maitland
city council

TENAMBIT FLYING FOX CAMP MANAGEMENT PLAN

JULY 2022

ACKNOWLEDGEMENTS

Maitland City Council acknowledges Aboriginal peoples as the First Peoples of this Country and the Wonnarua People as the Traditional Custodians, Owners and knowledge holders of the land and waterways within the Maitland Local Government Area.

We acknowledge input by the NSW Department of Planning and Environment, and consultants Ecosure, in developing the template on which this camp management plan was based. Peggy Eby also provided advice which was included in the template.

We thank the current owners of the land Anglican Care and Terry Bailey, the residents of Natalie Close and David Avenue Tenambit, the community as a whole, Linuwel School, local wildlife carers, and Local Government NSW for their input into this document.

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Acronyms and abbreviations

ABLV	Australian bat lyssavirus
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BFF	black flying-fox (*Pteropus alecto*)
the Code of Practice	Flying-fox Camp Management Code of Practice 2018 (NSW)
DEE	Commonwealth Department of the Environment and Energy
DPIE	Department of Planning, Industry and Environment (NSW)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	Environment Protection Authority (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
GHFF	grey-headed flying-fox (*Pteropus poliocephalus*)
the Guideline	Referral guideline for management actions in grey-headed and spectacled flying-fox camps 2015 (Commonwealth)
LGA	local government area
LGNSW	Local Government NSW
LRFF	little red flying-fox (*Pteropus scapulatus*)
MNES	matters of national environmental significance
NPWS	National Parks and Wildlife Service (NSW)
PEPs	protection of the environment policies
the Plan	Camp Management Plan
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
the Policy	Flying-fox Camp Management Policy 2015 (NSW)
SEPPs	State Environmental Planning Policies
SIS	species impact statement
TEC	threatened ecological community

1. Overview

This management plan has been prepared by Maitland City Council to guide management of land at Tenambit, occupied periodically by a flying fox camp since 2017. The camp occupies a small area of just 0.7 hectares across private and public land owned by four different individuals or entities close to Edward Street and Natalie Close Tenambit. The Plan has been prepared to identify actions that are available to reduce the impact of flying-foxes on residents, particularly adjacent to the land occupied by the camp, while identifying suitable habitat options to enable long term flying fox conservation activities to occur within the Maitland Local Government Area in low conflict locations.

The Plan has been developed in consultation with the NSW Department of Planning and Environment, local residents, Local Government NSW and flying fox experts from Ecosure. It outlines how the flying fox camp will be managed and actions that Maitland City Council will take to reduce residential impacts as far as possible, noting that the majority of the camp is on private land. The Plan is consistent with relevant guidelines and practice for flying-fox camps.

1.1 Objectives

The objectives of this Camp Management Plan (the Plan) are to:

- Minimise community impacts of flying-fox occupation of the area by implementing appropriate management actions.
- Identify issues for the management of the land and the amenity of surrounding residents
- Balance amenity of residents within the LGA with the conservation of flying-fox habitat, and creation of new habitat where relevant
- Comply with legislative requirements, animal welfare and conservation objectives
- Manage public health and safety risks
- Provide community education and awareness of flying fox and other biodiversity issues
- Clearly define roles and responsibilities for management of the camp
- Ensure management activities are consistent with the NSW Flying-fox Camp Management Policy (OEH 2018)
- Facilitate licence approval (where required) for actions at the camp
- Implement an adaptive management approach to camp management based on evidence collected
- Augment and align with other relevant land use and community planning documentation such as the Maitland Local Environmental Plan 2011, Maitland Greening Plan 2002, Maitland +10 Community Strategic Plan, Maitland Local Strategic Planning Statement 2040+.

2. Camp Context

Since 2017 Council has been receiving correspondence from residents regarding the formation of a flying fox at 58 David Avenue Tenambit, primarily on private land. Numbers of flying foxes in the camp have varied over time with up to an estimated 3,000 individuals using the site. Up to three species have used the camp over time: grey headed, black and little red flying foxes. This section provides an overview of the Tenambit Flying Fox Camp, its history and management response to date.

2.1 Camp area

The Tenambit Flying-fox Camp is located primarily on 58 David Avenue and 34 Edward Street Tenambit, between Natalie Close and Collinson Street. The camp extent as at September 2021 is shown in Figure 1. The camp currently covers 0.7 hectares focusing on 12 mature trees, with no suitable contiguous camp habitat remaining.

The majority of the site is under private tenure (particularly properties at 58 David Avenue and 34 Edward Street), although flying-foxes have also been observed using trees on adjoining Council managed land at the northern part of the site, between David Avenue and Natalie Close. Anglican Care and Mr Terry Bailey have legal responsibility for the majority of the camp area, with Maitland City Council being responsible for the road reserves and drainage reserve. Tenure of other surrounding land is private. Zoning is R1 Residential under Maitland City Council LEP 2011.

The camp forms part of a regional network of over 40 camps identified in the Lower Hunter, with surrounding camps shown in Figure 2. The camp is identified in the Local Government NSW *Flying Fox Habitat Restoration Program – Camp Mapping Report* (2019) as a very high conflict location and a priority area for a new site.

2.2 History of the camp

The camp was first recorded in March 2017 and was permanently occupied by Grey-headed, Black and Little Red Flying-foxes. The maximum total number of flying-foxes ever recorded at the camp was 3,000 individuals, including grey-headed flying-foxes (*Pteropus poliocephalus*), black flying-foxes (*P. alecto*) and little red flying-foxes (*P. scapulatus*), recorded in February 2019. Individual species numbers have not been recorded.

In 2020 multiple large flying-fox roosting trees (including spotted gum Corymbia maculata and narrow-leaved ironbark Eucalyptus crebra) were removed from 58 David Avenue (in accordance with DA 2016/2359 and DA 18-1951; DA 2016/2359 was approved in 2016 before the camp had become permanently established). This resulted in the animals instead primarily roosting in the small number of remaining large trees (grey gum Eucalyptus punctata and tallowwood Eucalyptus microcorys) adjacent to properties on Natalie Close (particularly numbers 13 and 14 at the southern end of the close).

As a result, residents of Natalie Close have reported negative impacts associated with large numbers of flying-foxes roosting very close to their properties, including noise (resulting in difficulty sleeping), damage to property and mess resulting from faecal drop, and odour. In response to the complex and high conflict nature of the Tenambit camp, Council sought a threatened species licence in 2021 to undertake tree trimming and weed removal works around the camp in an attempt to create buffers between residents and the camp.

Since May 2021, flying-foxes have been roosting periodically at the Tenambit camp, being absent from May to September 2021, and with significant fluctuations in numbers since that time. Small numbers have also been reported feeding from gardens on Natalie Close.

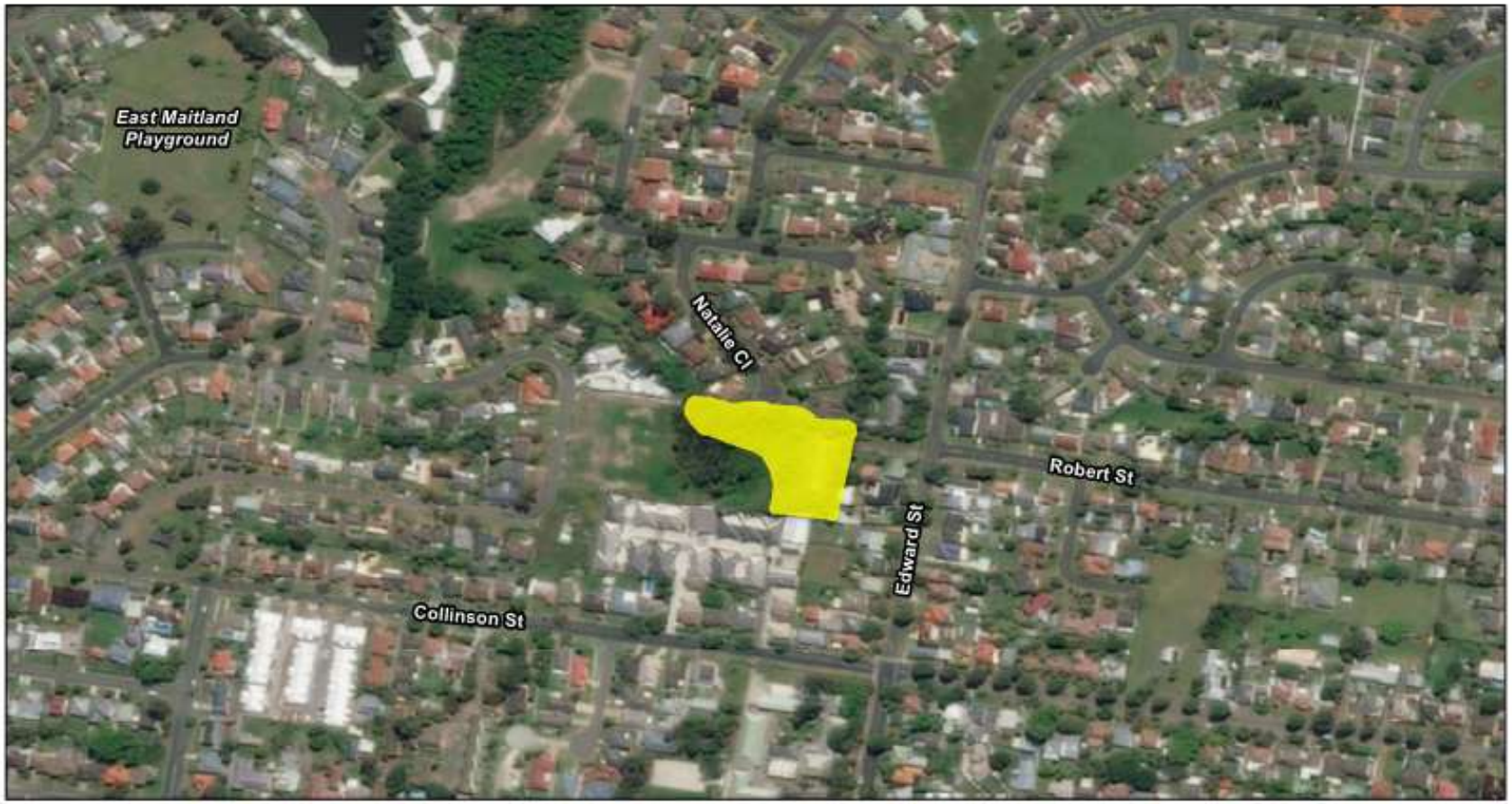


Figure 1: Site location

Maitland City Council

Tenambit Flying Fox Camp Ecological Review 2021

Tenambit maximum recent camp extent

ecosure

Figure 1: Site location Tenambit Flying Fox Camp

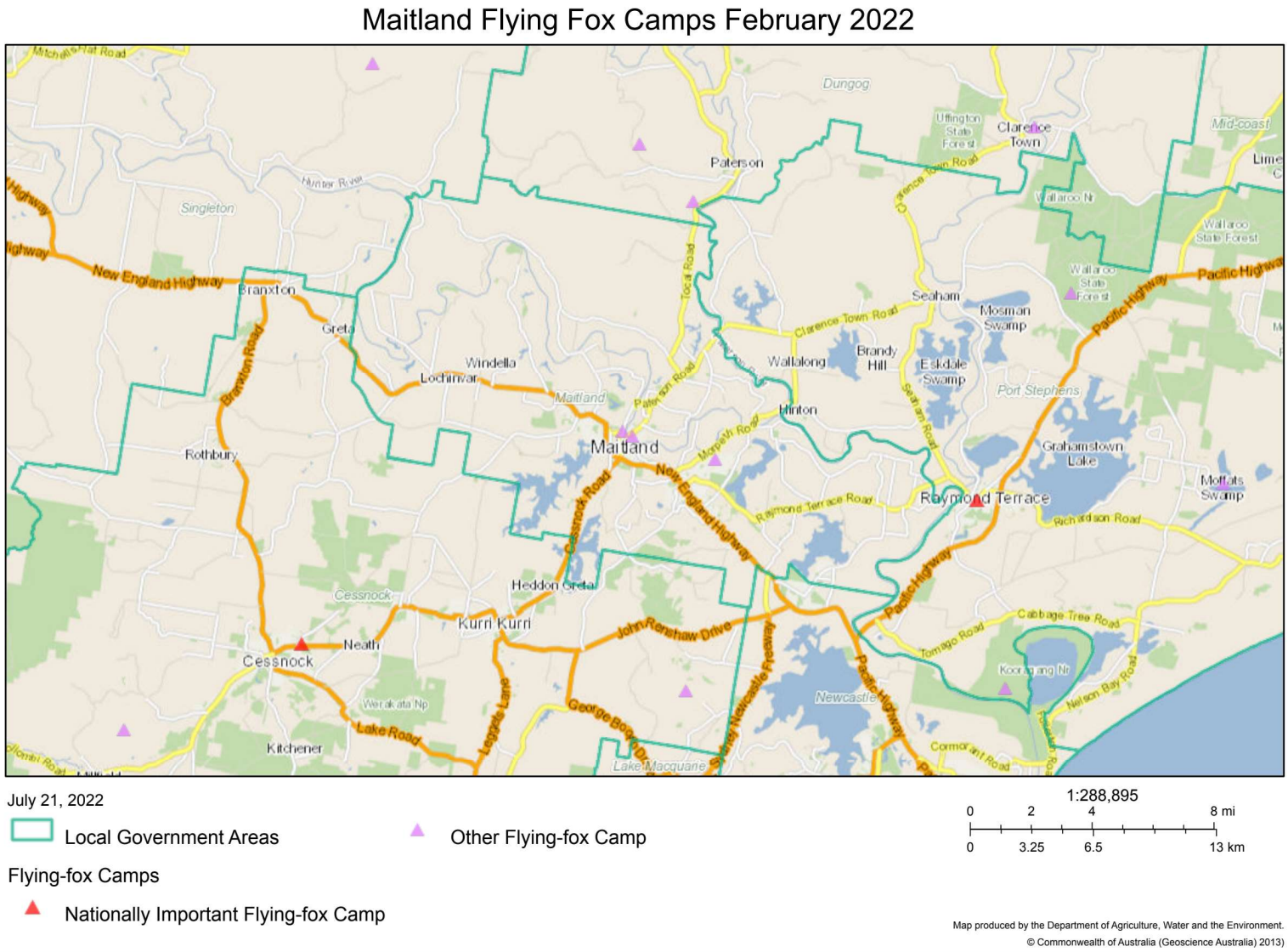


Figure 2 – Regional Context and Location of Known Flying Fox Camps, February 2022

2.3 Reported issues related to the camp

The following list is a collation of the issues related to the camp that have been reported by the community. The list has been compiled from information collected via a range of reporting and consultation methods. Further discussion about community engagement efforts and outcomes can be found in Section 3.

Reported issues include:

- noise as flying-foxes depart or return to the camp
- noise from the camp during the day
- flying-foxes overhanging pathways/residential properties
- faecal drop on outdoor areas, cars and washing lines, and estimated resources associated with cleaning areas adjacent to the camp
- smell
- fear of disease
- health and/or wellbeing impacts (e.g. associated with lack of sleep, anxiety)
- reduced general amenity
- damage to vegetation
- increased need for bush regeneration and associated costs
- impacts on other native animals
- impacts on businesses
- reports of property devaluation
- reports of diminished rental return.

In addition to feedback from community engagement efforts by Council in 2021 and 2022, nine (9) written complaints have been received by Council from 8 complainants in the past four years. This represents 33% of the total population adjoining the camp. There are also 1 person in the surrounding area who enjoys the camp and would prefer it be managed in situ. Reported positive feedback stems from people who:

- recognise the landscape-scale benefits flying-foxes provide through seed dispersal and pollination
- acknowledge the need to conserve flying-foxes as an important native species
- feel the camp does not negatively impact on their lifestyle
- recognise the need for people and wildlife to live together
- appreciate opportunities to learn more about flying-foxes

2.4 Management response to date

The Camp is primarily on private land and the owners who are legally responsible for the land were directed to DPE to seek advice on the management of the flying-fox camp.

Two development applications were approved to enable works to the Anglican Care portion on David Avenue. The second of the development applications resulted in the Camp moving into the remaining trees across land owned by different private entities as well as trees in the Council owned road reserve and drainage reserve.

Community concerns had raised to a level that required Maitland City Council to mediate between the impacted residents, the owners of the land and DPE.

Following Council resolution, works were approved to trim overhanging trees onto a residence in Natalie Close and undertake weed removal on the property of Edward Street to maintain the health of the trees in an attempt to draw the camp into the centre of the property away from neighbouring residences.

Additionally, a licence was sought from DPE to allow a sprinkler system to be set up in the Council drainage line trees to deter flying-foxes. The residents alerted Council to the flying-foxes alighting in the tree early in the morning prior to flying into the camp which impacted sleep. The project was unable to be taken due to licence conditions and further meetings are being sought with DPIE.

Further proposed works from the Council resolution include provision of materials to assist with alleviating impacts of the presence of the camp to residents such as clothesline covers, vehicle covers.

As a long-term project, Council is seeking to apply to the Local Government NSW grant to gain funds to create camp habitat in the Tenambit Wetlands. By creating habitat in a location away from residential homes on the pathway on which the flying-foxes commute between food source and the contentious camp, it is hoped the new camp will eventually be more inviting than the current camp which has insufficient trees to house the number of flying-foxes occupying the site.

3. Community engagement

Council Officers commenced a consultation program regarding the Tenambit flying-fox camp in March 2021. Officers have had individual discussions with 16 residents and landowners, both owners of the private land encompassing the camp, various teams within DPE, the Hunter Joint Organisation and a representative of a wildlife care group.

Ongoing consultation will be undertaken as a part of management of the camp.

3.1 Stakeholders

A range of stakeholders are directly or indirectly affected by the flying-fox camp or are interested in its management. Stakeholders include those shown in Table 1.

Table 1 Stakeholders in the Tenambit flying-fox camp and Plan

Stakeholder	Interest/reported impacts
Residents	Landowners and residents near the camp (noise, smell etc.).
Indigenous community	The Wonnarua People are the Traditional Owners and Custodians of the land in the Tenambit area. Traditional Owners and Custodians have an interest in flying-foxes, including the ecological services they provide and the potential for sustainable harvesting for food or medicinal purposes.
Schools	Linuwel School if camp moves down the drainage line.
Hospitals	Hospitals and medical centres provide pre and/or post-exposure lyssavirus vaccinations.
Other/adjoining landholders; these may include government departments such as Crown Lands, Transport for NSW/Roads and Maritime Services, or neighbouring councils	State and Federal Government Departments and neighbouring councils may become involved if the camp occupants moves elsewhere,
Civic leaders and influencers (including local, state and federal politicians)	Local and State politicians have been involved up to date and may have further involvement should camp cause residents more grief in the future.
Local government	Local government has responsibilities to the community and environment of the area for which it is responsible in accordance with the *Local Government Act 1993*. Council is also responsible for administering local laws, plans and policies, and appropriately managing assets (including land) for which it is responsible.
Local Government NSW (LGNSW)	LGNSW is an industry association that represents the interests of councils in New South Wales.
Department of Planning, Industry and Environment	The Department of Planning, Industry and Environment is responsible for administering legislation relating to (among other matters) the conservation and management of native plants and animals, including threatened species and ecological communities.
Commonwealth Department of Agriculture, Water and the Environment (DAWE) (relevant to camps with grey-headed flying-foxes or other matters of national environmental significance)	DAWE is responsible for administering federal legislation relating to matters of national environmental significance, such as the grey-headed flying-fox and any other federally listed values of the camp site.
Wildlife carers and conservation organisations	Wildlife carers and conservation organisations have an interest in flying-fox welfare and conservation of flying-foxes and their habitat.
Researchers/universities/CSIRO	Researchers have an interest in flying-fox behaviour, biology and conservation.

3.2 Engagement methods

Extensive effort has been made to engage with the community regarding the flying-fox camp to:

- understand the issues, directly and indirectly, affecting the community
- raise awareness within the community about flying-foxes
- correct misinformation and allay fears
- share information and invite feedback about management responses to date
- seek ideas and feedback about possible future management options
- invite people to join advisory and/or plan development committees.

The types of engagement that have been undertaken include:

- promotion of contact details of responsible officers
- telephone conversations to record issues and complaints
- face-to-face meetings and telephone calls with adjacent residents
- brochures and other educational material
- website pages and links
- direct contact with adjacent residents including letters, brochures and emails
- public meetings / webinar
- ongoing emails to impacted residents as new information is available.

3.3 Community feedback – management options

A summary of the main feedback received is as follows:

- 16 submissions were made to Council Request system

The overall feedback from the community received via engagement favoured flying-fox camp management measures that:

- were of low financial cost to local ratepayers
- ensured the risk of transmission of flying-fox pathogens, viruses and disease remains low
- were able to be undertaken quickly
- reduced the impact of noise and odour on nearby residents and businesses
- reduced the impact of flying-fox excrement
- a small number of responses would not change the natural or ecological values of the site.

4. Legislation and policy

4.1 Commonwealth

4.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides protection for the environment, specifically matters of national environmental significance (MNES). A referral to the Commonwealth Department of the Environment and Energy (DEE) is required under the EPBC Act for any action that is likely to significantly impact on an MNES.

MNES under the EPBC Act that relate to flying-foxes include:

- world heritage sites (where those sites contain flying-fox camps or foraging habitat)
- wetlands of international importance (where those wetlands contain flying-fox camps or foraging habitat)
- nationally threatened species and ecological communities.

The grey-headed flying-fox (GHFF) is listed as a vulnerable species under the EPBC Act, meaning it is an MNES. It is also considered to have a single national population. The Commonwealth has developed the Referral guideline for management actions in GHFF and SFF[1] camps (DoE 2015) (the Guideline) to guide whether referral is required for actions pertaining to the GHFF.

The Guideline defines a nationally important GHFF camp as one that has either:

- contained ≥10,000 GHFF in more than one year in the last 10 years
- been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years.

Provided management at nationally important camps follows the mitigation standards below, DAWE has determined that a significant impact on the population is unlikely, and referral is not likely to be required.

Referral will be required if a significant impact to any other MNES is considered likely as a result of management actions outlined in the Plan. Self-assessable criteria are available in the Significant Impact Guidelines 1.1 (DoE 2013) to assist in determining whether a significant impact is likely; otherwise consultation with DAWE will be required.

Mitigation standards

- The action must not occur if the camp contains females that are in the late stages of pregnancy or have dependent young that cannot fly on their own.

[1] spectacled flying-fox (*P. conspicillatus*)

- The action must not occur during or immediately after climatic extremes (heat stress event[2], cyclone event[3]), or during a period of significant food stress[4].
- Disturbance must be carried out using non-lethal means, such as acoustic, visual and/or physical disturbance or use of smoke.
- Disturbance activities must be limited to a maximum of 2.5 hours in any 12-hour period, preferably at or before sunrise or at sunset.
- Trees are not felled, lopped or have large branches removed when flying-foxes are in or near to a tree and likely to be harmed.
- The action must be supervised by a person with knowledge and experience relevant to the management of flying-foxes and their habitat, who can identify dependent young and is aware of climatic extremes and food stress events. This person must assess the relevant conditions and advise the proponent whether the activity can go ahead consistent with these standards.
- The action must not involve the clearing of all vegetation supporting a nationally important flying-fox camp. Sufficient vegetation must be retained to support the maximum number of flying-foxes ever recorded in the camp of interest.

These standards have been incorporated into mitigation measures detailed in Section 10.3. If actions cannot comply with these mitigation measures, referral for activities at nationally important camps is likely to be required.

4.2 State

4.2.1 *Biodiversity Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) replaced the *Threatened Species Conservation Act 1995* on 25 August 2017.

The purpose of the BC Act includes to conserve biodiversity at the bioregional and state scales. Under this Act, a person who harms or attempts to harm an animal of a threatened species, an animal that is part of a threatened ecological community, or a protected animal, is guilty of an offence.

The grey-headed flying-fox is listed as threatened under the BC Act (see also Why the grey-headed flying-fox is listed as threatened).

A biodiversity conservation licence under Part 2 of the BC Act may be required if the proposed action is likely to result in one or more of the following:

a. harm to an animal that is a threatened species, or part of a threatened population
b. the picking of a plant that is a threatened species, or part of a threatened population or ecological community
c. damage to habitat of a threatened species, population or ecological community
d. damage to a declared area of outstanding biodiversity conservation value.

[2] A 'heat stress event' is defined for the purposes of the Australian Government's Referral guideline for management actions in GHFF and SFF camps as a day on which the maximum temperature does (or is predicted to) meet or exceed 38°C.

[3] A 'cyclone event' is defined as a cyclone that is identified by the Australian Bureau of Meteorology (www.bom.gov.au/cyclone/index.shtml).

[4] Food stress events may be apparent if large numbers of low body weight animals are being reported by wildlife carers in the region.

If the Department assesses a biodiversity conservation licence application and determines that a significant impact is unlikely, a biodiversity conservation licence will be granted (the appendix to the Policy lists standard conditions for flying-fox management approvals).

The Department regulates flying-fox camp management through two options provided to land managers:

- authorisation under the Flying-fox Camp Management Code of Practice for public land managers
- licensing for public and private land managers.

The Code of Practice provides a defence under the BC Act for public land managers, as long as camp management actions are carried out in accordance with the Code of Practice.

Proposed actions that would otherwise constitute an offence under the BC Act can be authorised under another law.

4.2.2 *Flying-fox Camp Management Policy 2018*

The Flying-fox Camp Management Policy 2018 (the Policy) has been developed to empower land managers, principally local councils, to work with their communities to manage flying-fox camps effectively. It provides the framework within which the Department will make regulatory decisions. In particular, the Policy strongly encourages local councils and other land managers to prepare Camp Management Plans for sites where the local community is affected.

4.2.3 *Prevention of Cruelty to Animals Act 1979*

It may be an offence under this Act if there is evidence of unreasonable/unnecessary torment associated with management activities. Adhering to welfare and conservation measures provided in Section 10.3 will ensure compliance with this Act.

4.2.4 *Environmental Planning and Assessment Act 1979*

The objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) are to encourage proper management, development and conservation of resources, for the purpose of the social and economic welfare of the community and a better environment. It also aims to share responsibility for environmental planning between different levels of government and promote public participation in environmental planning and assessment.

The EP&A Act is administered by the Department of Planning, Industry and Environment.

Development control plans under the Act should consider flying-fox camps so that planning, design and construction of future developments is appropriate to avoid future conflict.

Development under Part 4 of the Act does not require licensing under the BC Act.

Where public authorities such as local councils undertake development under Part 5 of the EP&A Act (known as ‘development without consent’ or ‘activity’), assessment and licensing under the BC Act may not be required; however, a full consideration of the development’s potential impacts on threatened species will be required in all cases.

Where flying-fox camps occur on private land, landowners are not eligible to apply for development under Part 5 of the EP&A Act. Private landowners should contact council to explore management options for camps that occur on private land.

5. Ecological Considerations

The Tenambit flying-fox camp vegetation is mapped as Hunter Valley Dry Rainforest and Scattered Trees, which is consistent with observations made during the site assessment. Vegetation communities that occur within 2 km of the camp are shown in Figure 3. Notably, Hunter Lowlands Redgum Forest and Lower Hunter Spotted Gum Ironbark Forest are listed as Endangered Ecological Communities in NSW under the BC Act.

A Protected Matters Search identified several Matters of National Environmental Significance (MNES, listed under EPBC Act) that may occur within 2 km of the flying-fox camp is provided in Appendix 1. In addition, there are 17 migratory species that potentially occur within 2 km of the camp.

5.1 Ecological role

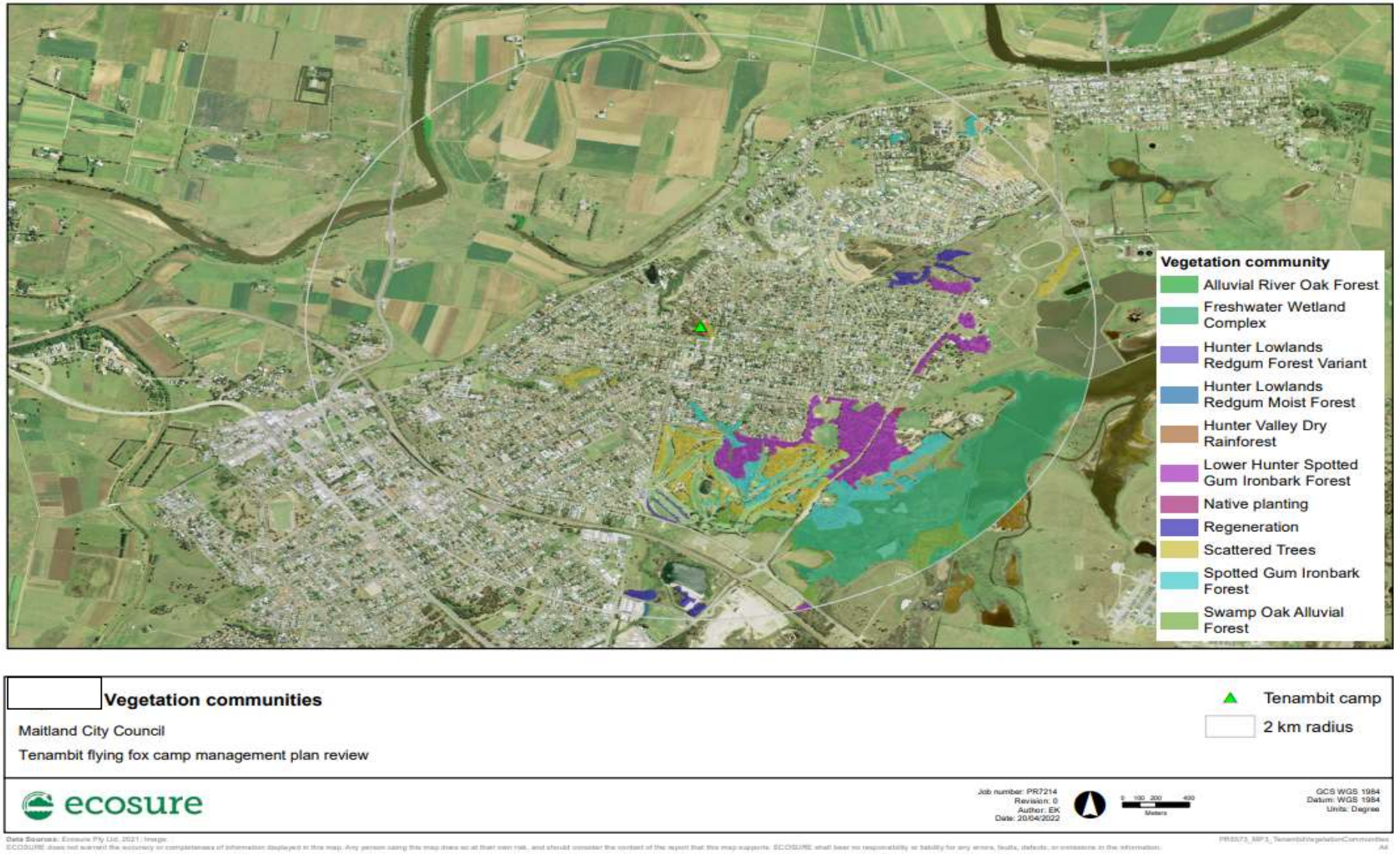
Flying-foxes make a substantial contribution to ecosystem health through their ability to move seeds and pollen over long distances (Southerton et al. 2004). This directly assists gene movement in native plants, improving the reproduction, regeneration and viability of forest ecosystems (DEE 2019b). Some plants, particularly *Corymbia* spp., have adaptations suggesting they rely more heavily on nocturnal visitors such as bats for pollination than daytime pollinators (Southerton et al. 2004).

Grey-headed flying-foxes may travel 100 kilometres in a single night with a foraging radius of up to 50 kilometres from their camp (McConkey et al. 2012) and have been recorded travelling over 500 kilometres in two days between camps (Roberts et al. 2012). In comparison bees, another important pollinator, move much shorter foraging distances of generally less than one kilometre (Zurbuchen et al. 2010).

Long-distance seed dispersal and pollination make flying-foxes critical to the long-term persistence of many plant communities (Westcott et al. 2008; McConkey et al. 2012), including eucalypt forests, rainforests, woodlands and wetlands (Roberts et al. 2006). Seeds that are able to germinate away from their parent plant have a greater chance of growing into a mature plant (DES 2018). Long-distance dispersal also allows genetic material to be spread between forest patches that would normally be geographically isolated (Parry-Jones & Augee 1992; Eby 1991; Roberts 2006). This genetic diversity allows species to adapt to environmental change and respond to disease pathogens. Transfer of genetic material between forest patches is particularly important in the context of contemporary fragmented landscapes.

Flying-foxes are considered ‘keystone’ species given their contribution to the health, longevity and diversity among and between vegetation communities. These ecological services ultimately protect the long-term health and biodiversity of Australia’s bushland and wetlands. In turn, native forests act as carbon sinks (Roxburgh et al. 2006), provide habitat for other animals and plants, stabilise river systems and catchments, add value to production of hardwood timber, honey and fruit (e.g. bananas and mangoes; Fujita 1991), and provide recreational and tourism opportunities worth millions of dollars each year (DES 2018).

Figure 3 Vegetation communities within 2 km of Tenambit roost



5.2 Flying-foxes in urban areas

Flying-foxes appear to be roosting and foraging in urban areas more frequently. There are many possible drivers for this, as summarised by Tait et al. (2014):

- loss of native habitat and urban expansion
- opportunities presented by year-round food availability from native and exotic species found in expanding urban areas
- disturbance events such as drought, fires, cyclones
- human disturbance at non-urban roosts or culling at orchards
- urban effects on local climate
- refuge from predation
- movement advantages, e.g. ease of manoeuvring in flight due to the open nature of the habitat or ease of navigation due to landmarks and lighting.

5.3 Under threat

Flying-foxes roosting and foraging in urban areas more frequently can give the impression that their populations are increasing; however, the grey-headed flying-fox is in decline across its range and, in 2001, was listed as vulnerable by the NSW Government through the *Threatened Species Conservation Act 1995* (now BC Act). It is also listed as vulnerable at a national level under the EPBC Act.

At the time of listing, the species was considered eligible for listing as vulnerable, as counts of flying-foxes over the previous decade suggested the national population had declined by up to 30%. It was also estimated the population would continue to decrease by at least 20% in the next three generations given the continuation of the current rate of habitat loss, culling and other threats.

The main threat to grey-headed flying-foxes in New South Wales is clearing or modification of native vegetation. This removes appropriate roosting and breeding sites and limits the availability of natural food resources, particularly winter–spring feeding habitat in north-eastern NSW. The urbanisation of the coastal plains of south-eastern Queensland and northern NSW has seen the removal of annually-reliable winter feeding sites, which is continuing.

There are a wide range of ongoing threats to the survival of the grey-headed flying-fox, including:

- habitat loss and degradation
- conflict with humans (including culling at orchards)
- infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, power line electrocution, etc.)
- exposure to extreme natural events such as cyclones, drought and heatwaves.

Flying-foxes have limited capacity to respond to these threats and recover from large population losses due to their slow sexual maturation, low reproductive output, long gestation and extended maternal dependence (McIlwee & Martin 2002).

5.4 Camp characteristics

All flying-foxes are nocturnal, typically roosting during the day in communal camps. These camps may range in number from a few to hundreds of thousands, with individual animals frequently moving between camps within their range. Typically, the abundance of resources within a 20 to 50 kilometre radius of a camp site will be a key determinant of the size of a camp (SEQ Catchments 2012). Many flying-fox camps are temporary and seasonal, tightly tied to the flowering of their preferred food trees; however, understanding the availability of feeding resources is difficult because flowering and fruiting are not reliable every year, and can vary

between localities (SEQ Catchments 2012). These are important aspects of camp preference and movement between camps and have implications for long-term management strategies.

Little is known about flying-fox camp preferences; however, research indicates that apart from being in close proximity to food sources, flying-foxes choose to roost in vegetation with at least some of the following general characteristics (SEQ Catchments 2012; Eco Logical Australia 2018):

- closed canopy >5 metres high
- dense vegetation with complex structure (upper, mid- and understorey layers)
- within 500 metres of permanent water source
- within 50 kilometres of the coastline or at an elevation <65 metres above sea level
- level topography (<5° incline)
- greater than one hectare to accommodate and sustain large numbers of flying-foxes.

Optimal vegetation available for flying-foxes must allow movement between preferred areas of the camp. Specifically, it is recommended that the size of a patch be approximately three times the area occupied by flying-foxes at any one time (SEQ Catchments 2012).

5.5 Species profiles

5.5.1 Black flying-fox (*Pteropus alecto*)

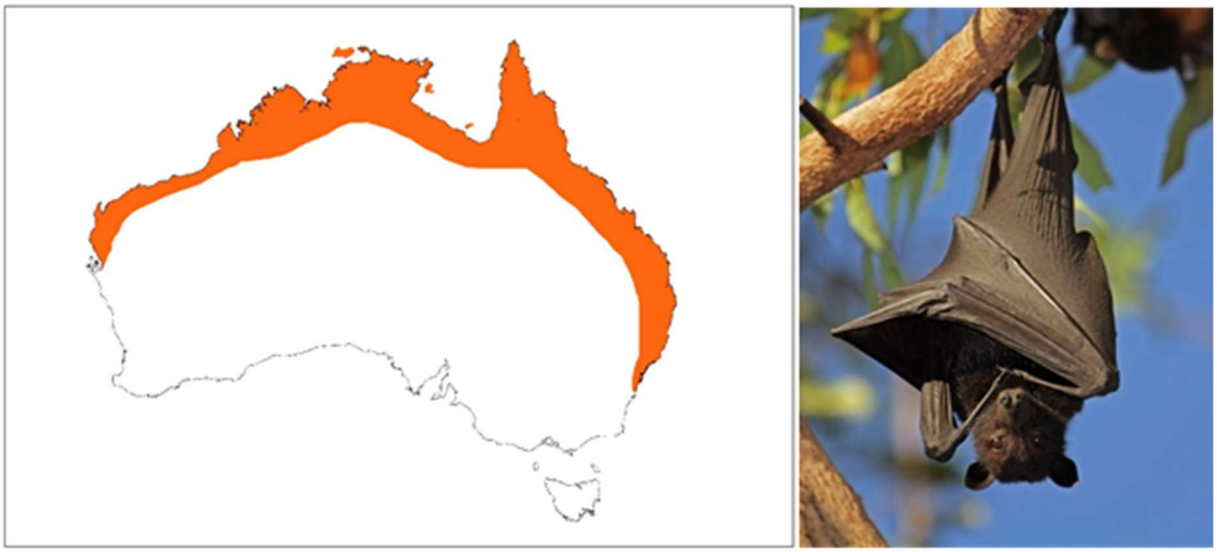


Figure 4 Black flying-fox indicative species distribution (adapted from DPIE 2019a)

The black flying-fox (BFF) (Figure 4) has traditionally occurred throughout coastal areas from Shark Bay in Western Australia, across northern Australia, down through Queensland and into New South Wales (Churchill 2008; DPIE 2019a). Since it was first described there has been a substantial southerly shift by the BFF (Webb & Tidemann 1995).

They forage on the fruit and blossoms of native and introduced plants (Churchill 2008; DPIE 2019a), including orchard species at times.

BFF are largely nomadic animals with movement and local distribution influenced by climatic variability and the flowering and fruiting patterns of their preferred food plants. Feeding commonly occurs within 20 kilometres of the camp site (Markus & Hall 2004).

BFF usually roost beside a creek or river in a wide range of warm and moist habitats, including lowland rainforest gullies, coastal stringybark forests and mangroves. During the breeding season, camp sizes can change significantly in response to the availability of food and the arrival of animals from other areas.

5.5.2 Grey-headed flying-fox (*Pteropus poliocephalus*)

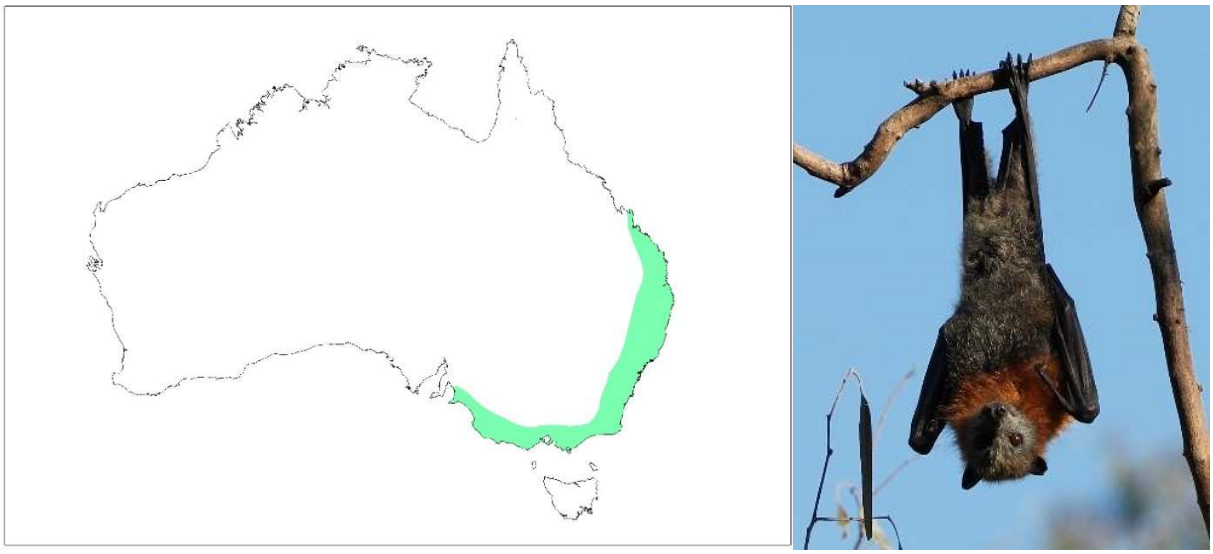


Figure 5 Grey-headed flying-fox indicative species distribution (adapted from DPIE 2019a)

The grey-headed flying-fox (GHFF) (Figure 5) is found throughout eastern Australia, generally within 200 kilometres of the coast, from Finch Hatton in Queensland to Melbourne, Victoria (DPIE 2019c). This species now ranges into South Australia and individual flying-foxes have been reported on the Bass Islands and mainland Tasmania (Driessen et al. 2011). It requires foraging resources and camp sites within rainforests, open forests, closed and open woodlands (including melaleuca swamps and banksia woodlands). This species is also found throughout urban and agricultural areas where food trees exist and will feed in orchards at times, especially when other food is scarce (DPIE 2019a).

All the GHFF in Australia are regarded as one population that moves around freely within its entire national range (Webb and Tidemann 1996; DoE 2015). GHFF may travel up to 100 kilometres in a single night with a foraging radius of up to 50 kilometres from their camp (McConkey et al. 2012). They have been recorded travelling over 500 kilometres over 48 hours when moving from one camp to another (Roberts et al. 2012). GHFF generally show a high level of fidelity to camp sites, returning year after year to the same site, and have been recorded returning to the same branch of a particular tree (SEQ Catchments 2012). This may be one of the reasons flying-foxes continue to return to small urban bushland blocks that may be remnants of historically used larger tracts of vegetation.

The GHFF population has a generally annual southerly movement in spring and summer, with their return to the coastal forests of north-east NSW and south-east Queensland in winter (Ratcliffe 1932; Eby 1991; Parry-Jones & Augee 1992; Roberts et al. 2012). This results in large fluctuations in the number of GHFF in New South Wales, ranging from as few as 20% of the total population in winter up to around 75% of the total population in summer (Eby 2000). They are widespread throughout their range during summer, but in spring and winter are uncommon in the south. In autumn they occupy primarily coastal lowland camps and are uncommon inland and on the south coast of New South Wales (DECCW 2009).

There is evidence the GHFF population declined by up to 30% between 1989 and 2000 (Birt 2000; Richards 2000 cited in DPIE 2019a). There is a wide range of ongoing threats to the

survival of the GHFF, including habitat loss and degradation, culling in orchards, conflict with humans, infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, and power line electrocution) and competition and hybridisation with the BFF (DECCW 2009). For these reasons it is listed as vulnerable to extinction under NSW and federal legislation (see Section 4).

5.5.3 Little red flying-fox (*Pteropus scapulatus*)

Figure 6 Little red flying-fox indicative species distribution (adapted from DPIE 2019a)

The little red flying-fox (LRFF) (Figure 6) is widely distributed throughout northern and eastern Australia, with populations occurring across northern Australia and down the east coast into Victoria.

The LRFF forages almost exclusively on nectar and pollen, although it will eat fruit at times and occasionally feeds in orchards (Australian Museum 2010). LRFF often move very long distances in search of sporadic food supplies. The LRFF is the most nomadic species of flying-fox in New South Wales. They are strongly influenced by the availability of food resources, predominantly the flowering of eucalypt species (Churchill 2008). This means the duration of their stay in any one place is generally very short.

Habitat preferences of this species are quite diverse and range from semi-arid areas to tropical and temperate areas, and can include sclerophyll woodland, melaleuca swamplands, bamboo, mangroves and occasionally orchards (Eby & Roberts 2016). LRFF frequently roost with other flying-fox species. In some colonies, LRFF individuals can number many hundreds of thousands and they are unique among *Pteropus* species in their habit of clustering in dense bunches on a single branch. As a result, the weight of roosting individuals can break large branches and cause significant structural damage to roost trees, in addition to elevating soil nutrient levels through faecal material (SEQ Catchments 2012).

Throughout its range, populations within an area or occupying a camp can fluctuate widely. There is a general migration pattern in LRFF, whereby large congregations of over one million individuals can be found in northern camp sites (e.g. Northern Territory, North Queensland) during key breeding periods (Vardon & Tidemann 1999). LRFF travel south to visit the coastal areas of south-east Queensland and New South Wales during the summer months. Outside these periods LRFF undertake regular movements from north to south during winter–spring (July–October) (Milne & Pavey 2011).

5.5.4 Reproduction

Black and grey-headed flying-foxes

Males initiate contact with females in January with peak conception occurring around March to April/May; this mating season represents the period of peak camp occupancy (Markus 2002). Young (usually a single pup) are born six months later from September to November (Churchill 2008). The birth season becomes progressively earlier, albeit by a few weeks, in more northerly populations (McGuckin & Blackshaw 1991); however, out of season breeding is common, with births occurring later in the year.

Young are highly dependent on their mother for food and thermoregulation. They are suckled and carried by the mother until approximately four weeks of age (Markus & Blackshaw 2002). At this time, they are left at the camp during the night in a crèche until they begin foraging with their mother in January and February (Churchill 2008) and are usually weaned by six months of age around March. Sexual maturity is reached at two years of age with a life expectancy up to 20 years in the wild (Pierson & Rainey 1992).

As such, the critical reproductive period for GHFF and BFF is generally from August (when females are in their final trimester) to the end of peak conception around April. Dependent pups are usually present from September to March (see Figure 6).

Little red flying-fox

The LRFF breeds approximately six months out of phase with the other flying-foxes. Peak conception occurs around October to November, with young born between March and June (McGuckin & Blackshaw 1991; Churchill 2008) (Figure 7). Young are carried by their mother for approximately one month then left at the camp while she forages (Churchill 2008). Suckling occurs for several months while young are learning how to forage. LRFF generally birth and rear young in temperate areas (rarely in New South Wales).

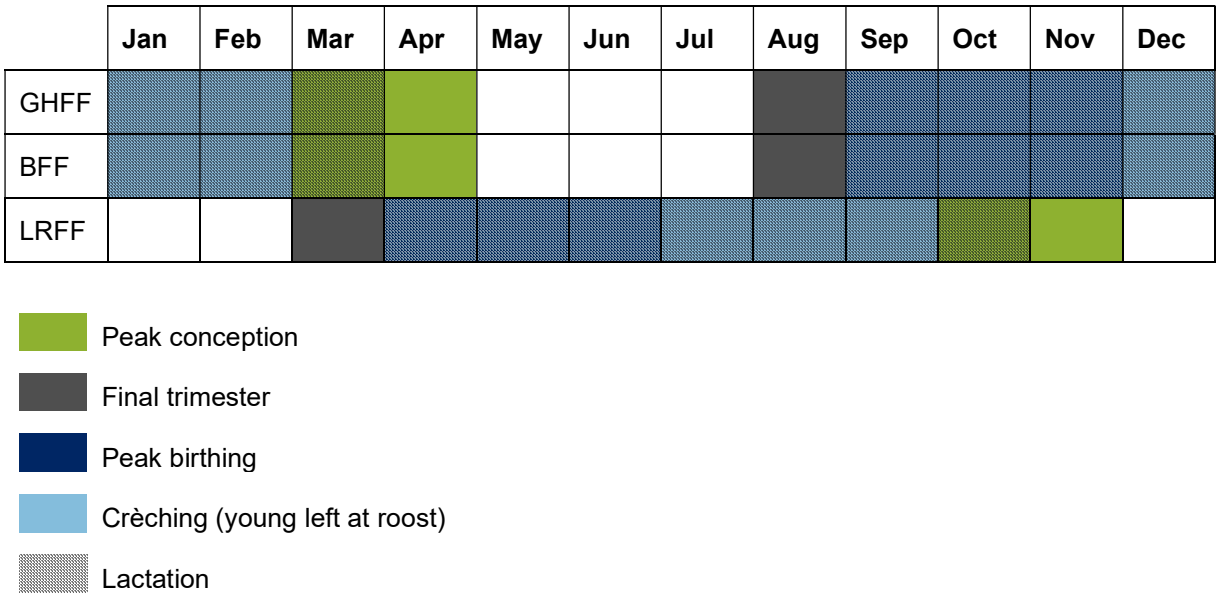


Figure 7 Indicative flying-fox reproductive cycle

Note that LRFF rarely birth and rear young in New South Wales. The breeding season of all species is variable between years and location, and expert assessment is required to accurately determine phases in the breeding cycle and inform appropriate management timing.

6. Human and animal health

Flying-foxes, like all animals, have the potential to carry pathogens that may pose human health risks. In Australia the most well-defined of these are Australian bat lyssavirus (ABLV) and Hendra virus. Specific information on these viruses is provided in Appendix 5.

Outside of an occupational cohort (e.g. wildlife carers, vets, biologists) human exposure to these viruses is extremely rare and similarly, transmission rates and incidence of human infection are very low. In addition, Hendra virus infection in humans apparently requires transfer from an infected intermediate equine host and direct transmission from bats to humans has not been reported. Coming into contact with bat faeces, urine or blood do not pose a risk of ABLV exposure, nor does living, playing or walking near bat roosting areas (Queensland Health 2020).

6.1 Disease and flying-fox management

A recent study at several camps before, during and after disturbance (Edson et al. 2015) showed no statistical association between Hendra virus prevalence and flying-fox disturbance; however, the consequences of chronic or ongoing disturbance and harassment and its effect on Hendra virus infection were not within the scope of the study and are therefore unknown.

The effects of stress are linked to increased susceptibility and expression of disease in both humans (AIHW 2012) and animals (Henry & Stephens-Larson 1985; Aich et al. 2009), including reduced immunity to disease. Therefore, it can be assumed that management actions that may cause stress (e.g. dispersal), particularly over a prolonged period or at times where other stressors are increased (e.g. food shortages, habitat fragmentation, etc.), are likely to increase the susceptibility and prevalence of disease within the flying-fox population, and consequently the risk of transfer to humans.

Furthermore, management actions or natural environmental changes may increase disease risk by:

- forcing flying-foxes into closer proximity to one another, increasing the probability of disease transfer between individuals and within the population
- resulting in abortions and/or dropped young if inappropriate methods are used during critical periods of the breeding cycle. This will increase the likelihood of direct interaction between flying-foxes and the public, and potential for disease exposure
- adoption of inhumane methods with the potential to cause injury which would increase the likelihood of the community coming into contact with injured/dying flying-foxes.

The potential to increase disease risk should be carefully considered as part of a full risk assessment when determining the appropriate level of management and the associated mitigation measures required.

7. Camp management options

7.1 Level 1 actions: routine camp management

7.1.1 Education and awareness programs

This management option involves undertaking a comprehensive and targeted flying-fox education and awareness program to provide accurate information to the local community about flying-foxes.

Such a program would include managing risk and alleviating concern about health and safety issues associated with flying-foxes, options available to reduce impacts from roosting and foraging flying-foxes, an up-to-date program of works being undertaken at the camp, and information about flying-fox numbers and flying-fox behaviour at the camp.

Residents should also be made aware that faecal drop and noise at night is mainly associated with plants that provide food, independent of camp location. Staged removal of foraging species such as fruit trees and palms from residential yards, or management of fruit (e.g. bagging, pruning) will greatly assist in mitigating this issue. Approval from Council may be required for the removal of some trees.

Collecting and providing information should always be the first response to community concerns in an attempt to alleviate issues without the need to actively manage flying-foxes or their habitat. Where it is determined that management is required, education should similarly be a key component of any approach. See also Section 3 and incorporate an education and awareness program into any community engagement plan.

An education program may include components shown in Figure 8.

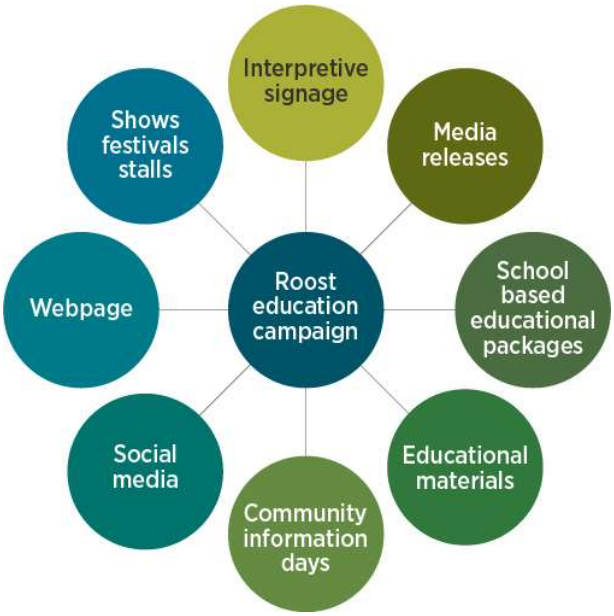


Figure 8 Possible components of an education program

By adopting these strategies, the likelihood of improving community understanding of flying-fox issues is high; however, the extent to which that understanding will help alleviate conflict issues is probably less so. Extensive education for decision-makers, the media and the broader community may be required to overcome negative attitudes towards flying-foxes.

It should be stressed that a long-term solution to the issue resides with a better understanding of flying-fox ecology and applying that understanding to careful urban planning and development.

7.1.2 Property modification without subsidies

The following actions on properties adjacent or near to the camp can be promoted to minimise impacts from roosting and foraging flying-foxes (note that approval may be required for some activities, refer to Section 4 for further information):

- Create visual/sound/smell barriers with fencing or hedges. To avoid attracting flying-foxes, species selected for hedging should not produce edible fruit or nectar-exuding flowers, should grow in dense formation between two and five metres (Roberts 2006) (or be maintained at less than five metres). Vegetation that produces fragrant flowers can assist in masking camp odour where this is of concern.
- Manage foraging trees (i.e. plants that produce fruit/nectar-exuding flowers) within properties through pruning/covering with bags or wildlife friendly netting, early removal of fruit, or tree replacement.
- Cover vehicles, structures and clothes lines where faecal contamination is an issue, or remove washing from the line before dawn/dusk.
- Move or cover eating areas (e.g. barbecues and tables) that are close to a camp or foraging tree to avoid droppings by flying-foxes.
- Install double-glazed windows, insulation and use air-conditioners when needed to reduce noise disturbance and smell associated with a nearby camp.
- Follow horse husbandry and property management guidelines provided at the Hendra virus webpage (DPIE 2019d).
- Include suitable buffers and other provisions (e.g. covered car parks) in planning of new developments.
- Consider removable covers for swimming pools and ensure working filters and regular chlorine treatment.
- Appropriately manage rainwater tanks, including installing first-flush systems.
- Avoid disturbing flying-foxes during the day as this will increase camp noise.

The cost would be borne by the person or organisation who modifies the property; however, opportunities for funding assistance (e.g. environment grants) may be available for management activities that reduce the need to actively manage a camp.

Odour neutralising trial

Odour neutralising systems (which modify odour-causing chemicals at the molecular level rather than just masking them) are commonly used in contexts such as waste management, food processing, and water treatment. They have the potential to be a powerful tool for managing odour impacts associated with flying-foxes. Two trials have been undertaken that utilised two different odour-neutralising systems. The indoor system uses a Hostogel™ pot containing a gel-based formula for neutralising indoor odour. These are inexpensive, only require replacement every few months, and may be sufficient to mitigate odour impacts in houses affected by flying-fox roosts. Initial results suggest there may be a positive localised effect in reducing flying-fox odour within homes. This option may be useful for affected

residents (particularly those directly adjacent to the roost), as residents could choose whether or not they wish to have a gel-pot in their living space and can simply put the lid back on the pot when the odour is not impacting on them.

The outdoor system consists of a Vapourgard™ unit that dispenses an odour-neutralising vapour through diffuser pipes that are installed on boundary fences. A world-first trial was undertaken in April – June 2021 with the participation of residents living near a flying-fox roost at Porter Park, Sunshine Coast. The system followed a predetermined schedule (alternating on / off cycles) for 9 weeks and residents were asked to rate the flying-fox odour every day throughout the trial.

The trial identified that the odour-neutralising technique has the potential to be effective. However, objective results were difficult to obtain due to the significant negative experience of residents as a consequence of the large influxes of flying-fox numbers during the trial. If future trials confirm this technique is effective, the odour-neutralising system could be installed along the boundary of residential properties bordering the flying-fox roost.

7.1.3 Subsidy programs

Subsidy programs provide Council with an opportunity to support impacted residents living near flying-fox roosts. There are a number of factors to consider when establishing a subsidy program, including who to offer subsidies to (i.e. who is eligible, generally based on proximity to roost), what subsidies to offer (e.g. service-based or property-based), how subsidies should be offered (e.g. reimbursements for purchases or upfront funding), and how the program will be evaluated to determine effectiveness for reducing flying-fox impacts to residents. A recent report published by the NSW Department of Planning, Industry & Environment (Mo & Roache 2020) summarised the implementation and efficacy of subsidy programs across six councils in NSW: Eurobodalla, Ku-ring-gai, Cessnock, Tamworth, and Sutherland councils. This report provides insight into the aforementioned factors for council's consideration, if a subsidy program is to be adopted.

Government initiatives that provide financial assistance commonly assess residents' eligibility based on a number of variables, including property distance from a roost, and deliver subsidies as partial or full reimbursements for purchases. It is important to consider that the popularity of certain subsidies likely varies across different communities, so affected residents should be consulted in the process of establishing an effective subsidy program. The NSW subsidy study (Mo & Roache 2020) found managers who design programs that best meet community needs have an increased probability of alleviating human-wildlife conflicts. Critical thresholds of flying-fox numbers at a roost and distance to a roost may also be used to determine when subsidies would apply.

While subsidies have the potential to alleviate flying-fox impacts within a community, they can be negatively received if residents believe there are broader issues associated with flying-foxes that are not being addressed (Mo & Roache 2020). As such, it is important (as with any community-based program) to assess the needs of residents and have open, ongoing communication throughout the program to ensure the subsidies are effectively reducing impacts, and if not, how the program can be adapted to address these needs.

A brief description and examples of property and service-based subsidies is provided below.

Property modification/item subsidies

Fully funding or providing subsidies to property owners for property modifications may be considered to manage the impacts of the flying-foxes. Providing subsidies to install infrastructure may improve the value of the property, which may also offset concerns regarding perceived or actual property value or rental return losses. Focusing funds towards manipulating the existing built environment also reduces the need for modification and removal

of vegetation. Examples of property modification subsidies (as offered by NSW councils) include vehicle covers, carports, clothesline covers, clothes dryers, pool/spa covers, shade cloths, rainwater first-flush diverters, high-pressure water cleaners, air conditioners, fragrance dispensers or deodorisers, double-glazing of windows, door seals, screen planting, tree netting, and lighting (to discourage flying-foxes). Of these, vehicle and clothesline covers and high-pressure water cleaners were the most common subsidies taken by residents (Mo & Roache 2020).

When offered, double-glazing windows was popular amongst residents and was able to achieve a 65% reduction in flying-fox noise (Mo & Roache 2020). Furthermore, in a study by Pearson and Cheng (2018), it was found using infrastructure such as double-glazing windows significantly reduced the external noise level measured inside a house adjacent to a roost. This finding was supported by post-subsidy surveys undertaken by Port Macquarie Hastings Council that showed that double-glazed windows were rated as being more effective in mitigating impacts than any other subsidised option (e.g. high pressure cleaners, clothesline covers, shade cloths etc.) (Reynolds 2021).

Sunshine Coast Council undertook Round 1 of a private property grant trial in July 2021. The trial was used to facilitate property improvement or impact reduction infrastructure on eligible private properties. Feedback from this round confirmed that residents that have lived nearby a roost long-term are more likely to participate in the trial and experience more positive outcomes. It is acknowledged that residents that have only experienced short-term impacts may not be ready yet for this intervention. Council is currently implementing Round 2 of the grant trial where a one-off grant would be provided to eligible residents, which would be supported by ongoing roost management, education, research and monitoring.

Service subsidies

This management option involves providing property owners with a subsidy to help manage impacts on the property and lifestyle of residents. The types of services that could be subsidised include clothes washing, cleaning outside areas and property, solar panel cleaning, car washing, removing exotic trees, or contributing to water/electricity bills. The NSW subsidy study showed that while many property modification subsidies proved popular amongst residents (e.g. high-pressure cleaners, air conditioners), many raised concerns over the increase in water/electricity bills. Increases in bills can be difficult to quantify and justify, and has not yet been effectively offered by a council in a subsidy program.

7.1.4 Revegetation and land management to create alternative habitat

This management option involves revegetating and managing land to create alternative flying-fox roosting habitat through improving and extending existing low conflict camps or developing new roosting habitat in areas away from human settlement.

A 2019 Local Government NSW digital mapping an analysis project identified the Tenambit camp as one of the top 25 camp priorities for habitat restoration in NSW. The justification for this was that the camp is in a very high conflict location, with no potential to move, and nearby Lorn and Hannan Street camps had also been previously identified as high conflict locations. The report recommended a feasibility assessment be undertaken prior to any targeted restoration work.

Council funded an ecological review and options analysis undertaken by environmental consultant Ecosure (2022), which notes the following in relation to the camp:

> *Given its extremely small size (approx. 0.6 ha), small number of remaining roosting trees, and close proximity to (and resulting conflict with) a large number*

of residences, the Tenambit flying-fox camp may not be viable in the long-term. However, active dispersal from Tenambit (see Section 4.1) is not currently recommended due to the risk of splintering the camp to other high-conflict sites. A better alternative might be to encourage the animals to roost elsewhere in the LGA by creating or augmenting flying-fox roosting habitat at low-conflict sites nearby.

Potential target sites were identified for the creation/augmentation of flying-fox roosting habitat in the vicinity of Tenambit (within a 6 km radius of the existing camp). Potential target sites were identified initially based on the July 2021 site assessment and presence of potential flying-fox roosting habitat, and then refined by considering risk of conflict (associated with proximity to sensitive sites and residential areas).

Based on the assessment undertaken, and in consultation with the NSW Flying Fox Habitat Restoration Program Council has developed the Maitland Flying Fox Home Base Project. The project aims to create new habitat (Lower Hunter Spotted Gum Ironbark Forest) to the east of Beryl Humble Oval (see Map 1), which is approximately 1.3 km from the existing flying fox camp in Tenambit (see Map 2). The proposal is based on the recommendations of the ecological review undertaken by Ecosure in 2021, and seeks to entice the current flying fox camp to move to an enhanced habitat site. The site is mapped as being of medium to high habitat potential and very low to low potential conflict. The existing site will be improved with additional plantings covering 9,000 m^2 (in line with favoured species and vegetation structure outlined in Ecosure 2022).

Map 1 Map 2

Figure 9 – Proposed Habitat Augmentation Site

Selecting new sites and attempting to attract flying-foxes to them has had limited success in the past, and ideally, habitat at known camp sites would be dedicated as a flying-fox reserve. However, if a staged and long-term approach is used to make unsuitable current camps less attractive, while concurrently improving appropriate sites, it is a viable option (particularly for the transient and less selective LRFF). Supporting further research into flying-fox camp preferences may improve the potential to create new flying-fox habitat.

7.1.5 Participation in research

This management option involves participating in research to improve knowledge of flying-fox ecology to address the large gaps in our knowledge about flying-fox habits and behaviours and why they choose certain sites for roosting. Further research and knowledge sharing at

local, regional and national levels will enhance our understanding and management of flying-fox camps.

7.1.6 Appropriate land use planning

Land use planning instruments may be able to be used to ensure adequate distances are maintained between future residential developments and existing or historical flying-fox camps. While this management option will not assist in the resolution of existing land use conflict, it may prevent issues for future residents.

7.1.7 Do nothing

The management option to ‘do nothing’ involves not undertaking any management actions in relation to the flying-fox camp and leaving the situation and site in its current state.

7.2 Level 2 actions: in situ management

7.2.1 Buffers

Buffers can be created through vegetation removal, revegetation of non-flying-fox attractant vegetation and/or the installation of permanent/semi-permanent deterrents.

Creating buffers may involve planting low-growing or spiky plants between residents or other conflict areas and the flying-fox camp. Such plantings can create a visual buffer between the camp and residences or make areas of the camp inaccessible to humans.

Buffers greater than 300 metres are likely to be required to fully mitigate amenity impacts (SEQ Catchments 2012). The usefulness of a buffer to mitigate odour and noise impacts generally declines if the camp is within 50 metres of human habitation (SEQ Catchments 2012); however, any buffer will assist and should be as wide as the site allows.

Buffers through vegetation removal

Vegetation removal aims to alter the area of the buffer habitat sufficiently so that it is no longer suitable as a roost. The amount required to be removed varies between sites and roosts, ranging from some weed removal to removal of most of the canopy vegetation.

Any vegetation removal should be done using a staged approach, with the aim of removing as little native vegetation as possible. This is of particular importance at sites with other values (e.g. ecological or amenity), and in some instances the removal of any native vegetation will not be appropriate. Thorough site assessment will inform whether vegetation management is suitable (e.g. can impacts to other wildlife and/or the community be avoided?).

Removing vegetation can also increase visibility into the roost and noise issues for neighbouring residents which may create further conflict.

Suitable experts should be consulted to assist selective vegetation trimming/removal to minimise vegetation loss and associated impacts. The importance of under- and midstorey vegetation in the buffer area for flying-foxes during heat stress events also requires consideration.

Buffers without vegetation removal

Permanent or semi-permanent deterrents can be used to make buffer areas unattractive to flying-foxes for roosting, without the need for vegetation removal. This is often an attractive option where vegetation has high ecological or amenity value.

While many deterrents have been trialled in the past with limited success, there are some options worthy of further investigation:

- Visual deterrents – Visual deterrents such as plastic bags, fluoro vests (GeoLINK 2012) and balloons (Ecosure 2016, pers. comm.) in roost trees have shown to have localised effects, with flying-foxes deterred from roosting within 1–10 metres of the deterrents. The type and placement of visual deterrents would need to be varied regularly to avoid habituation.
- Noise emitters on timers – Noise needs to be random, varied and unexpected to avoid flying-foxes habituating. As such these emitters would need to be portable, on varying timers and a diverse array of noises would be required. It is likely to require some level of additional disturbance to maintain its effectiveness, and ways to avoid disturbing flying-foxes from desirable areas would need to be identified. This is also likely to be disruptive to nearby residents.

- Smell deterrents – Bagged python excrement has been hung in trees at some sites; however, its effectiveness as a deterrent remains unproven. The smell of certain deterrents may also impact nearby residents, while flying-foxes may become used to it.
- Canopy-mounted water sprinklers – This method has been effective in deterring flying-foxes during dispersals (Ecosure personal experience), and trials in Queensland and New South Wales have shown sprinklers are generally effective at deterring flying-foxes from designated buffer zones. This option can be logistically difficult (installation and water sourcing) and may be cost-prohibitive. Design and use of sprinklers needs to be considerate of animal welfare and features of the site; for example, misting may increase humidity and exacerbate heat stress events, and overuse may impact other environmental values of the site and/or lead to flying-foxes becoming habituated.
- Screening plants – A 'screen' can be created by planting a row of trees along the edge of a roost, with the aim of reducing visual impacts associated with flying-foxes. This technique can be particularly useful in cases where residents can suffer extreme reactions triggered by the mere sight of flying-foxes.

Note that any deterrent with a high risk of causing inadvertent dispersal may be considered a Level 3 action.

The use of visual deterrents, in the absence of effective maintenance, could potentially lead to an increase in rubbish in the natural environment.

7.1 Level 3 actions: disturbance or dispersal

7.1.1 Nudging

Noise and other low-intensity active disturbance restricted to certain areas of the camp can be used to encourage flying-foxes away from high conflict areas. This technique aims to actively 'nudge' flying-foxes from one area to another, while allowing them to remain at the camp site.

Unless the area of the camp is very large, nudging should not be done early in the morning as this may lead to inadvertent dispersal of flying-foxes from the entire camp site. Disturbance during the day should be limited in frequency and duration (e.g. up to four times per day for up to 10 minutes each) to avoid welfare impacts. As with dispersal, it is also critical to avoid periods when dependent young are present (as identified by a flying-fox expert).

There is no contiguous habitat at the site so nudging is not suitable and not discussed further.

7.1.2 Dispersal

Dispersal aims to encourage a camp to move to another location, through either disturbance or habitat modification.

There is a range of potential risks, costs and legal implications that are greatly increased with dispersal (compared with in situ management as above). These include:

- impact on animal welfare and flying-fox conservation
- splintering the camp into other locations that are equally or more problematic
- shifting the issue to another area
- impact on habitat value
- effects on the flying-fox population, including potential increase in disease susceptibility and associated public health risk

- impacts to nearby residents associated with ongoing dispersal attempts
- excessive initial and/or ongoing effort and financial investment required
- negative public perception and backlash
- unsuccessful management requiring multiple attempts, which may exacerbate all of the above.

For these reasons, Council does not support dispersal at this stage and it has not been considered further in this CMP.

7.2 Unlawful activities

7.2.1 Culling

Culling is addressed here as it is often raised by community members as a preferred management method**;** however, culling is contrary to the objects of the BC Act and will not be permitted as a method to manage flying-fox camps.

7.3 Site-specific analysis of camp management options

Table 3 Analysis of management options

Definitions and descriptions of each management option are provided in Section 8.

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Level 1 actions				
Education and awareness programs	Fear of disease Noise Smell Faecal drop	$	Low cost, promotes conservation of flying-foxes, contributes to attitude change which may reduce general need for camp intervention and reduce anxiety, increasing awareness and providing options for landholders to reduce impacts can be an effective long-term solution, can be undertaken quickly, will not impact on ecological or amenity value of the site.	Education and advice itself will not mitigate all issues and may be seen as not doing enough.
Property modification	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	$–$$	Property modification is one of the most effective ways to reduce amenity impacts of a camp without dispersal (and associated risks), relatively low cost, promotes conservation of flying-foxes, can be undertaken quickly, will not impact on the site, may add value to the property.	May be cost-prohibitive for private landholders, unlikely to fully mitigate amenity issues in outdoor areas.

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Fully-fund/subsidise property modification **If external grants are available**	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	$–$$	Potential advantages as per property modification, but also overcomes the issue of cost for private landholders.	Costs to the land manager will vary depending on the criteria set for the subsidy including proximity to site, term of subsidy, level of subsidy. Potential for community conflict when developing the criteria, and may lead to expectations for similar subsidies for other issues.
Alternative habitat creation	All	$$–$$$	If successful in attracting flying-foxes away from high conflict areas, dedicated habitat in low conflict areas will mitigate all impacts, promotes flying-fox conservation. Rehabilitation of degraded habitat that is likely to be suitable for flying-fox use could be a more practical and faster approach than habitat creation.	Generally costly, long-term approach so cannot be undertaken quickly, previous attempts to attract flying-foxes to a new site have not been known to succeed.
Research	All	$	Supporting research to improve understanding may contribute to more effectively mitigating all impacts, promotes flying-fox conservation.	Generally cannot be undertaken quickly, management trials may require further cost input.
Appropriate land use planning	All	$	Likely to reduce future conflict, promotes flying-fox conservation. Identification of degraded sites that may be suitable for long-term rehabilitation for flying-foxes could facilitate offset strategies should clearing be required under Level 2 actions.	Will not generally mitigate current impacts, land use restrictions may impact the landholder.
Do nothing	Nil	Nil	No resource expenditure.	Will not mitigate impacts and unlikely to be considered acceptable by the community.

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Level 2 actions				
Buffers without vegetation removal	Noise Smell Health/wellbeing Damage to vegetation Property devaluation Lost rental return	$$	Successful creation of a buffer will reduce impacts, promotes flying-fox conservation, can be undertaken quickly, options without vegetation removal may be preferred by the community.	May impact the site, buffers will not generally eliminate impacts, maintenance costs may be significant, often logistically difficult, limited trials so likely effectiveness unknown.

8. Planned management approach

The planned management approach for the Tenambit flying-fox camp has been prepared based on an ecological assessment of the camp and short and long term management options analysis informed by two supporting reports by environmental consultants Ecosure (2021 and 2022). A summary of the management approach is provided in Table 4.

The following short term management measures have already been undertaken, in accordance with licence conditions where relevant:

- branch trimming to create small buffers between the camp and adjacent properties,
- targeted weed management to improve the health of roosting trees and reduce the risk of these trees being lost and the animals instead roosting closer to surrounding residences,
- commencement of a community engagement and education program to provide accurate information to the local community about flying-foxes.

Council has also resolved to undertake the following:

- Offer subsidies for impacted residents to a total value of $5,000 for mitigation materials such as odour neutralising tools, car and clothesline covers
- Encourage flying-foxes to roost elsewhere in the local government area by creating flying-fox roosting habitat at low-conflict sites nearby. Council has established the Flying Fox Home Base Project, including creation of new habitat (Lower Hunter Spotted Gum Ironbark Forest) to the east of Beryl Humble Oval, approximately 1.3km from the existing flying-fox camp in Tenambit.

In undertaking further management measures, Council will consider the management decision making flow chart provided in Figure 10.

8.1 Stop work triggers

The management program will cease and will not recommence or progress to subsequent levels without consulting the Department if:

- any of the animal welfare triggers occur on more than two days during the program, such as unacceptable levels of stress (see Table 5)
- there is a flying-fox injury or death
- a new camp/camps appear to be establishing
- impacts are created or exacerbated at other locations
- there appears to be potential for conservation impacts (e.g. reduction in breeding success identified through independent monitoring)
- standard measures to avoid impacts (detailed in Section 10.3) cannot be met.

Management may also be terminated at any time if:

- unintended impacts are created for the community around the camp
- allocated resources are exhausted.

Table 4 Management approach overview (Ecosure 2021 and 2022).

Issue	Management aim	Example success measures (recommend one measure only per aim)	Management actions to be considered		
			Level 1 actions	**Level 2 actions**	**Level 3 actions**
Noise	Mitigate noise impacts	Reasonable level of amenity achieved based on independent assessment	• Property modification (if grants are available to provide subsidies) • Appropriate land use planning • Dense planting to create screens at boundaries	• Buffers	• Level 3 actions will not be considered to mitigate this issue
Flying-foxes overhanging pathways/ residential properties	Prevent flying-foxes overhanging pathways/ properties	No roosting flying-foxes overhanging used pathways/residential properties	• Divert/temporarily close paths	• Trim overhanging vegetation	• Level 3 actions will not be considered to mitigate this issue
Faecal drop	Mitigate impacts of faecal drop	Reduce impacts of faecal drop by 80% (e.g. minimal financial impact of cleaning through subsidies)	• Education and awareness (e.g. managing foraging attractants and tips to reduce impacts/fear of disease) • Property modification (if grants are available to provide subsidies) • Appropriate land use planning • Support and promote research to understand site-specific movements/ trials to influence fly-out/in	• Buffers	• Level 3 actions will not be considered to mitigate this issue

Issue	Management aim	Example success measures (recommend one measure only per aim)	Management actions to be considered		
			Level 1 actions	**Level 2 actions**	**Level 3 actions**
Smell	Mitigate impacts of smell	Reasonable level of amenity achieved based on independent assessment	• Education and awareness programs (e.g. ensuring community understand not associated with uncleanliness) • Property modification (if grants are available to provide subsidies) • Appropriate land use planning • Revegetate land elsewhere to create alternative habitat • Support research to determine odour masking techniques (e.g. outdoor odour neutralising trial) • Distribute indoor odour-neutralising gel pots to affected residents	• Buffers	• Level 3 actions will not be considered to mitigate this issue
Fear of disease	Promote awareness that actual disease risk is low	All concerned community members have received and have access to factual information on disease	• Education and awareness programs (e.g. ensuring community understand actual low risk of disease transfer and simple mitigation measures)	• Trim roost vegetation overhanging properties where hygiene protocols may not be sufficient (e.g. childcare centres)	• Level 3 actions will not be considered to mitigate this issue
Health/ wellbeing impacts	Mitigate health and wellbeing impacts	No negative human/flying-fox interactions	• Education and awareness programs • Property modification (if grants are available to provide subsidies) to prevent wellbeing impacts associated with noise • Revegetate land elsewhere to create alternative habitat	• Buffers	• Level 3 actions will not be considered to mitigate this issue

Issue	Management aim	Example success measures (recommend one measure only per aim)	Management actions to be considered		
			Level 1 actions	**Level 2 actions**	**Level 3 actions**
Damage to vegetation	Mitigate impacts to vegetation	Long-term viability of vegetation not at risk/can be rehabilitated (need to assess cost/benefit of impacts associated with damage to vegetation against environmental services provided by flying-foxes and risks of other impacts if camp is dispersed)	• Revegetate land elsewhere to create alternative habitat	• Deterrents from select trees (e.g. netting, wires, sprinklers, etc.)	• Level 3 actions will not be considered to mitigate this issue
Property devaluation	Reduce economic loss associated with potential property devaluation	Property value not being impacted for owners that purchased property prior to camp formation, as assessed through independent valuation	• Property modification (if grants are available to provide (subsidies) • Appropriate land use planning • Revegetate land elsewhere to create alternative habitat	• Buffers	• Level 3 actions will not be considered to mitigate this issue
Lost rental return	Reduce economic loss associated with lost rental return	Rental return is not being impacted for owners that purchased property prior to camp formation, as assessed through an independent valuation	• Property modification (if grants are available to provide subsidies) • Appropriate land use planning • Revegetate land elsewhere to create alternative habitat	• Buffers	• Level 3 actions will not be considered to mitigate this issue

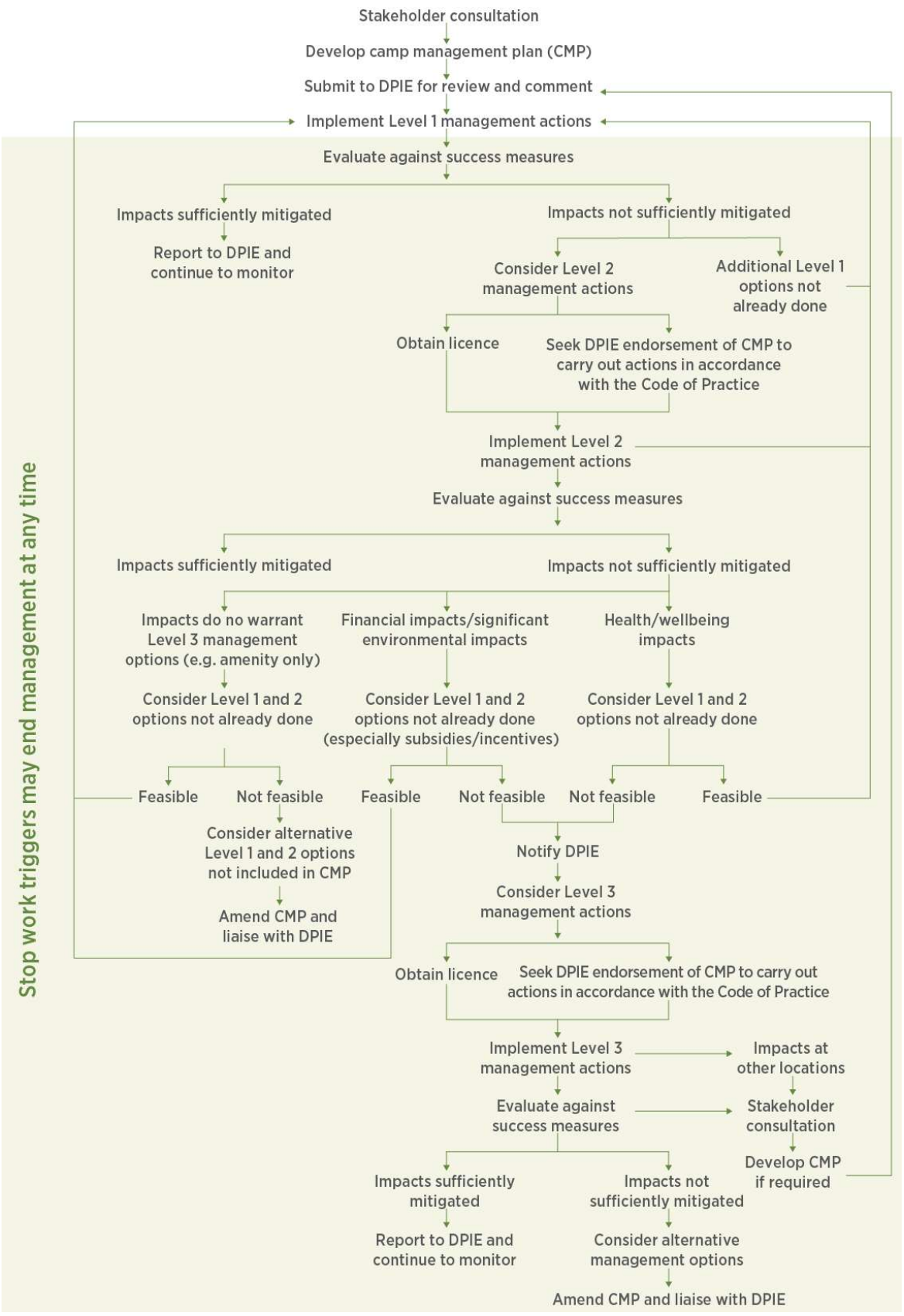


Figure 10 Management decision-making process

Table 5 Planned action for potential impacts during management

A person with experience in flying-fox behaviour (as per Appendix 1) will monitor for welfare triggers and direct works in accordance with the criteria below.

Welfare trigger	Signs	Action
Unacceptable levels of stress	If any individual is observed: • panting • saliva spreading • located on or within two metres of the ground	• Works to cease for the day
Fatigue	In situ management • more than 30% of the camp takes flight • individuals are in flight for more than five minutes • flying-foxes appear to be leaving the camp	• In situ management • Works to cease and recommence only when flying-foxes have settled* / move to alternative locations at least 50 metres from roosting animals
Injury/death	• a flying-fox appears to have been injured/killed on-site (including aborted foetuses) • any flying-fox death is reported within one kilometre of the dispersal site that appears to be related to the dispersal • loss of condition evident	• Works to cease immediately and the Department notified • Rescheduled • Adapted sufficiently so that significant impacts (e.g. death/injury) are highly unlikely to occur, as confirmed by an independent expert (see Appendix 1) • Stopped indefinitely and alternative management options investigated.
Reproductive condition	• females in final trimester • dependent/crèching young present	• Works to cease immediately and the Department notified • Rescheduled • Stopped indefinitely and alternative management options investigated.

*maximum of two unsuccessful attempts to recommence work before ceasing for the day.

9. Assessment of impacts to flying-foxes

All actions which have the potential to impact the flying-foxes will be subject to a licence application to DPE. All actions that would be considered for this camp would be Level 1 and 2 camp management actions which will have minimal impact to the flying-foxes and be aimed at alleviating impact to the residents.

9.1 Regional context

Regional context is addressed by a separate document - Ecosure report 'Tenambit Flying-Fox Options Paper April 2022 Maitland City Council.

9.2 Flying-fox habitat to be affected

The camp consists of approximately 12 large and medium sized trees on 34 Edward Street and 58 David Avenue. Trees are a mixture of native and introduced species, including *E. punctata* and *E. microcorys* and an understory of morning glory and lantana.

9.3 Standard measures to avoid impacts

9.3.1 All management actions

- The following mitigation measures will be complied with at all times during Plan implementation.
- All personnel will be appropriately experienced, trained and inducted. Induction will include each person's responsibilities under this Plan.
- All personnel will be briefed prior to the action commencing each day and debriefed at the end of the day.
- Works will cease and the Department consulted in accordance with the 'stop work triggers' section of the Plan.
- Large crews will be avoided where possible.
- The use of loud machinery and equipment that produces sudden impacts/noise will be limited. Where loud equipment (e.g. chainsaws) is required they will be started away from the camp and allowed to run for a short time to allow flying-foxes to adjust.
- Activities that may disturb flying-foxes at any time during the year will begin as far from the camp as possible, working towards the camp gradually to allow flying-foxes to habituate.
- Any activity likely to disturb flying-foxes so that they take flight will be avoided during the day during the sensitive GHFF/BFF birthing period (i.e. when females are in their final trimester or the majority are carrying pups, generally August – December) and avoided altogether during crèching (generally November/December to February).
- Where works cannot be done at night after fly-out during these periods, it is preferable they are undertaken in the late afternoon close to or at fly-out. If this is also not possible, a person experienced in flying-fox behaviour will monitor the camp for at least the first two scheduled actions (or as otherwise deemed to be required by that person) to ensure impacts are not excessive and advise on the most appropriate methods (e.g. required buffer distances, approach, etc.).

- The Department will be contacted immediately if LRFF are present between March and October or are identified as being in their final trimester/with dependent young.
- Non-critical maintenance activities will ideally be scheduled when the camp is naturally empty. Where this is not possible (e.g. at permanently occupied camps) they will be scheduled for the best period for that camp (e.g. when the camp is seasonally lower in numbers and breeding will not be interrupted, or during the non-breeding season, generally May to July).
- Works will not take place in periods of adverse weather including strong winds, sustained heavy rains, extreme heat, cold temperatures or during periods of likely population stress (e.g. food shortages). Wildlife carers will be consulted to determine whether the population appears to be under stress.
- Works will be postponed on days predicted to exceed 35°C (or ideally 30°C), and for one day following a day that reached ≥35°C. If an actual heat stress event has been recorded at the camp or at nearby camps, a rest period of several weeks will be scheduled to allow affected flying-foxes to fully recover. See the webpage about Responding to heat stress in flying-fox camps.
- Evening works may commence after fly-out. Noise generated by the works should create a first stage disturbance, with any remaining flying-foxes taking flight. Works should be paused at this stage to monitor for any remaining flying-foxes (including crèching young, although December – February should be avoided for this reason) and ensure they will not be impacted. All Level 1 and 2 works (including pack-up) will cease by 0100 to ensure flying-foxes returning early in the morning are not inadvertently dispersed. Works associated with Level 3 actions may continue provided flying-foxes are not at risk of being harmed.
- If impacts at other sites are considered, in the Department's opinion, to be a result of management actions under this Plan, assistance will be provided by the proponent to the relevant land manager to ameliorate impacts. Details of this assistance are to be developed in consultation with the Department.
- Any proposed variations to works detailed in the Plan must be approved, in writing, by the Department before any new works occur.
- The Department may require changes to methods or cessation of management activities at any time.
- Ensure management actions and results are recorded to inform future planning. See the webpage about Monitoring, evaluating and reporting on flying-fox camp management actions.

Human safety

- All personnel to wear protective clothing including long sleeves and pants; additional items such as eye protection and a hat are also recommended. People working under the camp should wash their clothes daily. Appropriate hygiene practices will be adopted such as washing hands with soap and water before eating/smoking.
- All personnel who may come into contact with flying-foxes will be vaccinated against ABLV with current titre.
- A wash station will be available on-site during works along with an anti-viral antiseptic (e.g. Betadine) should someone be bitten or scratched.
- Details of the nearest hospital or doctor who can provide post-exposure prophylaxis will be kept on-site.

Post-works

- Reports for Level 1 actions will be provided to the Department annually. Reports for Level 2 and 3 actions will be submitted to the Department one month after commencement of works and then quarterly for the life of the Plan (up to five years) (for all Level 3 actions and in periods where works have occurred for Level 2 actions). Each report is to include:
    - results of pre- and post-work population monitoring
    - any information on new camps that have formed in the area
    - impacts at other locations that may have resulted from management, and suggested amelioration measures
    - an assessment of how the flying-foxes reacted to the works, with particular detail on the most extreme response and average response, outlining any recommendations for what aspects of the works went well and what aspects did not work well
    - further management actions planned, including a schedule of works
    - an assessment[5] of how the community responded to the works, including details on the number and nature of complaints before and after the works
    - detail on any compensatory plantings undertaken or required
    - expenditure (financial and in-kind costs)
    - Plan evaluation and review (see Section 12).

9.3.2 All Level 2 actions

Prior to works

- Residents adjacent to the camp will be individually notified one week prior to on-ground works commencing. This will include information on what to do if an injured or orphaned flying-fox is observed, a reminder not to participate in or interfere with the program, and details on how to report unusual flying-fox behaviour/daytime sightings. Relevant contact details will be provided (e.g. Program Coordinator). Resident requests for retention of vegetation and other concerns relating to the program will be taken into consideration.
- Where the Plan is being implemented by council, information will be placed on council's website along with contact information.
- The Department will be notified at least 48 hours before works commence.
- A protocol for flying-fox rescue, in accordance with the NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes (OEH 2012), will be developed including contact details of rescue and rehabilitation organisations. This protocol will be made available to all relevant staff, residents and volunteers prior to the action commencing. See Appendix 8 for an example protocol.
- A licensed wildlife carer trained in flying-fox rescue and appropriately vaccinated will be notified prior to beginning works in the event that rescue/care is required.

Monitoring

- A flying-fox expert (identified in Section 13.3) will undertake an on-site population assessment prior to, during works and after works have been completed, including:
    - number of each species

[5] A similar approach should be taken to pre-management engagement (see Section 3) to allow direct comparison, and responses should be assessed against success measures (Section 9) to evaluate success.

    - ratio of females in their final trimester
    - approximate age of any pups present including whether they are attached or likely to be crèched
    - visual health assessment
    - mortalities.
- Counts will be done at least:
    - once immediately prior to works
    - daily during works
    - immediately following completion
    - one month following completion
    - 12 months following completion.

During works

- A flying-fox expert (identified in Section 13.3) will attend the site as often as the Department considers necessary to monitor flying-fox behaviour and ensure compliance with the Plan and the Policy. They must also be able to identify pregnant females, flightless young, individuals in poor health and be aware of climatic extremes and food stress events. This person will assess the relevant conditions and advise the supervisor/proponent whether the activity can go ahead.
- Deterrents in buffer areas will be assessed by a flying-fox expert so those that may cause inadvertent dispersal (e.g. canopy-mounted sprinklers) are not used during fly-in.
- At least one flying-fox rest day with no active management will be scheduled fortnightly, preferably weekly. Static deterrents (e.g. canopy-mounted sprinklers) may still be used on rest days.

9.3.3 Vegetation trimming/removal

- Deadwood and hollows will be retained on-site where possible as habitat.
- Vegetation chipping is to be undertaken as far away from roosting flying-foxes as possible (at least 100 metres).
- Vegetation removal should not involve the clearing of all vegetation supporting a nationally important flying-fox camp. Sufficient vegetation must be retained to support the maximum number of flying-foxes ever recorded in the camp.

9.3.4 Canopy vegetation trimming/removal

Prior to works

- Trees to be removed or lopped will be clearly marked (e.g. with flagging tape) prior to works commencing, to avoid unintentionally impacting trees to be retained.

During works

- Any tree lopping, trimming or removal is undertaken under the supervision of a suitably qualified arborist (minimum qualification of Certificate III in Horticulture (Arboriculture) who is a member of an appropriate professional body such as Arboriculture Australia).
- Trimming will be in accordance with relevant Australian Standards (e.g. AS4373 Pruning of Amenity Trees), and best practice techniques used to remove vegetation in a way that avoids impacting other fauna and remaining habitat.

- No tree in which a flying-fox is roosting will be trimmed or removed. Works may continue in trees adjacent to roost trees only where a person experienced in flying-fox behaviour assesses that no flying-foxes are at risk of being harmed. A person experienced in flying-fox behaviour is to remain on-site to monitor when canopy trimming/removal is required within 50 metres of roosting flying-foxes.
- While most females are likely to be carrying young (generally September – January) vegetation removal within 50 metres of the camp will only be done in the evening after fly-out, unless otherwise advised by a flying-fox expert.
- Tree removal as part of management will be offset at a ratio of at least 2:1. Where threatened vegetation removal is required, the land manager will prepare an Offset Strategy to outline a program of restoration works in other locations (in addition to existing programs). The strategy will be submitted to the Department for approval at least two months prior to commencing works.

9.3.5 Weed management

- All works will be carried out by suitably qualified and experienced bush regenerators, with at least one supervisor knowledgeable about flying-fox habitat requirements (and how to retain them for Level 1 and 2 actions) and trained in working under a camp.
- Vegetation modification, including weed removal, will not alter the conditions of the site such that it becomes unsuitable flying-fox habitat.
- Weed removal should follow a mosaic pattern, maintaining refuges in the mid- and lower storeys at all times.
- Weed control in the core habitat area will be undertaken using hand tools only (or in the evening after fly-out while crèching young are not present).
- Species selected for revegetation will be consistent with the habitat on-site, and in buffer areas or conflict areas should be restricted to small shrubs/understorey species to reduce the need for further roost tree management in the future.

10. Evaluation and review

The Plan will have a scheduled review annually, which will include evaluation of management actions against measures shown in Section 8.

The following will trigger additional reviews of the Plan:

- completion of a management activity
- progression to a higher level of management
- changes to relevant policy/legislation
- new management techniques becoming available
- outcomes of research that may influence the Plan
- incidents associated with the camp.

Results of each review will be included in reports to the Department (as per reporting timing outlined in Section 10.3.1).

If the Plan is to remain current, a full review including stakeholder consultation and expert input will be undertaken in the final year of the Plan's life prior to being resubmitted to the Department.

11. Plan administration

11.1 Monitoring of the camp

Camp will continue to be monitored by wildlife carers under the National Flying Fox Monitoring Program. Council will undertake periodic site assessments and maintain open communication with residents.

11.2 Reporting

Reporting will be one on as needs basis relating to the obligations related to licences or certificates associated with proposed works.

11.3 Management structure and responsibilities

Council does not generally undertake work on private property however will assist implementation of this Plan in consultation with relevant landholders where the camp is located.

Council will oversee approved works on land within its care and control or by Council resolution on private land, and will ensure compliance with this Plan, the NSW Flying-fox Camp Management Code of Practice 2018 and any accompanying licences. Council roles and responsibilities are outlined in Table 7.

11.4 Adaptive management

At any time that actions within this plan create an adverse impact to residents or the camp, the activity will cease and be reviewed in the context of this plan. As further research is undertaken and more relevant information on flying-fox behaviour becomes available, this plan will be amended to reflect those learnings.

11.5 Funding commitment

Funding commitments are outlined in Table 6 below. This program is assisted by the New South Wales Government through its Environmental Trust in association with Local Government NSW.

Table 6 – Funding Commitments for implementation of the Tenambit Flying-fox Camp Management Plan

Item	Amount	Funding body	Council Resolution
Maitland Flying Fox Home Base Project including habitat augmentation and community education 2022 - 2030	$109,700	Local Government NSW Flying Fox Habitat Restoration Program	26 July 2022
	$62,758	Council in-kind support	26 July 2022
Tree trimming and weed management	$15,000	Council	27 July 2021
Mitigation materials support to affected residents adjoining the existing Tenambit camp	$5,000	Council	27 July 2021

Table 7: Maitland City Council Roles and responsibilities

Role	Name	Required experience/approvals	Responsibilities/authority	Communication lines
Program Coordinator	Coordinator, Natural Environment & Resilience	Project management Human resource management Community engagement Reporting	Inform and consult with stakeholders and interested parties Community engagement Evaluate program Submit reports to DPIE/DEE Ensure all landowners have provided consent prior to works	Reports to: Manager Environment & Sustainability Direct reports: Project Manager
Project Manager	Sustainability Officer	Project management Team leadership and coordination Data management	Coordinate field teams and ensure all personnel are appropriately experienced and trained for their roles Induct all personnel to the program Collect and collate data Liaise with DPIE and DEE Liaise with wildlife carers/veterinarians (for orphaned/injured wildlife only)	Reports to: Program Coordinator Direct reports: Supervisor, Contractor
Supervisor	Sustainability Officer supported by flying fox expert as required	Knowledgeable in flying-fox biology, behaviour and camp management (see Appendix 1 for detail) ABLV-vaccinated and trained in flying-fox rescue Team training, leadership and supervision	Pre- and post-management monitoring Surrounding camp monitoring Coordinate daily site briefings Coordinate daily activities Monitor flying-fox behaviour Rescue flying-foxes if required (and no carer/vet on-site) Determine daily works end point Participate in management activities	Reports to: Project Manager Direct reports: Team members, Observers/support
Team member	As required	Recommended ABLV-vaccinated (employer to assess risk)	Attend daily site briefings	Reports to: Supervisor Direct reports: Nil

		Ideally, all team knowledgeable in flying-fox biology, behaviour and camp management; however, not required	Participate in relevant management activities	
Contractor e.g. arborist	As required	Relevant licences and experience in field	Conduct specified activities (e.g. tree trimming) Adhere to all directions given by Supervisor	Reports to: Project Manager Direct reports: Nil
Observer/support	Hunter Wildlife Rescue	Approval to access site	Provide care of injured/orphaned wildlife (under licence) if required	Reports to: Supervisor Direct reports: Nil
Flying-fox expert	External consultant	See Appendix 2	On-site population assessment, monitor flying-fox behaviour and ensure compliance with the Plan	Reports to: Supervisor Direct reports: Nil

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Appendix 1 MNES, threatened species and ecological communities that may occur within 2 km of the camp

Species name	Common name	Status	Likelihood of occurring
Threatened ecological communities			
Central Hunter Valley eucalypt forest and woodland		Critically Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community		Endangered	Community may occur within area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland		Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria		Critically Endangered	Community likely to occur within area
Threatened ecological communities			
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus	Australasian Bittern	Endangered	Species or species habitat known to occur within area
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	Species or species habitat known to occur within area
Callocephalon fimbriatum	Gang-gang Cockatoo	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus	Red Goshawk	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos	Grey Falcon	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta	Painted Honeyeater	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus	White-throated Needletail	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor	Swift Parrot	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri	Western Alaskan Bar-tailed Godwit	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis	Eastern Curlew	Critically Endangered	Species or species habitat may occur within area
Pycnoptilus floccosus	Pilotbird	Vulnerable	Species or species habitat may occur within area
Rostratula australis	Australian Painted Snipe	Endangered	Species or species habitat known to occur within area
Litoria aurea	Green and Golden Bell Frog	Vulnerable	Species or species habitat likely to occur within area
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus	Spotted-tail Quoll	Endangered	Species or species habitat likely to occur

Species name	Common name	Status	Likelihood of occurring
maculatus (SE mainland population)			within area
Petauroides volans	Greater Glider	Vulnerable	Species or species habitat likely to occur within area
Petaurus australis australis	Yellow-bellied Glider	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus	Koala	Endangered	Species or species habitat likely to occur within area
Potorous tridactylus tridactylus (northern)	Long-nosed Potoroo	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae	New Holland Mouse	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Species or species habitat likely to occur within area
Caladenia tessellata	Thick-lipped Spider-orchid	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Cryptostylis hunteriana	Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area
Eucalyptus glaucina	Slaty Red Gum	Vulnerable	Species or species habitat may occur within area
Euphrasia arguta		Critically Endangered	Species or species habitat may occur within area
Persicaria elatior	Knotweed	Vulnerable	Species or species habitat may occur within area
Pomaderris brunnea	Rufous Pomaderris	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum sp. Wybong	a leek-orchid	Critically Endangered	Species or species habitat may occur within area
Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Species or species habitat may occur within area
Rhodomyrtus psidioides	Native Guava	Critically Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum	Magenta Lilly Pilly	Vulnerable	Species or species habitat may occur within area
Tetratheca juncea	Black-eyed Susan	Vulnerable	Species or species habitat likely to occur within area
Thesium australe	Austral Toadflax	Vulnerable	Species or species habitat may occur within area

Appendix 2: Expert assessment requirements

The Plan template identifies where expert input is required. The following are the minimum required skills and experience which must be demonstrated by each expert.

Flying-fox expert

Essential

- Knowledge of flying-fox habitat requirements.
- Knowledge and experience in flying-fox camp management.
- Knowledge of flying-fox behaviour, including ability to identify signs of flying-fox stress.
- Ability to differentiate between breeding and non-breeding females.
- Ability to identify females in final trimester.
- Ability to estimate age of juveniles.
- Experienced in flying-fox population monitoring including static and fly-out counts, demographics and visual health assessments.

Desirable

- It is strongly recommended that the expert is independent of the Plan owner to ensure transparency and objectivity. The Department may be able to help with finding flying-fox experts.
- ABLV-vaccinated (N.B. This is often an essential requirement during management implementation as detailed within the template).
- Trained in flying-fox rescue (N.B. This is often an essential requirement during management implementation as detailed within the template).
- Local knowledge and experience.

Ecologist

Essential

- At least five years demonstrated experience in ecological surveys, including identifying fauna and flora to species level, fauna habitat and ecological communities.
- The ability to identify flora and fauna, including ground-truthing of vegetation mapping.
- Formal training in ecology or similar, specifically flora and fauna identification.

Desirable

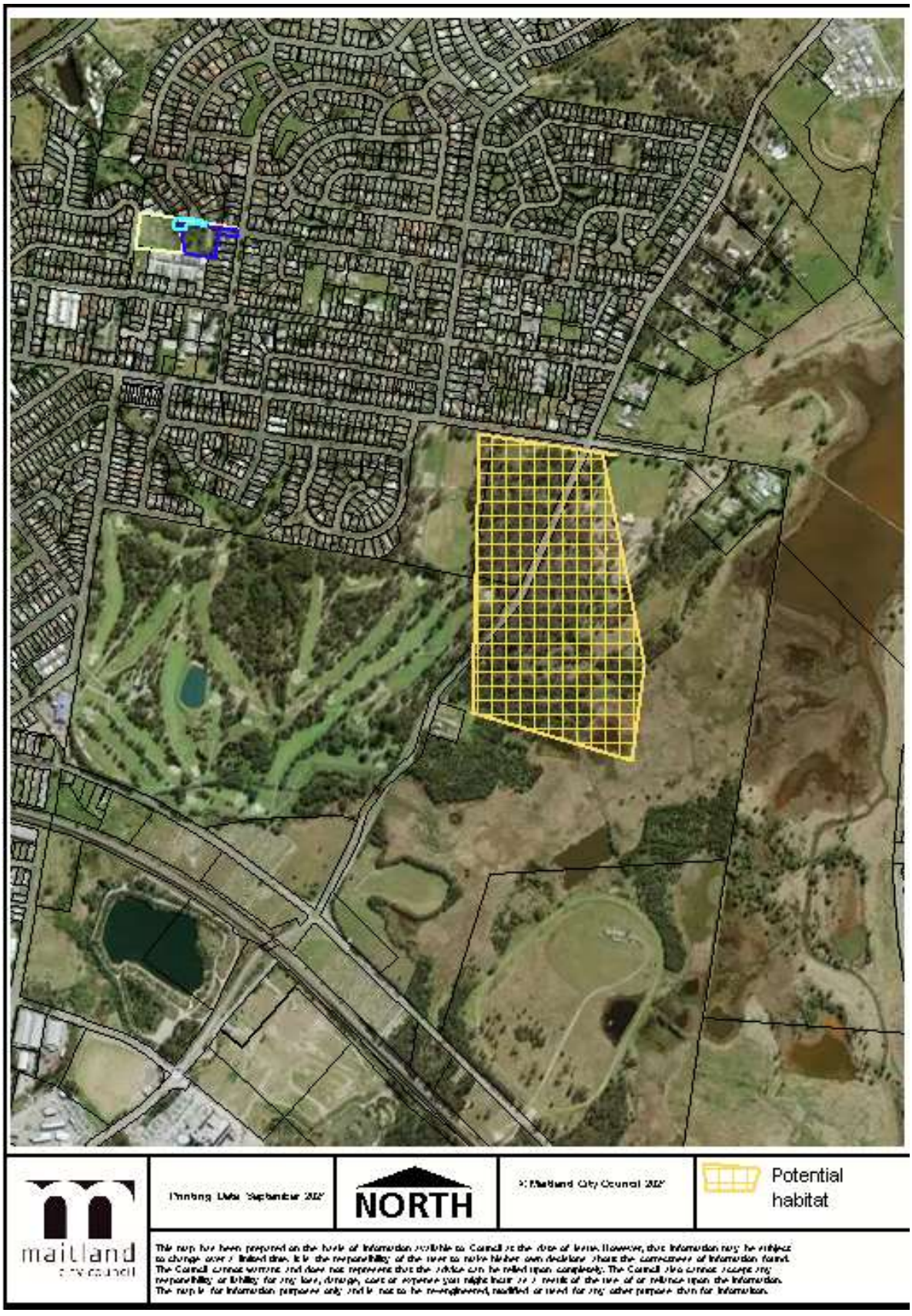
- Tertiary qualification in ecology or similar.
- Local knowledge and experience.
- Accredited Biodiversity Assessment Method assessor under the *Biodiversity Conservation Act 2016*.
- Practising member of the Ecological Consultants Association of NSW.

Depending on the site, for example, when vegetation management is proposed for an endangered ecological community or an area with a high likelihood of containing other

threatened flora and fauna species, a specialist in that field (e.g. specialist botanist) may be required.

Appendix 3: Tenambit Camp maps

Local potential habitat map



Appendix 4: Summary of other key legislation likely to apply at some camps

Local government legislation

Local government is required to prepare planning schemes (including environmental planning instruments and development control plans) consistent with provisions under the *Environmental Planning and Assessment Act 1979* (EP&A Act; see Section 4.1.4 of the template).

Local environment plans are environmental planning instruments that are legal documents and that relate to a local government area. Other environmental planning instruments, such as state environmental planning policies (SEPPs), may relate to the whole or part of the state. A development control plan provides detailed planning and design guidelines to support the planning controls in a Local Environment Plan, but they are not legal documents.

Planning schemes enable a local government authority to manage growth and change in their local government area (LGA) through land use and administrative definitions, zones, overlays, infrastructure planning provisions, assessment codes and other administrative provisions. A planning scheme identifies the kind of development requiring approval, as well as zoning all areas within the LGA based on the environmental values and development requirements of that land. Planning schemes could potentially include a flying-fox habitat overlay and may designate some habitat as flying-fox conservation areas.

State legislation

Rural Fires Act 1997

The objects of this Act are to prevent, mitigate and suppress bushfires, coordinate bush firefighting, while protecting persons from injury or death and property from damage from fire. A permit is generally required from the Rural Fire Service for any fires in the open that are lit during the local Bush Fire Danger Period as determined each year. This may be relevant for fires used to disperse flying-foxes, or for any burning associated with vegetation management.

Protection of the Environment Operations Act 1997

The main object of the *Protection of the Environment Operations Act 1997* (POEO Act) is to set out explicit protection of the environment polices (PEPs) and adopt more innovative approaches to reducing pollution.

The use of smoke as a dispersal mechanism may constitute ‘chemical production’ under Schedule 1, clause 8 of the POEO Act, so this type of dispersal activity may require a licence under Chapter 3 of the Act.

The POEO Act also regulates noise including ‘offensive noise’. The Protection of the Environment Operations (Noise Control) Regulation 2017 (Part 4) provides information on the types of noise that can be ‘offensive’ and for which the Environment Protection Authority (EPA) can issue fines. This may include noise generated as a part of dispersal activities. It is best to discuss the types of noise makers and the sound levels and times these will be generated, along with identified noise receptors, with council prior to any dispersal. Detailed advice and guidance on noise regulation can be found in the EPA’s Noise Guide for Local Government (EPA 2013).

Crown Land Management Act 2016

The principles of Crown land management include the observance of environmental protection principles and the conservation of its natural resources, including water, soil, flora, fauna and scenic quality. Any works on land that is held or reserved under the *Crown Land Management*

Act 2016 (including vegetation management and dispersal activities) are an offence under the Act without prior authorisation obtained through Department of Planning, Industry and Environment (Lands).

Local Government Act 1993

The primary purpose of this Act is to provide the legal framework for the system of local government. Most relevant to flying-fox management is that it also provides encouragement for the effective participation of local communities in the affairs of local government and sets out guidance on the use and management of community land which may be applicable to land which requires management of flying-foxes.

State Environmental Planning Policies

SEPPs are environmental planning instruments that address specific planning issues within New South Wales. These SEPPs often remove power from local councils in order to control specific types of development or development in specific areas. SEPPs often transfer decision-making from councils to the Planning Minister. While there may be others, some of the SEPPs likely to apply at some flying-fox camps are outlined below.

SEPP (Coastal Management) 2018

The aim of this policy is to promote an integrated and coordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the *Coastal Management Act 2016*.

Development consent must be obtained before any clearing of native vegetation, earthworks, construction of levees, draining or environmental protection works can occur on a mapped coastal wetland or littoral rainforest.

Camps are unlikely to fall within the bounds of a mapped coastal wetland, but additional restrictions for vegetation management in these areas may be required if they do. It is unlikely that clearing for flying-fox management in mapped littoral rainforest would be considered significant enough to trigger this policy, but this should be confirmed if the site is within a mapped littoral rainforest.

SEPP 19 – Bushland in Urban Areas

The aim of this policy is to protect and preserve bushland within urban areas defined in Schedule 1 of the SEPP. Broadly, this covers most LGAs within the Greater Sydney Region. It does not cover:

- land reserved or dedicated under the *National Parks and Wildlife Act 1974*
- state forests, flora reserves or timber reserves under the *Forestry Act 1916*
- land to which SEPP (Western Sydney Parklands) 2009 applies.

Bushland within the designated LGAs may not be disturbed without the consent of the council unless the disturbance is for: bushfire hazard reduction, facilitating recreational use of the bushland in accordance with a plan of management referred to in clause 8 of the policy, or essential infrastructure such as electricity, sewerage, gas or main roads. If the land owned by the proponent is zoned as SEPP 19 bushland, council approval would be required under this SEPP.

Council should be contacted to discuss any potential disturbance associated with camp management.

Appendix 5: Additional human and animal health information

Flying-fox camps in public places, such as parks, school grounds and residential areas can sometimes raise concerns for community members about possible health risks. Human infections with viruses borne by flying-foxes are very rare. There is no risk of being infected with these viruses as long as people do not come into physical contact with flying-foxes.

Australian bat lyssavirus

Australian Bat Lyssavirus (ABLV) is a rabies-like virus that may be found in all flying-fox species on mainland Australia. It has also been found in an insectivorous microbat and it is assumed it may be carried by any bat species. The probability of human infection with ABLV is very low with less than 1% of the flying-fox population being affected (DPI 2017) and transmission requiring direct contact with an infected animal that is secreting the virus. In Australia, three people have died from ABLV infection since the virus was identified in 1996 (NSW Health 2015).

Domestic animals are also at risk if exposed to ABLV. In 2013, ABLV infections were identified in two horses (Shinwari et al. 2014). There have been no confirmed cases of ABLV in dogs in Australia; however, transmission is possible (McCall et al. 2005) and consultation with a veterinarian should be sought if exposure is suspected.

Transmission of the virus from bats to humans is through a bite or scratch but may have potential to be transferred if bat saliva directly contacts the eyes, nose, mouth or broken skin. ABLV is unlikely to survive in the environment for more than a few hours, especially in dry environments that are exposed to sunlight (NSW Health 2015).

Transmission of closely related viruses suggests that contact or exposure to bat faeces, urine or blood does not pose a risk of exposure to ABLV, nor does living, playing or walking near bat roosting areas (NSW Health 2015).

The incubation period in humans is assumed similar to rabies and variable between two weeks and several years. Similarly, the disease in humans presents essentially the same clinical picture as classic rabies.

Once clinical signs have developed the infection is invariably fatal; however, infection can easily be prevented by avoiding direct contact with bats (i.e. handling).

Pre-exposure vaccination provides reliable protection from the disease for people who are likely to have direct contact with bats, and it is generally a mandatory workplace health and safety requirement that all persons working with bats receive pre-exposure vaccination and have their level of protection regularly assessed. Like classic rabies, ABLV infection in humans also appears to be effectively treated using post-exposure vaccination and so any person who suspects they have been exposed should seek immediate medical treatment. Post-exposure vaccination is usually ineffective once clinical manifestations of the disease have commenced.

If a person is bitten or scratched by a bat they should:

- wash the wound with soap and water for at least five minutes (**do not scrub**)
- contact their doctor immediately to arrange for post-exposure vaccinations.

If bat saliva contacts the eyes, nose, mouth or an open wound, flush thoroughly with water and seek immediate medical advice.

Hendra virus

Flying-foxes are the natural host for Hendra virus, which can be transmitted from flying-foxes to horses. Infected horses sometimes amplify the virus and can then transmit it to other horses, humans and on two occasions, dogs (DPI 2018). There is no evidence that the virus can be passed directly from flying-foxes to humans or to dogs (Halim et al. 2015). Clinical studies have shown cats, pigs, ferrets and guinea pigs can carry the infection (DPI 2018).

Although the virus is periodically present in flying-fox populations across Australia, the likelihood of horses becoming infected is low and consequently, human infection is extremely rare. Horses are thought to contract the disease after ingesting forage or water contaminated with urine from an infected flying-fox (CDC 2014).

Humans may contract the disease after close contact with an infected horse. Hendra virus infection in humans presents as a serious and often fatal respiratory and/or neurological disease and there is currently no effective post-exposure treatment or vaccine available for people. The mortality rate in horses is greater than 70% (DPI 2018). Since 1994, more than 100 horses have died (Degeling et al. 2018) and four of the seven infections in humans were fatal (Goldspink et al. 2015).

Previous studies have shown that infections of horses have been associated with foraging flying-foxes rather than camp locations. Therefore, risks are considered similar at any location within the range of flying-fox species and all horse owners should be vigilant. Vaccination of horses can protect horses and subsequently humans from infection (DPI 2018), as can appropriate horse husbandry (e.g. covering food and water troughs, fencing flying-fox foraging trees in paddocks, etc.).

Although all human cases of Hendra virus to date have been contracted from infected horses and direct transmission from bats to humans has not yet been reported, particular care should be taken by select occupational groups that could be uniquely exposed. For example, persons who may be exposed to high levels of Hendra virus via aerosol of heavily contaminated substrate should consider additional personal protective equipment (PPE), e.g. respiratory filters, and potentially dampening down dry dusty substrate.

General health considerations

Flying-foxes, like all animals, carry bacteria and other microorganisms in their guts, some of which are potentially pathogenic to other species. Direct contact with faecal material should be avoided and general hygiene measures taken to reduce the low risk of gastrointestinal and other diseases.

Contamination of water supplies by any animal excreta (birds, amphibians and mammals such as flying-foxes) poses a health risk to humans. Household tanks should be designed to minimise potential contamination, such as using first-flush diverters to divert contaminants before they enter water tanks. Trimming vegetation overhanging the catchment area (e.g. the roof of a house) will also reduce wildlife activity and associated potential contamination. Tanks should also be appropriately maintained and flushed, and catchment areas regularly cleaned to remove potential contaminants.

Public water supplies are regularly monitored for harmful microorganisms and are filtered and disinfected before being distributed. Management plans for community supplies should consider whether any large congregation of animals, including flying-foxes, occurs near the supply or catchment area. Where they do occur, increased frequency of monitoring should be considered to ensure early detection and management of contaminants.

Appendix 6: Dispersal results summary

Roberts and Eby (2013) summarised 17 known flying-fox dispersals between 1990 and 2013, and made the following conclusions:

- In all cases, dispersed animals did not abandon the local area[6].
- In 16 of the 17 cases, dispersals did not reduce the number of flying-foxes in the local area.
- Dispersed animals did not move far (in approx. 63% of cases the animals only moved <600 metres from the original site, contingent on the distribution of available vegetation). In 85% of cases, new camps were established nearby.
- In all cases, it was not possible to predict where replacement camps would form.
- Conflict was often not resolved. In 71% of cases, conflict was still being reported either at the original site or within the local area years after the initial dispersal actions.
- Repeat dispersal actions were generally required (all cases except where extensive vegetation removal occurred).
- The financial costs of all dispersal attempts were high, ranging from tens of thousands of dollars for vegetation removal to hundreds of thousands for active dispersals (e.g. using noise, smoke, etc.).

Ecosure, in collaboration with a Griffith University Industry Affiliates Program student, researched outcomes of management in Queensland between November 2013 and November 2014 (the first year since the current Queensland state flying-fox management framework was adopted on 29 November 2013).

An overview of findings[7] is summarised below.

- There were attempts to disperse 25 separate roosts in Queensland (compared with nine roosts between 1990 and June 2013 analysed in Roberts and Eby (2013)). Compared with the historical average (less than 0.4 roosts/year) the number of roosts dispersed in the year since the framework was introduced has increased by 6250%.
- Dispersal methods included fog[8], birdfrite, lights, noise, physical deterrents, smoke, extensive vegetation modification, water (including cannons), paintball guns and helicopters.
- The most common dispersal methods were extensive vegetation modification alone and extensive vegetation modification combined with other methods.
- In nine of the 24 roosts dispersed, dispersal actions did not reduce the number of flying-foxes in the LGA.
- In all cases, it was not possible to predict where new roosts would form.
- When flying-foxes were dispersed, they did not move further than six kilometres away.
- As at November 2014 repeat actions had already been required in 18 cases.
- Conflict for the council and community was resolved in 60% of cases, but with many councils stating they feel this resolution is only temporary.

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[6] Local area is defined as the area within a 20-kilometre radius of the original site = typical feeding area of a flying-fox.

[7] This was based on responses to questionnaires sent to councils; some did not respond and some omitted responses to some questions.

[8] Fog refers to artificial smoke or vapours generated by smoke/fog machines. Many chemical substances used to generate smoke/fog in these machines are considered toxic.

- The financial costs of all dispersal attempts were considerable, regardless of methods used, ranging from $7500 to more than $400,000 (with costs ongoing).

Appendix 7: Biodiversity conservation licences

Planning, Industry & Environment

Ms Deanne Nelson-Pritchard
Coordinator Environmental Strategy & Programs
Maitland City Council
285-287 High Street
MAITLAND NSW 2320
Australia

Our ref: DOC21/792687-5
Licence number: C0006344
Contact: Robert Gibson, 4927 3154

16 September 2021

Dear Ms Nelson-Pritchard

Threatened Species Licence to pick two trees at 58 David Avenue, Tenambit

I refer to your application to Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment (the Department) dated 9 September 2021 for a Threatened Species Licence, a class of biodiversity conservation licence under Part 2 of the *Biodiversity Conservation Act 2016* (BC Act), for tree works to two trees at 58 David Avenue, Tenambit in the Maitland Local Government Area.

The Department understands that the two trees are usually occupied by roosting flying-foxes, including grey-headed flying-foxes, and overhang 13 Natalie Close, thereby leading to frequent noise, smell and faecal drop for the residents at the house. Removing the branches would create a buffer between the house and flying-fox camp. The two trees are part of a local occurrence of Lower Hunter Spotted Gum – Ironbark Forest of the Sydney Basin Bioregion endangered ecological community. The trees would be removed when flying-foxes are not roosting at the site, to minimise disturbance to local grey-headed flying-foxes.

I have assessed your application in accordance with the provisions of the BC Act and the *Biodiversity Conservation Regulation 2017* and have decided to grant a threatened species licence for the proposed activity. An extract of the conditions and a description of the proposed action are provided in **Attachment 1**. If you require any further information regarding this matter, please contact Robert Gibson, Regional Biodiversity Conservation Officer, on 4927 3154 or via email at huntercentralcoast@environment.nsw.gov.au

Yours sincerely

STEVEN CRICK

Senior Team Leader Planning

Hunter Central Coast Branch

Biodiversity and Conservation Division

16 September 2021

Threatened Species Licence

Biodiversity Conservation Act 2016

Planning, Industry & Environment

ATTACHMENT 1

Threatened species licence, a class of biodiversity conservation licence under Part 2 of the *Biodiversity Conservation Act 2016*, to:

- harm or pick a threatened species, threatened ecological community or protected plant or animal, and
- damage habitat of a threatened species or threatened ecological community

Licence number: C0006344
Date granted: 16 September 2021
Date of expiry: 31 December 2022

Granted To:

Ms Deanne Nelson-Pritchard
Coordinator Environmental Strategy & Programs
Maitland City Council
deannen@maitland.nsw.gov.au

Description of proposed works:

The proposed works would be undertaken on Lot 4 DP 513051 at 58 David Avenue, Tenambit in the Maitland Local Government Area (**Figure 1**). The two branches to be removed overhang Lot 282 DP 835099 at 13 Natalie Close, Tenambit. The two branches are from two different Grey Gum (*Eucalyptus punctata*) (**Figure 2**). The trees occur on private property, owned by Anglican Church Newcastle. In an e-mail dated 9 September 2021 (Anglican Church Newcastle) they endorsed Maitland City Council to undertake the tree works on the Anglican Care land.

The flying-fox camp has been occupied since March 2017 and is usually occupied during the warmer months but has been used year-round during some years. The licence application states that flying-foxes vacated the camp in May 2021 and had not yet returned. This provides an opportunity to undertake the tree works to create a buffer between 13 Natalie Close and the flying-fox camp. Tree works would not occur if flying-foxes were present and would be done during the day while the camp is unoccupied. Or if the flying-foxes return, the tree works would be undertaken at night when the flying-foxes are foraging. An ecologist would direct the tree works and a wildlife carer would be on the site during the works.

The two Grey Gums for part of a small patch of Lower Hunter Spotted Gum – Ironbark Forest of the Sydney Basin Bioregion endangered ecological community that was mapped on site by WSP (WSP, 2018).

The tree works are proposed to be undertaken as soon as the Biodiversity Conservation (Threatened Species) Licence has been issued and will also be dependent upon the availability of a suitably qualified arborist, and actions allowed under current Covid-19 restrictions.

ATTACHMENT 1

Figure 1. Locality Plan showing the location of the property at 13 Natalie Close – tan roofed house to the left of the end of the road, and trees on the lot to the south.

Figure 2. Two branches proposed to be removed (from Ecosure, 2021).

Threatened Species Licence

Biodiversity Conservation Act 2016

NSW GOVERNMENT | Planning, Industry & Environment

ATTACHMENT 1

Licence conditions:

1. The works must be carried out in accordance with the information provided in the application provided to the Department of Planning Industry and Environment on 9 September 2021, unless otherwise stated in the following conditions.
2. Prior to any tree works, the trees must be assessed by a qualified arborist to provide advice on how to tree lopping may be done to ensure that the trees remain healthy and stable.
3. The tree works can only occur when there are no lying-foxes roosting at 58 David Avenue, Tenambit or any adjacent property.
4. The applicant must notify the Senior Team Leader Planning, Hunter Central Coast Branch of Biodiversity Conservation Division of the Department of Planning, Industry and Environment within seven (7) days of the tree lopping works being carried out. The notification must state the date that the tree works were conducted and describe the extent of branch removal. The notification shall be provided to the Senior Team Leader Planning, Hunter Central Coast via email sent to huntercentralcoast@environment.nsw.gov.au.

Note it is an offence under s2.14(4) of the *Biodiversity Conservation Act 2016* to breach a condition of a licence.

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STEVEN CRICK

Senior Team Leader Planning

Hunter Central Coast

Biodiversity and Conservation Division

(by Delegation)

Dated: 16 September 2021

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Planning, Industry & Environment

Ms Deanne Nelson-Pritchard
Coordinator Environmental Strategy & Programs
Maitland City Council
285-287 High Street
MAITLAND NSW 2320
Australia

Our ref: DOC21/905814-3
Licence number: C0006376
Contact: Robert Gibson, 4927 3154

9 November 2021

Dear Ms Nelson-Pritchard

Threatened Species Licence to pick two trees at 58 David Avenue, Tenambit

I refer to your application to Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment (the Department) dated 14 October 2021 for a Threatened Species Licence, a class of biodiversity conservation licence under Part 2 of the *Biodiversity Conservation Act 2016* (BC Act), for the installation of a sprinkler system in two trees in a drainage reserve at Tenambit in the Maitland Local Government Area.

The Department understands that the proposal is to place a sprinkler system into two Liquidambar trees in a Council Reserve (Lot 22 DP 264358) between Natalie Close and David Avenue. The two trees are briefly and infrequently used by roosting flying-foxes and they are located to the north of the Tenambit Flying-fox Camp on Lot 4 DP 513051. Flying-foxes roost often enough in two trees for local residents to have requested their removal, due to the smell and noise generated when the trees are used. Instead, Council will use sprinklers to deter flying-foxes from using the Liquidambars are a roosting site.

I have assessed your application in accordance with the provisions of the BC Act and the *Biodiversity Conservation Regulation 2017* and have decided to grant a threatened species licence for the proposed activity. An extract of the conditions and a description of the proposed action are provided in **Attachment 1**. If you require any further information regarding this matter, please contact Robert Gibson, Regional Biodiversity Conservation Officer, on 4927 3154 or via email at huntercentralcoast@environment.nsw.gov.au

Yours sincerely

STEVEN CRICK

Senior Team Leader Planning

Hunter Central Coast Branch

Biodiversity and Conservation Division

9 November 2021

Threatened Species Licence

Biodiversity Conservation Act 2016

NSW GOVERNMENT | Planning, Industry & Environment

ATTACHMENT 1

Threatened species licence, a class of biodiversity conservation licence under Part 2 of the *Biodiversity Conservation Act 2016*, to:

- harm or pick a threatened species, threatened ecological community or protected plant or animal, and
- damage habitat of a threatened species or threatened ecological community

Licence number: C0006376
Date granted: 9 November 2021
Date of expiry: 31 December 2022

Granted To:

Ms Deanne Nelson-Pritchard
Coordinator Environmental Strategy & Programs
Maitland City Council
deannen@maitland.nsw.gov.au

Description of proposed works:

The proposed works would be undertaken on Lot 22 DP 264358, adjacent to 9 Natalie Close (Lot 30 DP 264358), at Tenambit in the Maitland Local Government Area (**Figure 1**). A sprinkler system would be installed in two Liquidambar (*Liquidambar styraciflua*) trees in a drainage reserve to the north of 58 David Avenue (Lot 4 DP 513051) on which the core area of the Tenambit flying-fox camp occurs. The Liquidambars occur on Crown Land managed by Maitland City Council. The licence application states that the Liquidambar trees are used periodically and usually briefly by grey-headed flying-foxes. However, local residents have requested that the trees are cut down to provide relief from noise and smell when the trees are used by roosting bats. However, Council is willing to trial the use of sprinklers to deter flying-foxes from roosting in the trees in a way that does not permanently remove the roosting resource. It also allows for management actions to change if there a risk that flying-foxes could instead be moving to more undesirable locations, such as to the grounds of the nearby Linuwel School.

The Tenambit flying-fox camp has been occupied since March 2017 and is usually occupied during the warmer months but has been used year-round during some years. The licence application states that flying-foxes vacated the camp in May 2021 and returned on 11 October 20201. However, in a phone call on 3 November 2021, Council stated that flying-foxes had left the camp in the last two weeks had not yet returned.

The sprinkler system is proposed to be installed as soon as the Biodiversity Conservation (Threatened Species) Licence has been issued.

ATTACHMENT 1

Figure 1. Locality Plan showing the location of the Liquidambars in the drainage reserve west of 9 Natalie Close –house with a shed, both with a red roof.

Threatened Species Licence

Biodiversity Conservation Act 2016

NSW GOVERNMENT | Planning, Industry & Environment

ATTACHMENT 1

Licence conditions:

1. The works must be carried out in accordance with the information provided in the application provided to the Department of Planning Industry and Environment on 15 October 2021, unless otherwise stated in the following conditions.
2. An appropriately qualified flying-fox expert shall be present during installation of the sprinklers to ensure conditions are complied with.
3. Prior to operation of the sprinklers, Council shall liaise with relevant wildlife carers and residents to ensure awareness of the action.
4. No installation works or operation of sprinklers will occur when flying-foxes are heavily pregnant or birthing. For Grey-headed Flying-foxes, this typically occurs in August – November inclusive.
5. No installation works or operation of sprinklers will occur when dependent young are present or when young are crèched. For Grey-headed Flying-foxes, this typically occurs in December – February inclusive.
6. No installation works or operation of sprinklers are to occur if flying-foxes occupy branches within 3 metres of the works.
7. Sprinklers shall operate for no longer than two hours at a time to coincide with sunrise and the return of flying-foxes to roost.
8. Sprinklers shall operate for no longer than one hour continuously at any other time.
9. Sprinklers shall impact no more than 15% of roosting habitat at any one time.
10. Council and/or its nominated representative shall monitor the area impacted by the action and provide quantitative and anecdotal evidence to BCD, using monitoring datasheets provided with this licence.
11. Monitoring shall occur one week prior to initial operation of the sprinklers, and one week after sprinklers have stopped operation.
12. Monitoring shall occur weekly during periods when sprinklers are in use.
13. Monitoring shall occur during sunrise no less than twice per calendar month to coincide with flying-fox return to roost.
14. Council shall provide a report on the action to Biodiversity Conservation Division of the Department of Planning, Industry and Environment. The report must be provided every three months from the date of the first operation of the sprinklers, until operation ceases, using the report template provided. This shall include counts, species present, condition of animals, and the presence of pregnant females or females with young, triggers for sprinkler use, as well as any comments received from residents about the action. The report shall be provided to the Senior Team Leader Planning, Hunter Central Coast via email sent to huntercentralcoast@environment.nsw.gov.au
15. Council shall provide the reports until 31 December 2022.
16. Council must immediately cease the action and immediately notify BCD where any flying foxes, as a result of the activity:
    a. Have been or appear to have been killed, or

b. Have been, or appear to have been injured, or

c. Are displaying signs of stress or fatigue.

Note it is an offence under s2.14(4) of the *Biodiversity Conservation Act 2016* to breach a condition of a licence.

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STEVEN CRICK

Senior Team Leader Planning

Hunter Central Coast

Biodiversity and Conservation Division

(by Delegation)

Dated: 9 November 2021

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Appendix 8: Example flying-fox rescue protocol

Reference documents:

Office of Environment and Heritage (OEH) 2012, NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes, Office of Environment and Heritage, Sydney.

Office of Environment and Heritage (OEH) 2011, NSW Code of Practice for Injured, Sick and Orphaned Protected Fauna, Office of Environment and Heritage, Sydney.

Purpose

These work instructions are intended for licensed and ABLV-vaccinated wildlife rescue personnel on-site during dispersal activities to monitor, capture or provide first aid treatment for sick or injured flying-foxes that may require human intervention for their survival. Flying-fox rescue must only be attempted by personnel trained and experienced in flying-fox rescue and handling.

This work instruction provides rescuers with information regarding capture and first aid until a flying-fox is in the specialist care of a veterinarian or licensed bat carer.

Requirements

Wildlife rescue personnel involved in flying-fox rescue must:

- be trained and experienced in flying-fox rescue and handling
- be vaccinated against ABLV (titre levels checked at least once every two years)
- be aware of the hazards and risks of coming into contact with bats
- utilise appropriate PPE and equipment for capture, transport and treatment of flying-foxes
- undertake a risk assessment before carrying out a rescue – do not endanger yourself or others during a rescue
- have the contact details for a local veterinarian or bat carer who will accept the sick or injured flying-fox.

Human first aid

All bats in Australia should be viewed as potentially infected with ABLV. If bitten or scratched by a bat, immediately wash the wound with soap and water (do not scrub) and continue for at least five minutes, followed by application of an antiseptic with anti-viral action (e.g. Betadine), and immediate medical attention (post-exposure vaccinations may be required). Similarly, medical attention should be immediately sought if exposed to an animal's saliva or excreta through the eyes, nose or mouth.

Equipment

- lidded plastic carry basket or 'pet-pack' with bedding (juveniles) / transport container with hanging perch, tall enough for bat to hang without hitting its head (in accordance with Section 5.1 of the NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes (OEH 2012))
- warm water bottle/cold brick
- wraps /towels
- teats for small bottle

- extension pole or broom
- bat first aid kit – juice drink/glucose powder, syringes, cloths for wounds, Betadine/saline, dummy for flying-fox pups. Flying-foxes are only to be offered liquids under advice from a licensed bat carer.

Work instructions

Case assessment

Observe, assess and then determine if/what intervention is required using the decision tree below, adapted from the NSW Code of Practice for Injured, Sick and Orphaned Protected Fauna (OEH 2011).

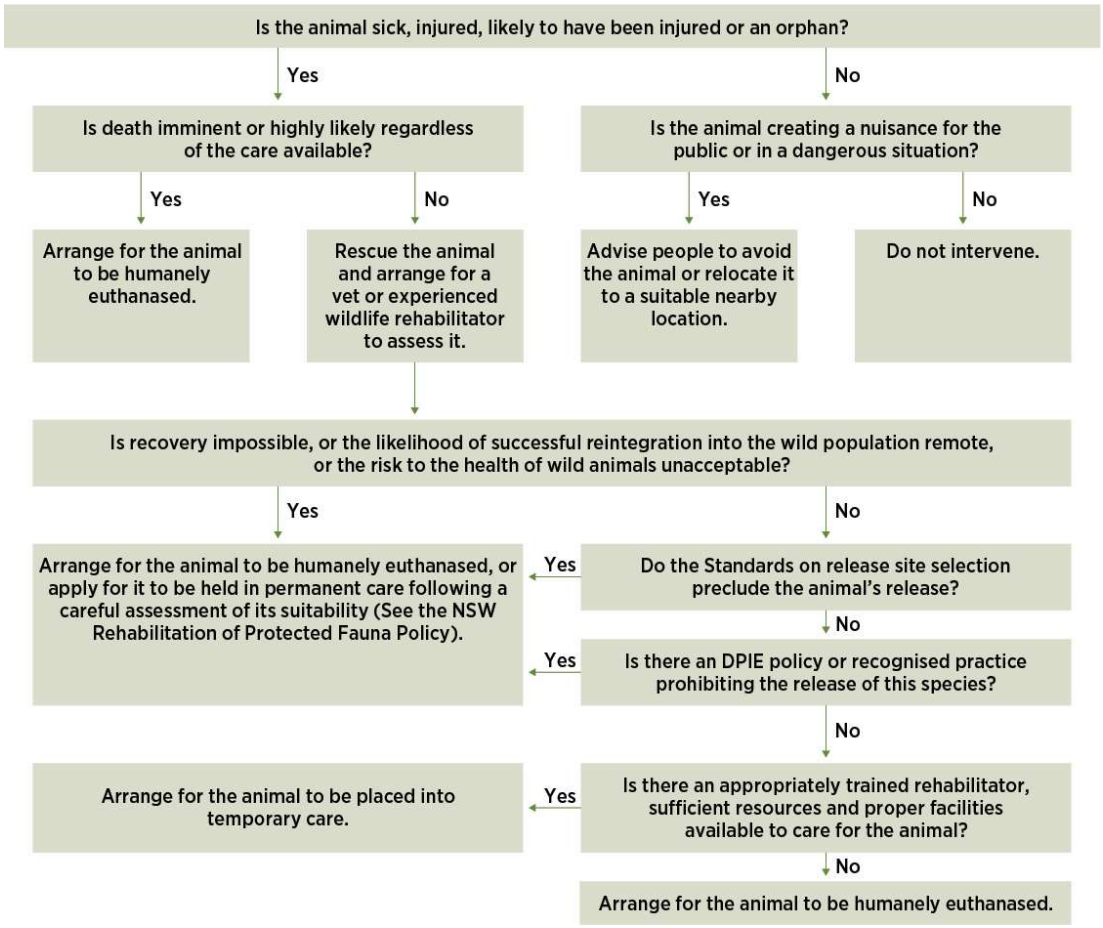

Figure 1 Assessment process

Personnel should approach stressed flying-foxes cautiously. If flying-foxes panic or fly this will waste energy; retreat and continue to monitor behaviour.

Stressed flying-foxes can be identified by the following clinical signs:

- Dehydration: Eyes dull or depressed in skull, change to skin elasticity, skin stays pinched, animal cold, wing membranes dry, mouth dry.
- Heat stress: wing fanning, shade seeking, clustering/clumping, salivating, panting, roosting at the base of trees, on the ground, falling from tree.
- Obvious injury: bleeding, broken bones.

Rescue instructions

As per Section 4 of the NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes (OEH 2012):

i The objective is to rescue a flying-fox while minimising further stress and injury to the animal.

ii Before a rescue attempt, rescuers must assess the risks to the flying-fox from environmental hazards and from capture.

iii Rescuers must employ the correct rescue equipment for the condition and location of the flying-fox and be trained in its use.

Example scenarios

1. Bat low in tree:
    - quickly place towel around bat before it can move away
    - grab hold of feet, toes may curl over rescuer's fingers
    - place in carry basket/transport container.
2. Bat high in tree:
    - place pole wrapped in towel in front of bat
    - coax bat onto towel
    - once on towel, quickly move away from branches and lower to ground
    - once on ground, cover with towel and place into carry basket/transport container.
3. A bat caught on barbed wire fence:
    - two people only – one to restrain with towel, while the other untangles
    - put towels on the wire strands under or around to avoid further entanglement
    - if the membrane has dried onto wire, syringe or spray water onto wing
    - use pliers or wire cutter if necessary.

Animal first aid

Physical assessment: Keep animal wrapped and head covered, only expose one part at a time. Examine head. Unwrap one wing and extend. Wrap and extend other wing. Check legs. Examine front and back of body.

Dehydration: Offer water/juice (low acid juice only, e.g. apple/mango) orally with syringe (under supervision/advice from licensed wildlife carer **only**).

Heat stress: Reduce temperature in heat exhausted bats by spraying wings with tepid water.

Hypothermia: May be seen in pups separated from mother – keep head covered and warm core body temperature slowly by placing near (not on) warm water bottle covered by towel.

Bleeding: Clean wounds with room temperature saline or diluted Betadine.

Transport to veterinarian/wildlife carer

See Section 5 of the NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes (OEH 2012) summarised below.

Objective

To transport a flying-fox so as to minimise further stress and injury to the animal.

Standards

a. The transport container must be tall enough for the flying-fox to hang by its feet without hitting its head on the floor.
b. The container must be designed, set up and secured to prevent injuries to the flying-fox. The sides of the container must prevent the flying-fox from poking its head or wings out.
c. The container must be designed to prevent the flying-fox from escaping.
d. The flying-fox must be allowed to hang by its feet from the top of the container or if it is unable to hang, wrapped in material (e.g. sheet or flannel) and placed in a sling so its feet are higher than its head.
e. The container must be kept at a temperature which is appropriate for the age and condition of the flying-fox. A range of 25–27°C is appropriate for an adult. A temperature of 28°C is appropriate for an orphan. A cool or warm water bottle may be required.
f. The container must be ventilated so air can circulate around the flying-fox.
g. The container must minimise light, noise and vibrations and prevent contact with young children and pets.
h. During transport, a container holding a flying-fox must have a clearly visible warning label that says ‘Warning – live bat’.
i. A flying-fox must not be transported in the back of an uncovered utility vehicle or a car boot that is separate from the main cabin.

Guidelines

- Flying-fox transport should be the sole purpose of the trip and undertaken in the shortest possible time.
- The wildlife rehabilitation group’s contact details should be written on the transport container in case of an emergency.