noting that the breeding season and time when young are born may vary slightly between years, the breeding activity of resident GHFF will be determined by an expert assessment (ecologist or flying fox expert). If GHFF are in the late stages of pregnancy and/or birthing young demolition works must cease. An ecologist or GHFF expert will determine when and how works can recommence.	Zone A Kareela GHFF camp	Ecologist/Landowner/Developer	September to November	CoA (2017), OEH (2016, 2018), pers comm. SSC (2020)
Demolition and external construction (as defined in **Appendix C**) should not be undertaken in Zone A (refer to Zone Map in **Appendix D**) when young are flightless. If works are required in this period, consult with experts who will determine the monitoring frequency and actions.	Zone A Kareela GHFF camp	Ecologist/Landowner/Developer	November to March	CoA (2015), ELA (2014), pers comm. SSC (2020)

Stage: During demolition and construction	**Objectives: Minimise disturbance to the resident camp population particularly in times of stress**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Workers must not commence demolition and external construction (as defined in **Appendix C**) until 30 minutes after GHFF have returned in the morning to roost in the camp to avoid disturbance, which must be at least 1 hour after sunrise (EPBC Condition 4). A suitably qualified ecologist must be consulted to identify the fly in/fly out pattern of the camp monthly from April to August, and forecast the earliest time work can commence each work day, which must be at least 1 hour after sunrise (EPBC Condition 4).	Study area	Developer/Ecologist	Prior to commencement of work each day	OEH (2016)
Workers are to cease demolition and external construction work (as defined in **Appendix C**) no less than 30 minutes before GHFF leave the camp in the evening to avoid disturbance to GHFFs, which must be at least 1 hour after sunrise (EPBC Condition 4). A suitably qualified ecologist must be consulted to identify the fly in/fly out pattern of the camp monthly from April to August, and forecast the earliest time work must cease each work day, which must not be until at least 1 hour after sunrise (EPBC Condition 4).	Study area	Developer/Ecologist	At the end of work each day	OEH (2016)

Stage: During demolition and construction	**Objectives: Minimise disturbance to the resident camp population particularly in times of stress**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Conduct daily briefing regarding the GHFF camp and mitigation measures	Study area	Developer	Prior to commencement of work each day	OEH (2016)
During demolition and external construction works (as defined in **Appendix C**) an ecologist will inspect the GHFF camp to determine any signs of stress twice per week (with the inspections spread approximately evenly across the week, where possible). Signs of high levels of stress are observed panting, GHFF spreading saliva or GHFF located within 2 m of the ground.	Kareela GHFF camp	Ecologist/Sutherland Shire Council	Prior to commencement of work each relevant day.	OEH (2016), pers comm. SSC (2020)
Do not undertake demolition works or external construction (as defined in **Appendix C**), prior to consultation with Council, if the population is in a period of stress.	N/A	Ecologist/Developer	Prior to commencement of works	CoA (2017), OEH (2018)
Do not lop or remove trees when GHFF are in them or within 30 m and / or are likely to be harmed. This only applies to GHFF in the study area and does not include the adjacent GHFF camp.	Study area	Ecologist/Landowner/Developer	During demolition	CoA (2017), pers comm. SSC (2020)

Stage: During demolition and construction	**Objectives: Minimise disturbance to the resident camp population particularly in times of stress**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Cease production of noise if more than 30% of the camp takes flight and/or more than 10 animals are circling for more than 3 minutes. These behaviours are signs of stress in the GHFF camp management plan and can cause fatigue in the camp.	Kareela GHFF camp	Ecologist/Developer	When required	OEH (2016)
Cease production of noise if individuals in the GHFF camp are exhibiting signs of stress (i.e. observed panting, spreading saliva or located within 2 m of the ground).	Kareela GHFF camp	Ecologist/Developer	When required	OEH (2016)
Once GHFFs have stopped being agitated, recommence work, while continuing to monitor. An ecologist or GHFF expert will determine when works can recommence	Study area and Kareela GHFF camp	Ecologist/Developer	When required	OEH (2016)
If GHFFs continue to be agitated after work recommencement, liaise with Council for next steps.	Study area and Kareela GHFF camp	Ecologist/Developer	When required	N/A
If GHFF are present within the development area, a qualified ecologist must be used to 'nudge' them out of the area prior to demolition and external construction activities (as defined in **Appendix C**) continuing. Nudging should be done just prior to daylight (when GHFF are returning to camp) to avoid inadvertent dispersal.	Study area	Landowner/Developer/Ecologist	During demolition and construction	ELA (2014), OEH (2016), pers comm. SSC (2020)

Stage: During demolition and construction	Objectives: Minimise disturbance to the resident camp population particularly in times of stress			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Nudging refers to low intensity disturbance to encourage GHFF to move away from certain areas. This involves standard dispersal tools such as noise, smoke and visual deterrents, but at a lower intensity. A potential nudging route should be identified prior to work. The nudging should commence one hour before dawn for 10 minutes followed by a 5 minute break to observe dispersal direction. Cease nudging 30 minutes before dawn or if GHFF show signs of stress (see above). Determine where the GHFF have been nudged to and continue monitoring for an hour after sunrise to ensure re-establishment does not occur. Nudging activities must not be undertaken if a suitably qualified ecologist identifies: i. heavily pregnant GHFF females (in last trimester) are present. ii. flightless young GHFF are present; or iii. signs of stress and /or disruption to GHFF is detected, An ecologist or GHFF expert could be consulted to discuss permissible works and when works can recommence.				

Stage: During demolition and construction	**Objectives: Minimise disturbance to the resident camp population particularly in times of stress**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Undertake tree lopping, trimming or removal under the supervision of a suitably qualified ecologist. This applies to habitat trees and hollow bearing trees.	Study area	Landowner/Developer/Ecologist	Prior to demolition	OEH (2018)
A number of construction noise mitigation measures have been suggested in the Acoustic Report (Koikas Acoustics 2020) and include exhaust silencers on motorised plant and equipment such as the excavators and the use of moveable screens. Silenced plant and equipment could lower noise emission from the exhaust system by 5 to 10dB. The use of moveable screens for specific work practices could achieve noise reductions if required. The screens should be moveable because sound sources are not stationary on a construction site. The appropriate noise mitigation measures to alleviate known or potential impacts on GHFF, will be discussed with the ecologist, GHFF expert and Council.	Study area	Landowner/Developer	During demolition and construction	Koikas Acoustics (2020)

Table 3.3: Mitigation measures during demolition and construction if GHFF absent

Stage: During demolition and construction	**Objectives: Monitor for return of GHFF**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
An inspection of Zone A is to be undertaken to ensure no GHFF are present in the camp.	Zone A Kareela GHFF camp	Ecologist/Landowner/Developer	Weekly from late August until February.	CoA (2017), OEH (2016, 2018), pers comm. SSC (2020)
A suitably qualified ecologist monitor the camp weekly to ensure no GHFF fly into or begin using the camp following the commencement of demolition or construction If GHFF are seen entering the camp, works must cease immediately and the provision of **Table 3.2** would apply.	Study area	Developer/Ecologist	Weekly from late August until February.	OEH (2016)
Conduct daily briefing regarding the GHFF camp and mitigation measures and ensure all staff are aware of actions required should a GHFF return to the camp.	Study area	Developer	Prior to commencement of work each day	OEH (2016)
Undertake tree lopping, trimming or removal under the supervision of a suitably qualified ecologist. This applies to habitat trees and hollow bearing trees.	Study area	Landowner/Developer/Ecologist	Prior to demolition	OEH (2018)

Stage: During demolition and construction	**Objectives: Monitor for return of GHFF**			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
A number of construction noise mitigation measures have been suggested in the Acoustic Report (Koikas Acoustics 2020) and include exhaust silencers on motorised plant and equipment such as the excavators and the use of moveable screens. Silenced plant and equipment could lower noise emission from the exhaust system by 5 to 10dB. The use of moveable screens for specific work practices could achieve noise reductions if required. The screens should be moveable because sound sources are not stationary on a construction site. The appropriate noise mitigation measures to alleviate known or potential impacts on GHFF, will be discussed with the ecologist, GHFF expert and Council.	Study area	Landowner/Developer	During demolition and construction	Koikas Acoustics (2020)

Table 3.4: Mitigation measures during operation

Stage: During operation	Objectives: Minimise disturbance to the resident camp population particularly in times of stress			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
A light assessment has been undertaken to assess the current light emission and layout on site and predict the likely lighting emissions post construction. A third party is to undertake an artificial light audit post construction.	Study area	Landowner/Developer	Prior, during and post-construction	CoA (2020)
The mitigation measures proposed by the lighting consultant will result in after construction lighting that would represent one third of the current vertical illuminance in the non-curfew time and less than one tenth in the curfew period. These measures adhere to the requirements of Environmental zone class 'A2' (AS/NZS4282).	Study area	Landowner/Developer	Prior, during and post-construction	Lighting, Art and Science (2020)
LED lighting sources and lighting control systems will be used with a combination of motion sensing and dimming time control to limit the spill light, particularly late at night. Any outside lights will only be activated with motions sensors or with buttons. In both cases, the light will turn off after 5 minutes.	Study area	Landowner/Developer	During and post-construction	OEH (2016), Lighting, Art and Science (2020)
Light close to the ground, such as bollards, may be used for small paths but will need to be close together to achieve the required uniformity.	Study area	Landowner/Developer	During and post-construction	Lighting, Art and Science (2020)

Stage: During operation	Objectives: Minimise disturbance to the resident camp population particularly in times of stress			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
The external lighting on the development that faces the bush must comply with Environmental Zone A2 of AS/NZS4282:2019	Study area	Landowner/Developer	During and post-construction	Lighting, Art and Science (2020)
Posttop lights will be strategically placed so that they have no spill light back into the bushland.	Study area	Landowner/Developer	During and post-construction	Lighting, Art and Science (2020)
External lighting on awnings & balconies should be shielded so that they do not throw light into the bush. Any lighting on balconies shall have full cut-off distribution so that no light leaves the fitting in or above the horizontal plane.	Study area	Landowner/Developer	During and post-construction	Lighting, Art and Science (2020)
Monochromatic red LEDs, while less expensive, should not be used as they have no colour rendering and as the eye is least sensitive in the ed range will require around ten times the energy input to achieve the same illumination. Amber lighting will be used for paths through the bush but for paths and external lighting in a residential development the lighting consultant believes it is probably excessive.	Study area	Landowner/Developer	During and post-construction	Lighting, Art and Science (2020)
Path lighting and security lighting in areas that are visible from the bush will be located so that they face away from the bush and have minimal backthrow.	Study area	Landowner/Developer	During and post-construction	Lighting, Art and Science (2020)

Stage: During operation	Objectives: Minimise disturbance to the resident camp population particularly in times of stress			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Air conditioning will be installed as part of the proposal for those occasions where it may be required as an alternative to open windows and doors.	Study area	Landowner/Developer	During and post-construction	NA
Provide a health and safety protocol for residents in the case that GHFFs are found within the study area	Study area	Landowner/Developer	Prior, during and post-construction	N/A
A covenant will be placed on the proposed development in accordance with section 88b of the *Conveyancing Act 1919* to prohibit the planting of fruiting/high nectar producing flowering trees and coco palms. Maintain a fence between the development and the camp to limit interactions between humans and GHFF and prevent dogs from disturbing the camp.	Study area	Landowner/Developer	Prior, during and post-construction	OEH (2016)

Stage: During operation	Objectives: Minimise disturbance to the resident camp population particularly in times of stress			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Dense plantings to create screens at residential boundaries can assist reducing smell, noise and general amenity impacts. Species should be restricted to those that do not grow taller than five metres (or that can be maintained at less than five metres). Species that produce fragrant flowers may also be used as an additional odour buffer. Species which attract foraging flying-foxes should also be avoided. residential yards, or management of fruit (i.e. bagging, pruning) will greatly assist in mitigating this issue.	Study area	Landowner/Developer	Prior, during and post-construction	Ecosure (2015)
Shade cloth and / or bat-safe netting will be installed over recreational areas to prevent human-bat contact	Study area	Landowner/Developer	Post- construction	OEH (2016)
Position eating areas (e.g. tables) under covered areas to avoid contamination by flying-foxes.	Study area	Landowner/Developer	Post- construction	OEH (2018)
Surfaces of outdoor recreational furniture and railings will be regularly cleaned and surfaces coatings used where available to prevent damage from bat guano.	Study area	Landowner/Developer	Post- construction	N/A
Units will be fitted with air conditioning so that windows can be closed when odours from the GHFF camp cannot be avoided.	Study area	Landowner/Developer	Prior, during and post-construction	OEH (2016)

Stage: During operation	Objectives: Minimise disturbance to the resident camp population particularly in times of stress			
Action detail	**Location**	**Responsibility**	**Timeframe**	**References**
Underground car parking to prevent bat guano on cars and disturbance to camp of cars starting up.	Study area	Landowner/Developer	Post-construction	N/A
Signage will be erected on the boundaries of the property advising residents of the camp, noting safe distances, advising of any noise restrictions and a direction to not touch GHFF and to call WIRES if injured, orphaned or dead GHFF are observed.	Study area	Landowner/Developer	Prior, during and post-construction	N/A

4 References

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Office of Environment and Heritage (OEH) (2016). Flying-fox Camp Management Plan Camellia Gardens. Goulburn Street, Sydney. Prepared by Sutherland Shire Council's Environmental Science Unit.

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Office of Environment and Heritage (OEH) (2019). Parramatta North Draft Camp Management Plan.

Appendix A Monitoring protocol

The ecologist and the landowner will monitor the study area and GHFF camp for GHFF individuals and signs of stress every day as per the proposed measures in this report. Monitoring will be undertaken during the period of demolition and construction. Should the camp be vacant at the commencement of demolition and / or construction, monitoring will be undertaken weekly between late August and February to enable GHFF to be detected should they return to the camp.

Monitoring and reporting will be documented and compiled into a monthly report to determine the effectiveness of the mitigation measures. Site conditions will be recorded on the work plan template at the beginning and end of works. This data should be included in the monthly report.

Monitoring should include:

- Inspection of camp to determine if there are signs of stress
- Inspection of vegetation and trees to be removed to determine if GHFF are present
- Supervision of tree removal or lopping
- Examination of signage to ensure legibility
- A description of any problems encountered and how they were overcome
- Photos
- Climatic conditions which may have influenced GHFF behaviour and stress

Monitoring will be adaptive as outlined in this FMP. If GHFF are agitated or stressed, then work will either not commence or be stopped if already commenced. the ecologist will make contact with the on-site Project Manager and Developer to determine when work can recommence (when signs of agitation of GHFF have stopped).

The monthly report will be submitted to Council.

Appendix B Monitoring data sheets

The following table provides a survey data sheet to be used for monitoring points. This will be used to keep track of the effectiveness of the mitigation measures and stop work procedures to manage potential impacts on the GHFF.

Date:	
Name of Ecologist:	
Temperature:	
Humidity:	
GHFF Population Stress:	
Worker start time:	
Worker end time:	
Daily briefing undertaken:	
GHFF camp inspection:	
Population stressed:	
Photos of camp:	
Study area inspection:	
GHFF in study area:	
Tree clearing or lopping supervised:	
Describe measures undertaken if GHFF are present or stressed	
Performance criteria: Have GHFFs become less stressed following work stoppage?	
Are GHFFS still agitated once work recommenced? If so, liaise with Council for next steps.	

Appendix C Description of external construction activities

The following works are not to be undertaken during final trimester of the GHFF breeding season within Zone A (refer to **Appendix D**). All works within Zones B and C can be completed at any time in accordance with the mitigation measures (Section 3).

Work item	Description of 'External Construction' activity	Activities not considered 'External Construction' activities
Site clearing and demolition	Clearing of the site and demolition of existing buildings by machine. Completion of minor works such as stripping out using held power tools is acceptable.	Completion of minor works such as stripping out using hand-held power tools in Zone A.
Bulk and detailed excavation	Bulk/detail excavation by machine with removal of material from site by truck. Minor excavation works for services trenches by small excavators (max 3 tonne machines) is acceptable.	Minor excavation works for services trenches by small excavators (max 3 tonne machines) in Zone A.
Ground floor structure	Formwork, reinforcement and concrete pour of ground floor slab on ground. Prior works including inground services and drainage is acceptable.	Prior works including inground services and drainage in Zone A.
Suspended floor structure	Formwork, reinforcement and concrete pour of suspended floor slabs.	
Masonry walls	Construction of external brickwork/masonry walls.	Material delivery and handling in Zone A.
Wall framing	Installation of internal and external timber wall frames. Material delivery and handling acceptable.	Material delivery and handling in Zone A.
Roof framing	Installation of timber roof framing. Material delivery and handling acceptable.	Material delivery and handling in Zone A.
Roof cladding	Installation of metal roofing. Material delivery and handling acceptable.	Material delivery and handling in Zone A.
External window and doors	Installation of external glazed windows and doors.	Material delivery and handling in Zone A.
External wall cladding	Installation of external wall cladding.	Material delivery and handling in Zone A.
Retaining wall structures	Detailed excavation by machine, pouring of footings and construction of masonry retaining walls.	Completion of inground services and stormwater in Zone A.
Roadworks and paving	Excavation works, road preparation and road pavement works including kerbs and gutters. Completion of inground services and stormwater acceptable.	

Work item	Description of 'External Construction' activity	Activities not considered 'External Construction' activities
External structures	Installation of external structures relating to the dwellings in this area. External fencing acceptable.	External fencing in Zone A.

Appendix D Zone map