



Flying-fox Camp Management Plan Tarban Creek

**Tarban Creek Flying Fox
Camp Management Plan**

July 2020

Hunters Hill Council

Flying-fox Camp Management Plan Tarban Creek

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Statement of Authorship

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Limitations Statement

Information presented in this report is based on an objective study undertaken in response to the brief provided by the client. Any opinions expressed in this report are the professional, objective opinions of the authors and are not intended to advocate any particular proposal or pre-determined position.

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We acknowledge and appreciate the Original People of this place the Wallumategal clan and the 1000s of years of connection with the Country and their knowledge of seasons and cycles. First Peoples have strong connections with flying-foxes and we appreciate the knowledge of camps sizes, locations and fluctuations over 1000s of years.

The input of all stakeholders is highly valued and has been used in the development of this plan.

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We acknowledge input by the NSW Office of Environment and Heritage, and consultants Ecosure, in developing the template on which this Camp Management Plan is based. Peggy Eby also provided advice which was included in the template. An array of other studies were used as background and case studies and these are referenced in the reading list.

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Acronyms and abbreviations

ABLV	Australian bat lyssavirus
BC Act	Biodiversity Conservation Act (2016)
BFF	Black flying-fox (<i>Pteropus alecto</i>)
CMP	Camp Management Plan
DoE	Commonwealth Department of the Environment
DPI	Department of Primary Industries (NSW)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPA	Environment Protection Authority (NSW)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
GHFF	Grey-headed flying-fox (<i>Pteropus poliocephalus</i>)
the Guideline	Referral guideline for management actions in grey-headed and spectacled flying-fox camps 2015 (Commonwealth)
HeV	Hendra virus
LGA	Local government area
LGNSW	Local Government NSW
LRFF	Little red flying-fox (<i>Pteropus scapulatus</i>)
MNES	Matters of national environmental significance
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
NPWS	National Parks and Wildlife Service (NSW)
OEH	Office of Environment and Heritage (NSW)
PEPs	Protection of the environment policies
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
the Policy	Flying-fox Camp Management Policy 2015 (NSW)
SEPPs	State Environmental Planning Policies
SIS	Species impact statement
TEC	Threatened ecological community

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Recommendation	Symbol
Expert assessment/input required (see section 1 for minimum requirements)	
Stakeholder consultation / engagement required	
Further approvals may be required	
Mapping required	
Monitoring required	

Appendices

Appendix 1 Legislation and Policy

Appendix 2. Community Engagement Feedback

Appendix 3. Species Profiles

Appendix 4. Flying Fox Ecology and Behaviour

Appendix 5. Requirements: expert assessment requirements, Section 91 licence application form & legislation likely to apply

Appendix 6. Desktop ecological assessment guidelines

Appendix 7. Human and animal health

Appendix 8. General Camp Management Options

Appendix 9. Assessment of impacts to Flying Foxes

Appendix 10. Assessment of impacts to other threatened species or communities

Appendix 11. Example flying-fox rescue protocol including the NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes.

1. Overview

Hunter's Hill Council has prepared a Camp Management Plan (CMP) for the Tarban Creek Grey-headed flying-fox camp, which will guide the future management of the camp. Council engaged Ecological Consultants Australia Pty Ltd to provide expert input into the plan.

Community feedback has helped Council develop the CMP. Council has sought community views on both the impacts of the flying-fox camp and the outcomes people hope management of the flying-fox camp will achieve.

Extensive consultation was undertaken and information and views gathered are included within this plan.

1.1 How to use the plan

The information provided by this document should be used as a guide for Hunter's Hill Council to decide on appropriate management measures for the Tarban Creek Grey-headed flying-fox camp. It includes background information on the Grey-Headed Flying-Fox, ecological values of the site, results from community consultation, camp management options, administrative details plus additional information included in the addendum.

For information regarding specific camp management options at the Tarban Creek camp, see section 5.1 – table 8.1. **Table 1.0(a-c) and 8.1 must be read in conjunction with one another.** This will assist in providing background information on actions and outline the strategy for council going forward.

1.1.1 Summary of management actions for Hunters Hill Council

This section outlines the specific and meaningful management actions that can be applied by council to the Tarban Creek GHFF camp. The aim is to provide clear guidance to council by summarising what may be required when satisfying individual actions.

The CMP includes mitigation measures that are classed into three levels. Each level has actions that are increasing in impact. Level one actions need to be performed prior to Level two or Level three. (Level two and three actions will still require approval from the NSW State Government (DPIE) before being undertaken). Progressive implementation of actions occurs until the impacts are reduced to an acceptable level. The aim is to reduce the impact of the flying-foxes on the surrounding environment while being consistent with legal requirements.

The point at which the following level of actions can be implemented has been detailed under each table within the following section. The implementation of such actions does not follow a timeline. All actions (level one – three) must be investigated, implemented and monitored for success. If these actions prove to be unsuccessful, then the ensuing level of actions can be executed.

The tables below (1.0a -1.0c) outline the proposed actions to be adopted by council. For detail on all management actions - costing, timing, advantages/disadvantages and suitability to Hunters Hill Council - please refer to table 8.1.

Table 1.0a. A summary of the adopted level one management actions and advice to assist with implementation. See also table 8.1 for detail on all potential management actions.

Level One		
Management Option	Action for Council	Advice moving forward
Education and awareness programs	Adopt	<ul style="list-style-type: none"> • Council to provide factual information on living near FF camps. • Specifically on disease, as it was a top community concern. • Council host Walks and Talks at least annually covering all aspects of ecology of the park including the FF.
Routine camp management	Adopt	<ul style="list-style-type: none"> • Continue with routine maintenance. • Identify priority areas for planted vegetation – away from dwellings but within camp vicinity.
Odour reducing/ Screening Plants	Adopt	<ul style="list-style-type: none"> • Implement immediately, seek advice from ecologists for planting opportunities, species, costs, maintenance.
Alternative habitat creation	Adopt	<ul style="list-style-type: none"> • Develop action plan - Alternative habitat design, location, implementation strategy.
Protocols to manage incidents	Adopt	<ul style="list-style-type: none"> • Build on existing guidelines as required.
Research	Adopt	<ul style="list-style-type: none"> • Research should be implemented in conjunction with other management actions such as; alternative habitat creation and provision of artificial roosting habitat. • Council can provide in-kind contribution to research. External funding from public and/or private organisations would be required for council to facilitate this option internally.
Appropriate land-use planning	Adopt	<ul style="list-style-type: none"> • Consider any proposed re-zoning within 100m of the camp. • Recommendations for appropriate mitigation provisions in DAs.

Recommended point at which level two actions can be implemented –If level one actions identified above in table 1.0a do not reduce the impacts from the GHFF camp, to an acceptable level, then level two options can be implemented. DPIE approval will be required to advance to level two actions.

Level one actions are in accordance with the Flying-fox CMP Template (OEH, 2015c). All management actions must be considered, adopted (where feasible) and continually monitored, once implemented. All management actions which are considered have been included in table 8.1. Tables 1.0a -1.0c include actions which have been proposed for adoption by council.

Table 1.0b. A summary of the adopted level two management actions and advice to assist with implementation. See also table 8.1 for detail on all potential management actions.

Level Two		
Management Option	Action for Council	Advice moving forward
Buffers through vegetation removal/mgt	Adopt	<ul style="list-style-type: none"> Investigate and develop options paper for managing and reducing roost trees adjoining residence – ensure no net loss of habitat. Seek approval from DPIE for level two actions
Buffers without vegetation removal	Adopt	<ul style="list-style-type: none"> Investigate and develop action plan – identify buffers to be used and priority residence identified. Seek approval from DPIE for level two actions Actions may form part of external funding - i.e. buffer trials and/or research.

Recommended point at which level three actions can be implemented –If level two actions identified above in table 1.0b do not reduce the impacts from the GHFF camp, to an acceptable level, then level three options can be implemented. DPIE approval will be required to advance to level three actions.

Level two actions are in accordance with the Flying-fox CMP Template (OEH, 2015c). All management actions must be considered, adopted (where feasible) and continually monitored, once implemented. All management actions which are considered have been included in table 8.1. Tables 1.0a -1.0c include actions which have been proposed for adoption by council.

Table 1.0c. A summary of the adopted level three management actions and advice to assist with implementation. See also table 8.1 for detail on all potential management actions.

Level Three		
Management Option	Action for Council	Advice moving forward
Nudging	Adopt	<ul style="list-style-type: none"> Investigate and develop action plan for when trigger point is reached. Implement level one and two actions prior.
Active dispersal	Adopt	<ul style="list-style-type: none"> Investigate and develop action plan. Not recommended and it would require State and Federal government approval. Often ineffective.
Early dispersal before a camp is established at a new location	Adopt	<ul style="list-style-type: none"> Investigate and develop action plan. Option if other camps form in the Council area. Securing funding and identify potential areas for where FF camps may naturally establish.

1.2 Objectives

Objectives listed are consistent with the objectives of the [NSW Flying-fox Camp Management Policy 2015](#) (the Policy) (OEH 2015b) and reflect the purpose of the CMP. Objectives also consider the interests/concerns raised by community during surveys and other engagement.

The objectives of this CMP are:

Management outcomes

- implement an adaptive management approach to camp management based on evidence
- provide a reasonable level of amenity for the surrounding community
- minimise impacts to the community, while conserving flying-foxes and their habitat
- manage public health and safety risks
- clearly define roles and responsibilities
- enable long-term conservation of flying-foxes
- improve community understanding and appreciation of flying-foxes, including their critical ecological role

Understanding flying-fox dynamics of the site

- understand the camp dynamics as far as possible including population fluctuations and movement of flying foxes between camps and major habitat areas
- understand the use of the site by the flying foxes including for roosting and breeding
- understand the carry-capacity of the camp including the use of the environmental features (trees etc) by flying-foxes.



Effective input into the CMP and on-going management

- effectively communicate with stakeholders during planning and implementation of management activities

Management implementation

- ensure flying-fox welfare is a priority during all works
- clearly outline the camp management actions that have been approved and will be utilised at the camp
- enable land managers and other stakeholders to use a range of suitable management responses to sustainably manage flying-foxes
- ensure management is sympathetic to flying-fox behaviours and requirements



Planning and legislation

- ensure camp management is consistent with broader conservation management strategies that may be developed to protect threatened species/communities
- ensure management activities are consistent with the NSW Flying-fox Camp Management Policy (OEH 2015b)
- facilitate licence approval (where required) for actions at the camp
- ensure camp management does not contribute to loss of biodiversity or increase threats to threatened species/communities

General biodiversity management in the area of the camp

This plan also considers the following especially how actions to manage these values could be effected by GHFF camp management and vice versa.

- Other ecological values of the site including threatened species/communities management and the retention and strengthening of the corridor for small birds.
- Assessment of impacts to flora and fauna of any proposed management actions.
- Assessment of impacts to other threatened species or communities such as Saltmarsh, Mangroves, Sydney Turpentine Ironbark Forest and the Powerful Owl.
- Water quality

2. Context

2.1 Camp area

The camp is located in Riverglade Reserve along Tarban Creek between Manning Road and the unmade road extension of Mary Street, between the suburbs of Gladesville, Huntleys Cove and Hunters Hill (refer to map Figure 2.1).

The camp extent as at August 2018 is shown in Figure 2.1 The camp currently covers approximately 1.1 hectares, with approximately 2ha of suitable contiguous camp habitat remaining.



Figure 2.1 The camp extent as at August 2018

All of the optimal habitat has GHFF roosting within it. Extra capacity is expected to first come from an increase in density then an expansion of area.



Figure 2.2 Forested area including core habitat zone 2.3 ha



Figure 2.3 Core habitat zone 1.3ha – used during the 2017-2018 sampling events



Figure 2.4 Less Suitable habitat away from water – lower value habitat 2.5ha



Figure 2.5 Mangroves 0.75ha – not used by GHFF and waterway (blue-line) location



Figure 2.6 Tarban Creek 1943 – noting GHFF habitat present at this time. Source SixMaps



Figure 2.7 Core GHFF colony and 20m buffer

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7m buffer (yellow) road

20m buffer (pink)

Roosting habitat (hatched)

Optimal habitat (yellow outline)

Optimal Roost area is approximately 1.2ha (11,750m²)

Optimal Roost is in close proximity (within 40m) to the open water



Figure 2.8a Vegetated Land within the GHFF Plan

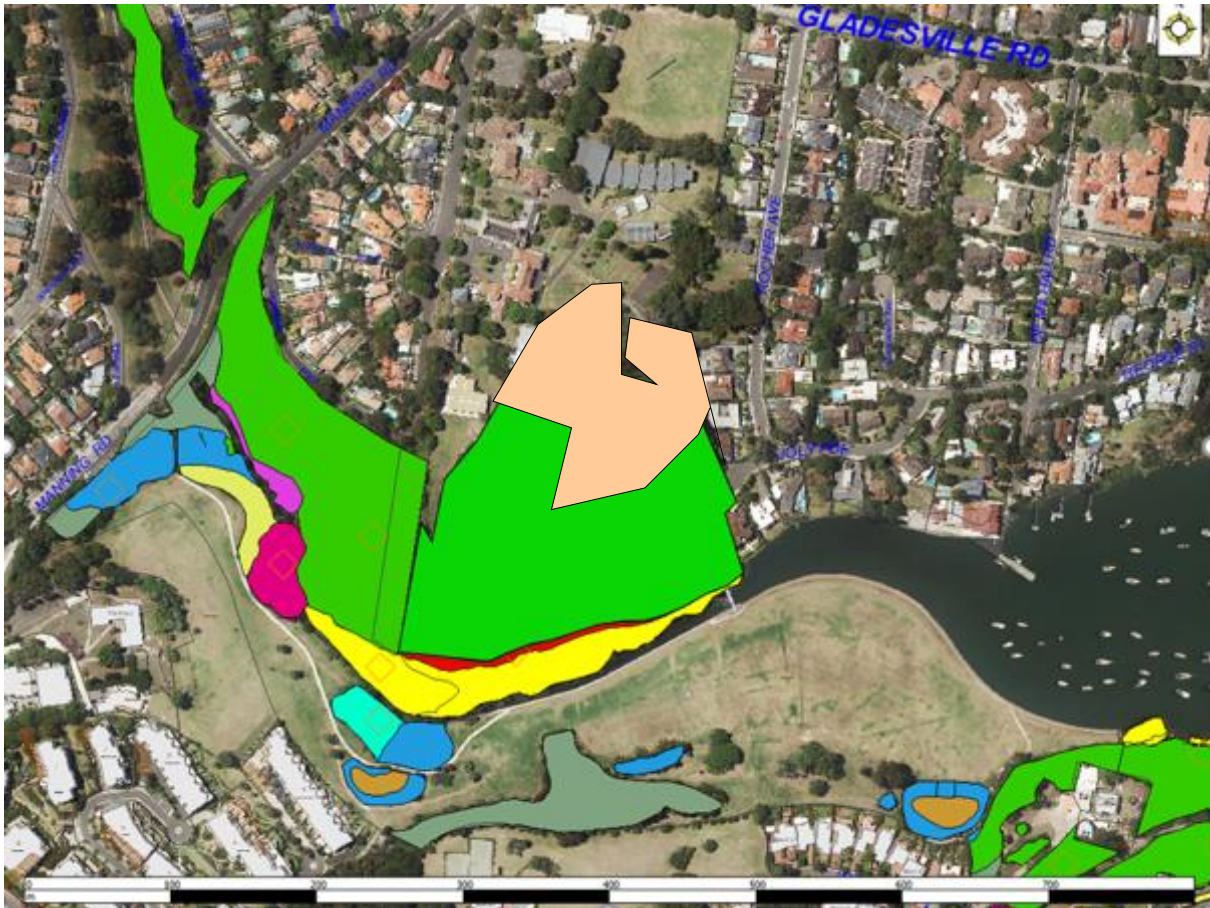


Figure 2.8b Detailed Vegetation communities in Riverglade Reserve

Legend:

- Green = Coastal Sandstone Foreshores Forest
- Pinks = Exotic Closed Forest
- Red = Coastal Saltmarsh
- Yellow = Mangroves including remnants of Coastal Saltmarsh
- Light Blue = Sydney Freshwater Wetlands
- Peach = Sydney Turpentine/Ironbark Forest

2.1.1 History of the camp since 1900

The camp was first recorded in May, 2010 between Manning Road and The Priory, and is now permanently occupied and serves as a maternity site. It is occupied mostly by Grey-headed flying-fox and occasional Black flying-fox. However individuals of these species were anecdotally observed at the site at least 10 years prior to 2010. The camp moved to the current Tarban Creek site between November 2013 and February 2014. The maximum total number of flying-foxes ever recorded at the camp was [8,000, and proportion of each species] in [February, 2015].

The maximum number of flying-foxes recorded at the camp is 8000 in February 2015 (John Martins).

GHFF are the most abundant species at the Tarban Creek camp. Black Flying-foxes (BFF) *Pteropus alecto* are present though in lower numbers than GHFF with maximums around 2000. Black Flying-foxes are not recorded on site each year and records from other parts of Sydney indicate BFF were first reported roosting in Sydney in the summer of 2006 – 2007.

Black Flying-foxes appear to be migrating in a southerly direction. Evidence from coastal areas north from the Clarence Valley and in the tablelands of southeast Queensland during the past 20 years show that the numbers of Grey-headed Flying-foxes relative to those of Black Flying-foxes have declined markedly .

The rate of increase in Black Flying-foxes in northern New South Wales has been particularly rapid in the past 10 years and numbers may increase at Tarban Creek. Monitoring is required to know if this is occurring.

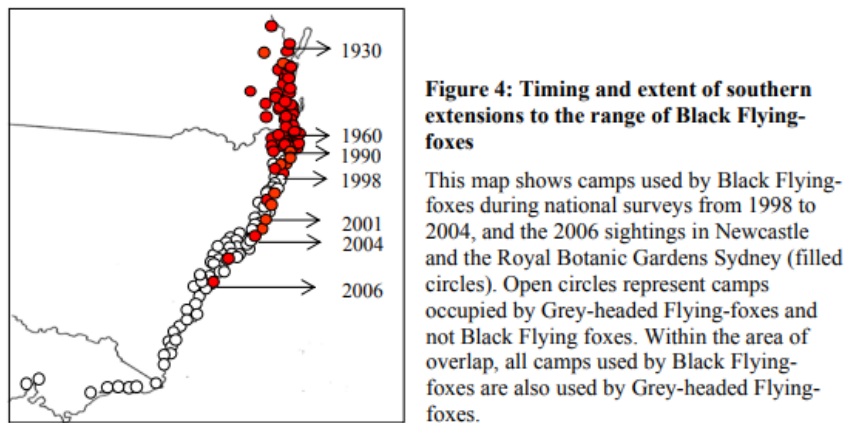


Figure 2.9 BHFF moving south through time. Source: National Recovery Plan for the Grey-headed Flying Fox (2009)

Population Monitoring

The abundance of fruit and blossom within a 20-50 km radius of a camp site is a key determinant of the population size of a camp at any given time. Understanding the availability of foraging resources goes beyond general knowledge of usual fruiting and flowering times. The majority of eucalypts do not flower every year in a local area and several rainforest species do not fruit annually. The often erratic changes in camp size reflect the irregular nature of local food resources and the migratory responses of flying-foxes. All species move long distances as they track flowering and fruiting of species in their diet. Production of fruit and blossom is thought to be related to conditions in previous seasons. Extended dry or wet periods, e.g. drought, may have a significant impact on local food availability.

Population monitoring is essential to effective management and decision making as it provides an understanding of flying-fox behaviour and movements. Monthly monitoring has occurred at known Sunshine Coast roosts since 2003 with weekly monitoring occurring at high-conflict roosts since September 2014. Monitoring is a useful means of providing population information and assessing the outcome of management activities while also allowing for early detection of a colony to a new or unsuitable roost location.

CSIRO developed monitoring methodology is being used to gather updated information about Grey-headed Flying-fox populations and population trends. Figures 2.10 and 2.11 are for the Tarban Creek Camp (see below).

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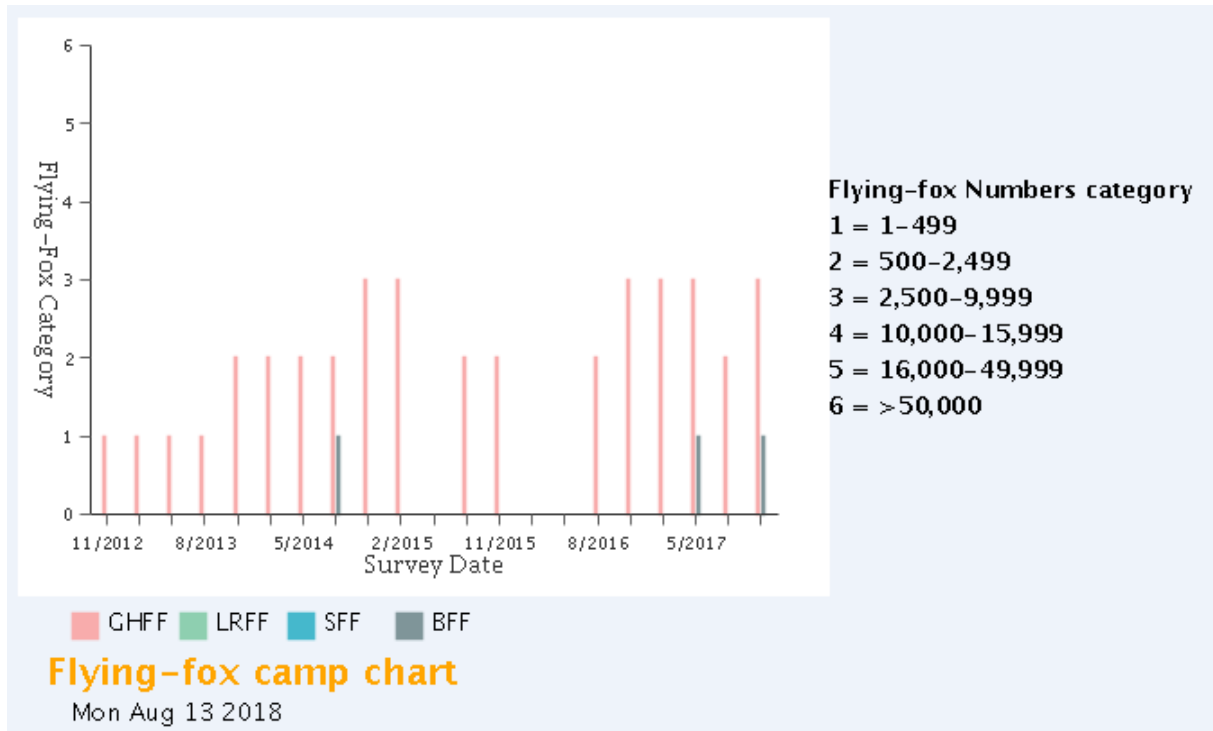
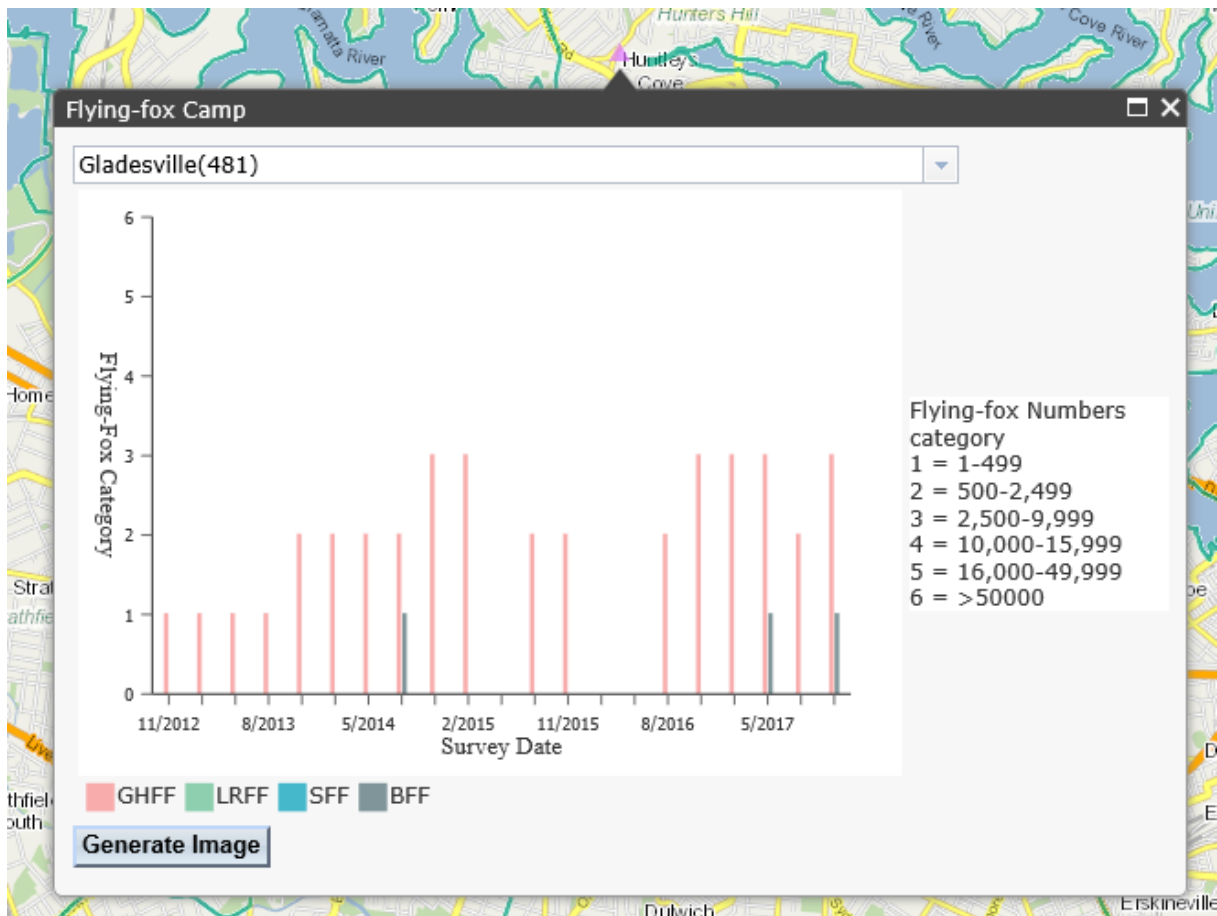


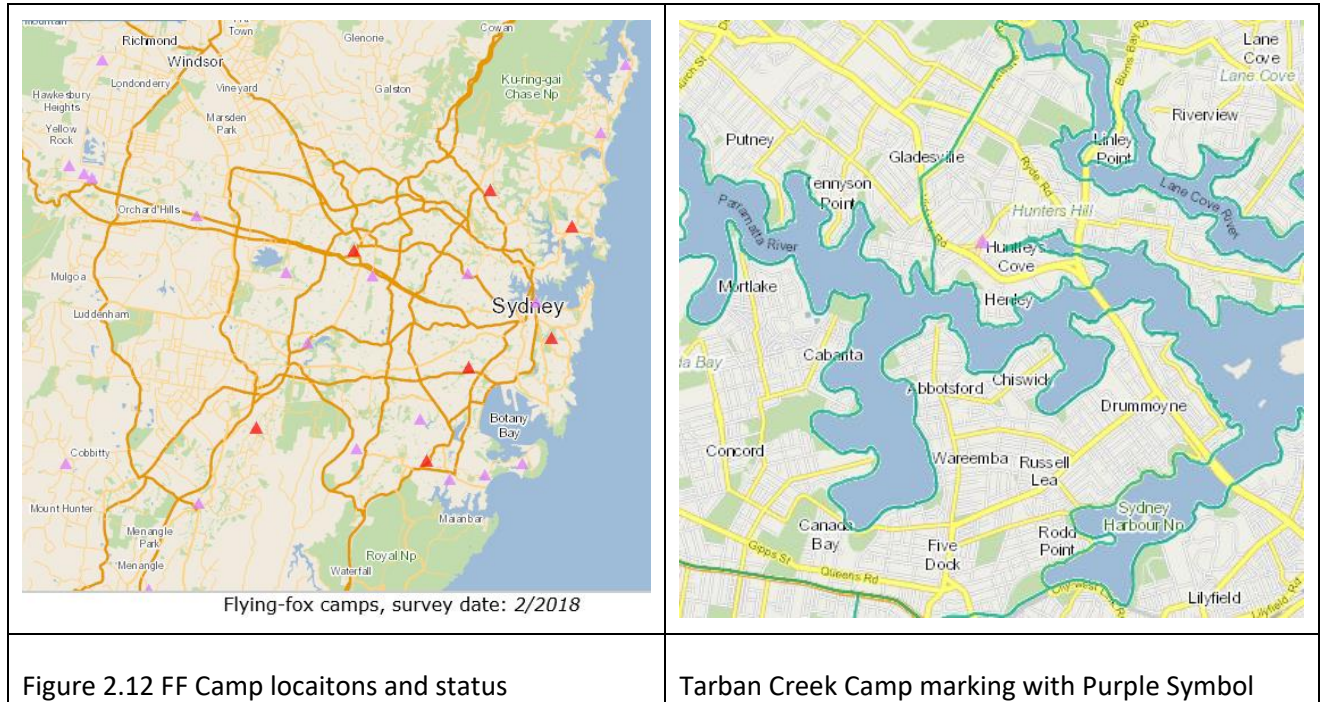
Figure: 2.10 and 2.11 FF numbers Tarban Creek camp. <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>

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Commonwealth and state governments are working together to implement a multi-year monitoring program, based on the CSIRO's method (ideally).

The Method recommends census should be conducted at the time when the greatest numbers of animals are present in camps in order to minimise errors associated with uncertainty in the proportion of the population being counted. For GHFF this period corresponds to the period after birthing, during territory establishment and leading up to mating which is some point in the spring or summer.

See the Australian Government's flying-fox web viewer [Monitoring Flying-Fox Populations](#) this has information spans the data gathered from November 2012 to present.



Red = Nationally Important Flying Fox Camp Purple = other Flying Fox Camp

As part of this CMP counts were conducted using the CSIRO method Table 2.1 summarises the data.

Table 2.1 observed population numbers using the CSIRO method

Date	Count	Notes
Jan 2018	4100	Near pathway and in core habitat. None on the two Eucalypts trees with die-back
June 2018	5800	Same as Jan but increased density
August 2018	6500	Near pathway and in core habitat. 5+ FF at least 50m from nearest house.
September 2018	4500	Near pathway and in core habitat. None on the two Eucalypts trees with die-back. 5+ FF at least 80m from nearest house.

Population Dynamics and Historical Data

Flying-fox numbers at any camp can be highly variable and made up of resident and visiting individuals. When undisturbed, camp locations are generally stable through time (Lunney and Moon 1997). Numbers are strongly linked to diet and foraging ecology. Grey-headed Flying-foxes feed primarily on blossom and fruit in canopy vegetation and supplement this diet with leaves (Ratcliffe 1931, Parry-Jones and Augee 1991, Eby 1995, 1998, Tidemann 1999, Hall and Richards 2000).

The majority of animals feed on nectar and pollen from eucalypts (genera *Eucalyptus*, *Corymbia* and *Angophora*), melaleucas and banksias. Grey-headed Flying-foxes forage over extensive areas. One-way commutes of approximately 50 km have been recorded between camps and foraging areas (Eby 1991), although commuting distances are more often < 20 km (Tidemann 1999).

Long distance movements.

The majority of eucalypts have regular seasonal flowering schedules but do not flower every year, and there are few areas within the range of the Grey-headed Flying-fox where nectar is available continuously (House 1997, Wilson and Bennett 1999, Law et al. 2000). Grey-headed Flying-foxes have no adaptations for withstanding food shortages (e.g. torpor) and migrate in response to changes in the amount and location of food (Hall and Richards 2000).

Evidence from broad-scale surveys, radio-telemetry and satellitetelemetry shows that adults and young can move hundreds of kilometres between productive habitats (Eby 1991, Spencer et al. 1991, Parry-Jones 1993, Augee and Ford 1999, Tidemann and Nelson 2004). In most areas within the species' range, patterns of migration and distribution vary considerably between seasons and between years (Eby and Lunney 2002).

The mechanisms that flying-foxes use to locate stands of flowering trees are unknown and have not been studied. However, no speculative movements of large numbers of animals have been observed, and there is inferential evidence that information exchange plays a role in locating food.

Thus accurate historical populations, numbers and distribution, is most accurately gained from First Peoples (Aboriginal People) rather than vegetation cover. With connected vegetation it's expected the flying-foxes had more continuous ranges with set birthing camps within these.

The number of flying-foxes in most camps is primarily related to the amount of food available within nightly commuting distance, although the annual reproductive cycle also influences the stability and size of populations (Ratcliffe 1931, Nelson 1965a, Parry-Jones and Augee 2001, Birt 2005).

In late spring and summer the camp provides refuge for flightless young. Vocalisations associated with territorial disputes and mother–infant recognition are most concentrated pre-dawn, when animals return to camps.

Estimating Resources

Methods developed by Eby & Law (2008) are comprehensive for determining the significance of vegetation communities for flying-foxes based on the flowering and fruiting characteristics of the diet plants they contain. The Tarban Creek Camp is within an urban area with few intact vegetation communities.

Hence, resource estimation was via determining total vegetation within a 30km radius. 30km was chosen because the data indicates that 20km (each way) is the usual for GHFF in an evening however it can go 50km each way) in one evening so the 30km is a slight increase over the average.

See Figure 2.13 for graphic showing the area of 30km radius form the site.

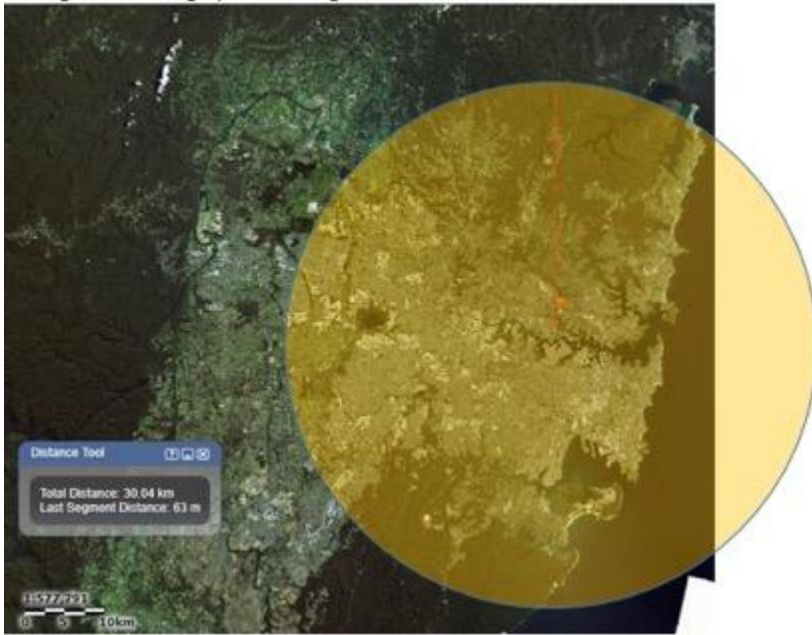


Figure 2.13 30km radius from Tarban Creek Camp.

The process used to determine values of habitats to flying-foxes uses a combination of the productivity of flowers (nectar) and the duration that nectar is available. This can be used to determine, identify and flag for conservation priority vegetation communities that:

- contain high densities of highly productive food plants;
- are highly productive during key periods in the reproductive cycle of GHFFs (spring to autumn); and / or
- contain high densities of Spotted Gum.

Flower Scores

Various characteristics of nectar production are significant to the assessment. High-quality dietary species are those that:

1. provide relatively large volumes of food (Productivity score),
2. are annually reliable in their productivity (Reliability score), and
3. are productive for lengthy periods (Duration score).

The Hunter GHFF Management Plan has a comprehensive example of how to value food resources.

2.2 Land tenure

Council is now Crown Land Manager under Crowns Land Management Act 2016 and Riverglade Reserve POM is currently being reviewed.

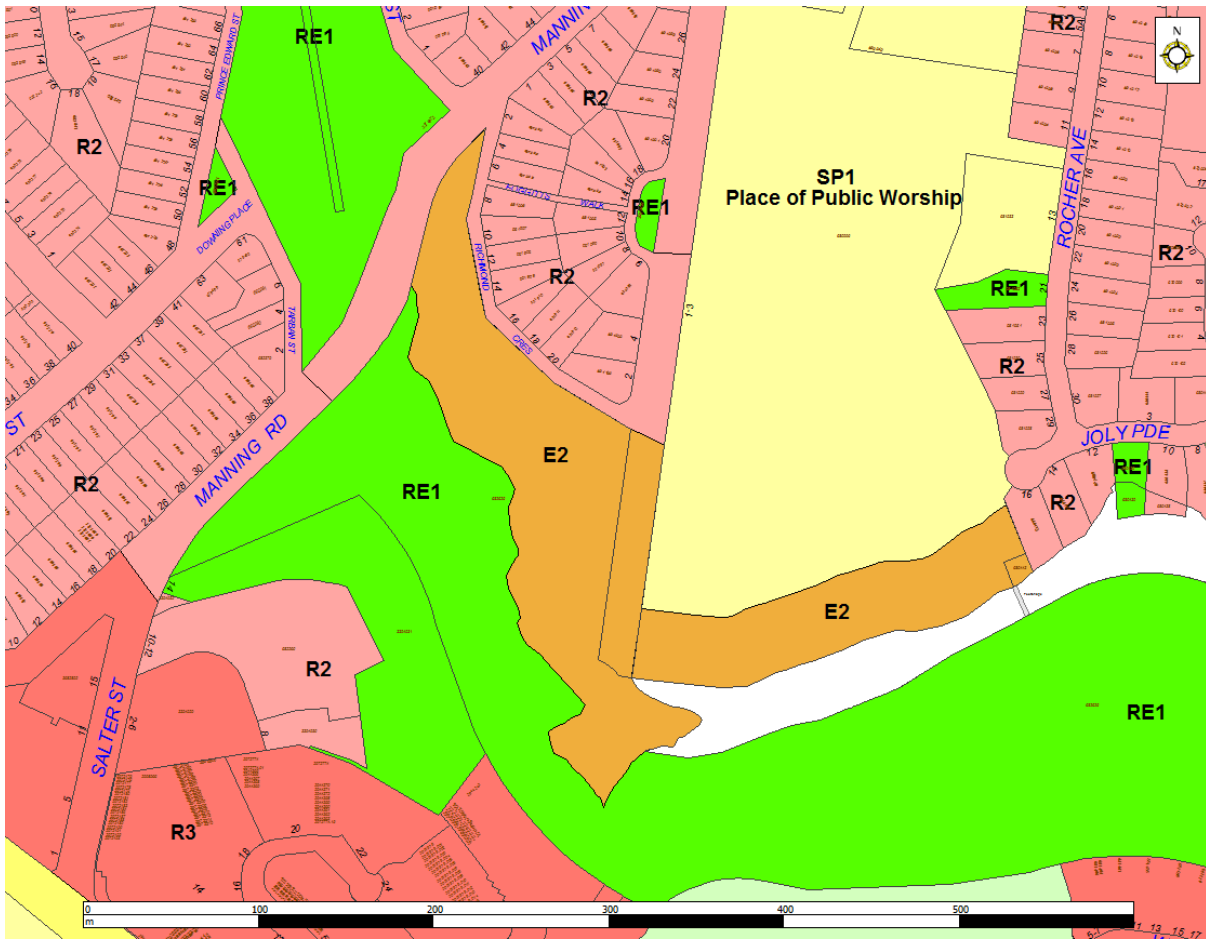


Figure 2.14 : Land use zones within the radius of the Grey-headed Flying-fox camp.

The camp area is zoned E2 Environmental Conservation under the Hunters Hill Local Environment Plan 2012. The adjoining land uses are public recreation immediately south and north west, residential to the north, further south and west, and special activities i.e. place of public worship to the east.

Riverglade Reserve is managed in accordance with the Riverglade Reserve Plan of Management 2013 (in revision) and the Estuary Vegetation Rehabilitation Action Plan for Riverglade Reserve and Tarban Creek Reserve 2011. In addition management actions within the Parramatta River Coastal Zone Management Plan 2013 relate to the camp area.



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 and Appendix 2.

Reported issues include:

- noise as flying-foxes depart or return to the camp – this is worse in spring/summer and at dawn and dusk.
- noise from the camp during the day
- faecal drop on outdoor areas, cars and washing lines, and estimated resources [time, cost] associated with cleaning areas adjacent to the camp

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- smell, most problematic during humid and lightly rainy weather, especially in February and March
- fear of disease
- health and/or wellbeing impacts
- reduced general amenity
- damage to vegetation
- increased need for bush regeneration and associated costs
- concern about water quality
- perceived property value lower

The majority of issues related to the camp are recorded around February to May when the camp population is at its annual maximum.

The majority of issues recorded are related to the interface of the camp and the residential properties.

A total of ~ 20 complaints with 12 complaints over approx.. 5 years.

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
- enjoy watching flying-foxes at the camp and/or flying out or in
- appreciate the intrinsic value of the camp
- see the value of the camp as a local education / attraction
- appreciate the natural values of the camp and habitat
- feel the camp does not negatively impact on their lifestyle
- value the opportunity the camp provides for them and their family to get close to nature
- recognise the need for people and wildlife to live together.

2.4 Management response to date

Management of the camp to date includes : bush regeneration with contractors working monthly in the reserve. In addition to this Council staff undertaken regular maintenance in the adjoining parkland. Community education about flying foxes has been conducted via Council newsletter and temporary signage.

It is suspected that contractor activity and associated noise moved the camp from The PRIORITY to the Tarban Creek camp area.

3. Community engagement

This CMP has been developed within the context of a community engagement strategy for flying-fox management in order to build a shared understanding of the approach and ensure it is relevant to the local area.

Appendix 2 is a summary of this Community Consultation.

The CMP has been placed on public exhibition, and made available online and in hard copy at Council. Stakeholder consultation, including community engagement, started before the CMP’s development, and will continue through its development and implementation.

Consultation and the engagement process generally, considered OEH’s working with communities living with flying-foxes fact sheet as well as the OEH Flyingfox-engage program.

3.1 Stakeholders

Stakeholders who are directly or indirectly affected by the flying-fox camp, or who are interested in its management are included in Table 3.1.

Table 3.1: Stakeholders in the camp and Plan

Stakeholder	Interest/reported impacts
Residents	Residents include those within 300m and more specifically those within 100m and 50m and 20m.
Church	Within 300m
Park users	The majority are local people
Other/adjoining landholders; these may include government departments such as Crown Lands, Transport for NSW / Roads and Maritime Services, or neighbouring councils	Adjoining landholders are affected by neighbouring landholders actions within those the communities and environment of those areas
Civic leaders and influencers (including local, state and federal politicians)	Councillors of Hunters Hill Council are interested in the management process and successes
Local government	Local government has responsibilities to the community and environment of the area for which it is responsible in accordance with the <i>Local Government Act 1993</i> . 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 NSW.
OEH	OEH 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.
Crown Lands	Land holdings with camps and or food supplies
Roads and Maritime Services	Mgt of Roads within Camps Areas
Commonwealth Department of the Environment (DoE) (relevant to camps with grey-headed flying-foxes or other matters of national environmental significance)	DoE 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.

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Stakeholder	Interest/reported impacts
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 Community Engagement

Extensive input 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

The types of engagement that have been undertaken include:

- promotion of contact details of responsible officers
- residents contacting council via customer service line
- face-to-face interviews with adjacent residents and park users
- media (print, social media)
- brochures and other educational material
- website pages and links
- direct contact with adjacent residents including letters, brochures and emails
- on-site signage
- online surveys.

3.3 Community feedback – management options

A summary of the main feedback received is as follows:

- Responses were from: 49 household interviews, 99 park users interviewed, 119 online surveys on Councils website and 85 responses to Flyingfoxngage online survey

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

- were of low financial cost to residents near the site
- were of low financial cost to local ratepayers
- ensured the risk of transmission of flying-fox pathogens, viruses and disease remains low
- reduced the impact of noise and odour on nearby residents
- reduced the impact of flying-fox excrement
- would be unlikely to have a negative impact on the flying-foxes
- would retain the natural and ecological values of the site
- would retain the visual appeal or on recreational opportunities currently undertaken at the site.

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- The action must not occur during or immediately after climatic extremes (heat stress event¹, cyclone event²), or during a period of significant food stress³.
- 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 make an assessment of 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 Appendix 9. If actions cannot comply with these mitigation measures, referral for activities at nationally important camps is likely to be required.

¹ 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.

² A 'cyclone event' is defined as a cyclone that is identified by the Australian Bureau of Meteorology (www.bom.gov.au/cyclone/index.shtml).

³ Food stress events may be apparent if large numbers of low body weight animals are being reported by wildlife carers in the region.

4. Other ecological values of the site

Vegetation mapping from Sydeny Metro Mapping (accessed via the SEED data Portal shows 3 Plant Community Types (PCTs) Figure 3.1 shows these.

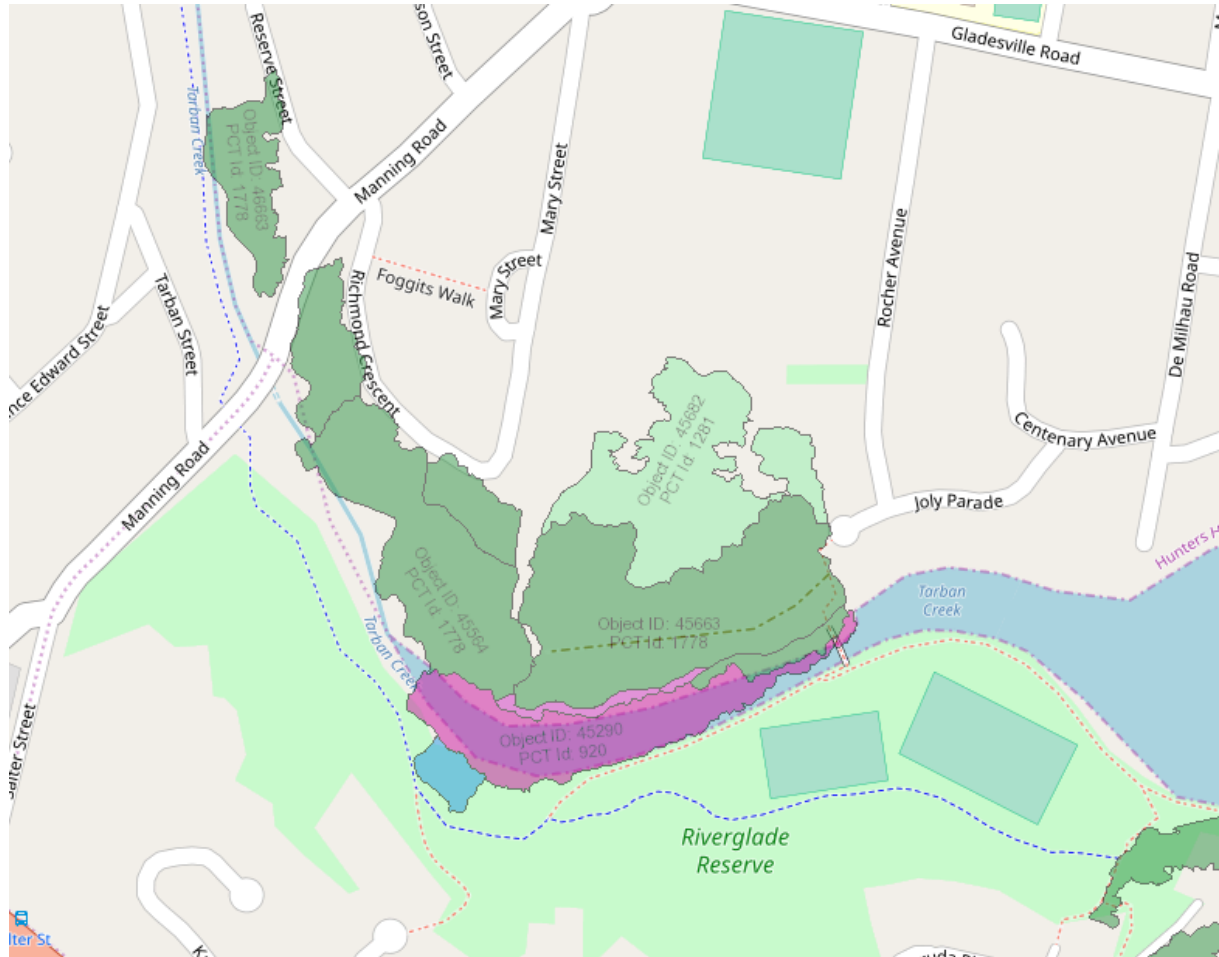


Figure 3.1 Plant Community Types. Source: SEEDdata Portal

1778 Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (Common Name: Coastal Sandstone foreshores Forest)

1281 Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion. (Common Name: Sydney Turpentine/Ironbark Forest)

920 Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Common Name: Estuarine Mangrove Forest)

Sydney Turpentine-Ironbark Forest is listed as Critically Endangered Ecological Community under BC Act 2016 and Critically Endangered under the EPBC Act 1999. It originally extended over 26,000 hectares but today, Sydney Turpentine-Ironbark Forest is reduced to 4.5 percent its original extent, surviving as small remnants. It is an open forest community and occurs <150m north west of the Flying Fox Camp.

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A list of threatened species known to occur within 10 km of the site is provided in Table 5.1, A bionet search has been conducted and threatened species, populations and communities.

Vegetation is mapped as Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney. The vegetation forms part of a biodiversity corridor linking the Lane Cove River and Parramatta River. In addition the mangroves and coastal saltmarsh are mapped Coastal Wetlands in the creekline under the NSW Coastal Management SEPP Maps.

Riverglade Reserve also supports breeding populations of nativebirds that have disappeared from much of urban Sydney.

A list of threatened species known to occur within 10 km of the site is provided in Table 5.1, including the likelihood of each occurring on site. Most works will require expert assessment and OEH defines this – See Appendix 5 for details.

Table 5.1: Threatened species that may occur at the site or use it at times as habitat and two Endangered Ecological Communities

Species name	Common name	Status	Likelihood of occurring
Fauna			
<i>Pseudophryne australis</i>	Red-crowned Toadlet	Vulnerable	Potential habitat in camp area.
<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	Endangered	Unlikely
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered	Potential habitat in camp area.
<i>Ixobrychus flavicollis</i>	Black Bittern	Vulnerable	Potential habitat in camp area.
<i>Haliaeetus leucoogaster</i>	White-bellied Sea - Eagle	Vulnerable	Sighted in the LGA but unlikely habitat in camp area.
<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable	Potential habitat in camp area
<i>Pandion cristatus</i>	Eastern Osprey	Vulnerable	Unlikely
<i>Burhinus grallarius</i>	Bush Stone-curlew	Endangered	Potential habitat in camp area
<i>Haematopus langirostris</i>	Pied Oystercatcher	Endangered	Unlikely
<i>Calidris ferruginea</i>	Curlew Sandpiper	Endangered	Potential habitat in camp area
<i>Limosa limosa</i>	Black-tailed Godwit	Vulnerable	Unlikely
<i>Sternula albifrons</i>	Little Tern	Endangered	Unlikely
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Vulnerable	Unlikely due to lack of She-oaks
<i>Glossopsitta pusilla</i>	Little Lorikeet	Vulnerable	Potential habitat in camp area
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Unlikely
<i>Ninox canniens</i>	Barking Owl	Vulnerable	Potential habitat in camp area
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	Sighted by Bushland Management Office in 2017 and Birdlife Australia Volunteer in 2014 in camp area.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable	Potential habitat in camp area

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<i>Artamus cyanopterus</i>	Dusky Woodswallow	Vulnerable	Potential habitat in camp area
<i>Petraica boodang</i>	Scarlet Robin	Vulnerable	Unlikely
<i>Perameles nasuta</i>	Long-nosed Bandicoot population in inner western Sydney	Endangered	Unlikely
<i>Petaurus australis</i>	Yellow-bellied Glider	Vulnerable	Potential habitat in camp area
<i>Miniopterus australis</i>	Little Bentwing-bat	Vulnerable	Potential habitat in camp area
<i>Miniopterus schreibersi oceanensis</i>	Eastern Bentwing-bat	Vulnerable	Potential habitat in camp area
	Green and Golden Bell Frog	Vulnerable	Unlikely
<i>Caretta caretta</i>	Loggerhead Turtle	Endangered	Unlikely
<i>Dermochelys coriacea</i>	Leatherback Turtle	Endangered	Unlikely
<i>Varanus rosenbergi</i>	Rosenburg's Goanna	Vulnerable	Unlikely
<i>Ptilinopus superbus</i>	Superb Fruit-dove	Vulnerable	Unlikely
<i>Circus assimilis</i>	Spotted Harrier	Vulnerable	Unlikely
<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable	Unlikely
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vulnerable	Unlikely
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	Unlikely
<i>Neophema pulchella</i>	Turquoise Parrot	Vulnerable	Unlikely
<i>Epthianura albifrons</i>	White-fronted Chat	Vulnerable	Unlikely
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Vulnerable	Unlikely
<i>Micronomus norfolkensis</i>	Eastern Freetail-bat	Vulnerable	Unlikely
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipstrelle	Vulnerable	Unlikely
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable	Unlikely
<i>Myotis macropus</i>	Southern Myotis	Vulnerable	Unlikely
Flora			
<i>Hibbertia spanantha</i>	Julian's Hibbertia	Critically Endangered	Unlikely
<i>Tetratheca glandulosa</i>		Vulnerable	Possible occurrence due to shale influence
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		Vulnerable	Possible occurrence due to shale influence
<i>Dillwynia tenuifolia</i>		Vulnerable	Unlikely
<i>Acacia bynoeana</i>	Bynoe's Wattle	Endangered	Unlikely
<i>Acacia pubescens</i>	Downy Wattle	Vulnerable	Unlikely
<i>Acacia terminalis</i>	Sunshine Wattle	Endangered	Unlikely

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<i>subsp terminalis</i>			
<i>Prostanthera marifolia</i>	Seaforth Mintbush	Critically Endangered	Highly unlikely
<i>Callistemon linearifolius</i>	Netted Bottle Brush	Vulnerable	Possible occurrence
<i>Darwinia biflora</i>		Vulnerable	Possible occurrence due to shale influence
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	Vulnerable	Unlikely
<i>Eucalyptus nicholi</i>	Narrow-leaved Black Peppermint	Vulnerable	Highly unlikely
<i>Leptospermum deanei</i>		Vulnerable	Unlikely
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	Vulnerable	Unlikely
<i>Melaleuca deanei</i>	Deane's Paperbark	Vulnerable	Unlikely
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Endangered	Unlikely
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	Endangered	Unlikely
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	Endangered	Possible occurrence.
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	Endangered	Possible occurrence due to shale influence
<i>Persoonia hirsuta</i>	Hairy Geebung	Endangered	Unlikely
<i>Pimelea curviflora var. curviflora</i>		Vulnerable	Possible occurrence due to shale influence.
<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	Vulnerable	Unlikely
<i>Zanichellia palustris</i>		Endangered	Unlikely
Threatened ecological communities			
	Coastal Saltmarsh	Endangered	Mapped in Riverglade Reserve by Bush-it Pty Ltd in 2011.
	Sydney Freshwater Wetlands	Endangered	Mapped in Riverglade Reserve by Bush-it Pty Ltd in 2011.
	Swamp Oak Floodplain Forest	Endangered	Not mapped within Riverglade Reserve (SEED 2019)
	Sydney Turpentine-Ironbark Forest	Critically Endangered	Not mapped within Riverglade Reserve (SEED 2019)
	Swam Sclerophyll Forest on Coastal Floodplains	Endangered	Not mapped within Riverglade Reserve (2019)
	Castlereagh/Cooks River Ironbark Forest	Endangered	Not mapped within Riverglade Reserve (2019)
	Blue Gum High Forest	Critically Endangered	Not mapped within Riverglade Reserve (2019)

5. Camp management options

A summary of general FF Camp Management Options is included in Appendix 8. See Addendum one for summaries of what other NSW councils have done when managing FF camps.

5.1 Site-specific analysis of camp management options

Table 1.0(a-c) and 8.1 must be read in conjunction with one another. This will assist in providing background information on actions and outline the strategy for council going forward.

Table 8.1 focuses on actions raised by and through the community. Currently there are few specific camp management options that seek to protect and increase the well-being of flying-foxes. Such management options to support flying-foxes long-term sustainability could include having adequate food resources and opportunities for alleviating the impacts of high temperatures on flying-foxes.

Table 8.1 includes cost estimates and most of these are given a range due to the actions having levels of delivery. For example alternative habitat creation is both a one-off item (planting / creating alternative habitat) and then there is the cost of maintenance. The cost depends on the area to be created and the condition of the areas per works.

Actions have been retained in this plan, even where Council could not fund them (such as purchasing homes) as it shows what has been considered and allows actions to be funded from sources other than Council.

Including the range of cost enables grants to be applied for to secure external funding for works. External funding is currently available, at 10-50K per project, to assist local government with implementing plans and this, or similar, is expected to be available in future.

<https://www.lgnsw.org.au/member-services/flying-fox-grant-program-2019>

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Table 8.1: Analysis of management options; definitions and descriptions of each management option are provided in Appendix 8. See also Table 1.0(a-c) for process moving forward for Hunters Hill Council.

Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
Level 1 actions						
1	Education and awareness programs	Fear of disease Noise Smell Faecal drop	<\$10K	<p>Low cost.</p> <p>Can help reduce community angst that could be based on misinformation or false understanding.</p> <p>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.</p>	<p>Education and advice itself will not mitigate all issues and on its own would not be acceptable to the community.</p>	<p>Community consultation results indicate the community is relatively well informed of flying-fox ecology. However, the community reported an ongoing fear of disease. This is generally without foundation and may be improved by additional targeted information.</p> <p>OEH to provide factual information on living near FF for Council to distribute. The community should continue to be updated and involved in flying-fox matters through targeted factual information.</p> <p>Disseminate environmental information via: <i>'Living with Flying Foxes'</i> education material</p> <p>https://www.environment.nsw.gov.au/topics/animals-and-plants/native-animals/native-animal-facts/flying-foxes/living-with-flying-foxes</p> <p>Council conduct Walks and Talks at least annually covering all aspects of ecology of the park including the FF.</p> <p>Proposed Council Decision: Adopt</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill
2	<p>Property modification – Landholders, subsidies or fully funded. Options include window glazing, air conditioning, noise insulation, shade sails, carports.</p>	<p>Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return</p>	<p><\$20K</p> <p>Property modification is one of the most effective ways to reduce amenity impacts of a camp without dispersal (and associated risks). It can be relatively low cost, promotes conservation of FFs, can be undertaken quickly, will not impact on the site, may add value to the property.</p>	<p>May be cost-prohibitive for private landholders, However, subsidies would assist. Unlikely to fully mitigate amenity issues especially in outdoor areas.</p> <p>Ongoing program administration to achieve equitable access to services may be challenging</p>	<p>Options like subsidising property modification were ranked highly in the community consultation. However, council cannot afford this option. External funding from NSW Government would be required to adopt this measure.</p> <p>Trigger Point: when FF are within 20m of residential dwellings (or roosting within 5m of Richmond Crescent) for 2 seasons consecutively. Approximately 30 dwelling fall into this category. Prepare a site-specific options paper for these dwellings.</p> <p>Proposed Council decision: Disregard. Option not feasible for HH Council. Cost prohibitive, external funding would be required.</p> <p>Optional - Prepare an action plan for when trigger point is reached and external funds are available.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
3	Service subsidies. Options include free pressure cleaners, car covers, clothes line covers, outdoor furniture covers, air fresheners and ear plugs	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	<\$20K	May encourage tolerance of living near a camp, promotes conservation of FFs, can be undertaken quickly, will not impact on the site, may reduce the need for property modification.	Ongoing program administration to achieve equitable access to services may be challenging	<p>Option of subsidising service subsidies were ranked highly in the community consultation. However, council cannot afford this option. External funding from NSW Government would be required to adopt this measure.</p> <p>Trigger Point: when FF are within 100m of residential dwellings (or roosting within 50m of Richmond Crescent) for 6 months consecutively. Approximately 50 dwelling fall into this category. Prepare a site-specific options paper for these dwellings.</p> <p>Proposed Council decision: Disregard. Option not feasible for HH Council. Cost prohibitive, external funding would be required.</p> <p>Optional - Prepare an action plan for when trigger point is reached and external funds are available.</p>
4	Rate rebates	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	-	May encourage tolerance of living near a camp.	<p>Rate rebates would be costly across multiple properties and would incur ongoing costs. Distance based criteria would require community agreement.</p> <p>Ongoing program administration to achieve equitable access to services may be challenging</p>	<p>Council cannot afford this option. External funding from NSW Government would be required.</p> <p>Proposed Council Decision: Disregard. Option not feasible for HH Council. Cost prohibitive, external funding would be required.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
5	Routine camp management	Health/wellbeing	<\$20K	Will allow property maintenance, likely to improve habitat, could improve public perception of the site, will ensure safety risks of a public site can be managed. Weed removal has the potential to reduce roost availability and reduce numbers of roosting FFs.	Will not generally mitigate amenity impacts for nearby landholders.	<p>Routine maintenance ranked in the middle of community responses but as cost is low and environmental and amenity outcomes are positive, on-going maintenance is worth undertaking.</p> <p>Bushcare group, contractors and staff are undertaking a maintenance program. Weed removal is being staged and alternative roost habitat planted (or installed), otherwise activities may constitute a Level 3 action.</p> <p>Proposed Council decision: Adopt – expand existing work.</p>
6	Odour reducing/ screening/ masking plants	Noise Smell Health/wellbeing	<\$20K	Residents to plant dense screens and fragrant plants to assist with odour and noise. Trim tall trees to less than 5 metres and use wildlife friendly netting to prevent roosting	<p>May take time for plants to provide desired effect and unlikely to mitigate odour during large influxes.</p> <p>Space and opportunity for a suitable screen may not be available to the extent required.</p>	<p>Residents could be encouraged to modify properties by planting dense screens and fragrant plants. This information could be provided in an education program. Plants unable to be subsidised by Council unless external funding becomes available.</p> <p>Planting of non-roost vegetation along the reserve side of Richmond Crescent is recommended. Prepare and options paper for planting opportunities, species, costs, maintenance.</p> <p>Nudging. Trigger Point: when FF are within 20m of residential dwellings (or roosting within 5m of Richmond Crescent) for 2 seasons consecutively and where FF have a density of over 1 FF/m²</p> <p>Proposed Council decision: Adopt Optional - Prepare an subsidy/action plan for when trigger point is reached and external funds are available.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
7	Alternative habitat creation	All	<\$10k	<p>If successful in attracting FFs away from high conflict areas, dedicated habitat in low conflict areas will mitigate all impacts, promotes FF conservation. Rehabilitation of degraded habitat that is likely to be suitable for FF use could be a more practical and faster approach than habitat creation.</p>	<p>Several years before useable habitat features develop.</p> <p>Generally costly, long-term approach so cannot be undertaken quickly, previous attempts to attract FFs to a new site have not been known to succeed.</p>	<p>Creation of alternative FF habitat was favoured by the community. Initial research to identify low conflict areas where habitat can be created found that options are limited. The current area is low-conflict habitat relative to other urban areas.</p> <p>Trigger point for alternative habitat creation is linked to other actions (high populations within the existing camp (8000+), excessive damage to existing habitat (roosting sites reduced to 50% of 2019 levels) or death of 50+ % of trees. Or when triggers for 'nudging FF' out of the camp are reached.</p> <p>Note: Trigger Point for nudging: when FF are within 20m of residential dwellings (or roosting within 5m of Richmond Crescent) for 2 seasons consecutively and where FF have a density of over 1 FF/m²</p> <p>Proposed Council decision: Adopt and develop action plan now for implementation if trigger point(s) is reached.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
8	Provision of artificial roosting habitat	All	<\$10K	<p>If successful in attracting FFs away from high conflict areas, artificial roosting habitat in low conflict areas will assist in mitigating all impacts, generally low cost, can be undertaken quickly, promotes FF conservation.</p> <p>Artificial roosting habitat is required as soon as practical as this can take pressure of the existing trees and allow for weed tree removal while retaining a net area of roosting habitat.</p>	<p>Would need to be combined with other measures (e.g. buffers/alternative habitat creation) to mitigate impacts, previous attempts have had limited success.</p> <p>Research is needed as there are few case-studies. On-site trial and error is expected – along with successes. Cost of artificial roosts are estimates only.</p>	<p>Artificial roosts were not specifically raised with the community but managing the site to create alternative habitat ranked highly.</p> <p>Artificial habitat should be tested now, with funding from State and Federal Agencies. Case Studies with artificial habitat are uncommon yet artificial habitat is likely to work within FF camps. Key is to have solid (not rope) habitat.</p> <p>Proposed Council decision: Disregard. Option not feasible for HH Council at this point in time. Cost prohibitive, external funding would be required to facilitate this option.</p>
9	Protocols to manage incidents	Health/wellbeing	<\$10K	<p>Low cost, will reduce actual risk of negative human/pet–FF interactions, promotes conservation of FFs, can be undertaken quickly, will not impact the site.</p> <p>Provides reassurance to community that risks will be managed.</p>	<p>Will not generally mitigate amenity.</p>	<p>This was not addressed in the community consultation. Council will build on existing guidelines as required and engage and train carers to respond events which may stress or significantly disturb the camp. Such incidences may include; heat stress events, conflict with humans, disturbance by community (i.e. construction activities, deliberate disturbance) and other incidents.</p> <p>Proposed Council decision: Adopt</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
10	Research	All	\$5K	<p>Supporting research to improve understanding may contribute to more effectively mitigating all impacts, promotes FF conservation.</p> <p>Increased understanding of the following will assist greatly in mg long-term:</p> <ul style="list-style-type: none"> • Population dynamics (resident v visiting FF) • Food resources within 20 and 50km and seasonal availability. 	Generally, cannot be undertaken quickly, management trials may require further cost input.	<p>This was not addressed in the community consultation. Council will continue to be involved in State and national FF monitoring programs and will stay up-to-date with research into effective management of FF colonies and update this CMP as necessary.</p> <p>Any management and mitigation measures implemented must include monitoring before/after to ascertain the success/or not of actions.</p> <p>Proposed Council decision: Adopt</p> <p>Council can provide in-kind contribution to research. External funding from public and/or private organisations would be required for council to facilitate this option internally.</p>
11	Appropriate land-use planning	All	<\$10K	<p>Likely to reduce future conflict, promotes FF conservation. Identification of degraded sites that may be suitable for long-term rehabilitation for FFs could facilitate offset strategies should camp reduction be required under Level 2 actions.</p> <p>Zoning permissibilities (including future re-zoning) in the vicinity of the FF Camp can be set such that it is appropriate.</p>	Will not generally mitigate current impacts, land-use restrictions may impact the landholder.	<p>This option was not canvassed in the community consultation but was raised during the submissions period of consultation.</p> <p>Council should consider including buffer zones and recommendations for appropriate mitigation provisions in DAs.</p> <p>Council to consider any future re-zoning proposals within 100m of the Camp or 100m from suitable camp-expansion/relocation habitat such that it is appropriate with neighbouring a FF colony.</p> <p>Proposed Council decision: Adopt - Apply consideration to any proposed re-zoning within 100m of the camp. Council consider recommendations for appropriate mitigation provisions in DAs.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill
12	Property acquisition All for specific property owners Nil for broader community	millions	Will reduce future conflict with the owners of acquired property.	Owners may not want to move, only improves amenity for those who fit criteria for acquisition, very expensive.	Cost prohibitive and not feasible for Hunters Hill Council. Proposed Council decision: Disregard
13	Do nothing Nil	Nil	No resource expenditure.	Will not mitigate impacts and unlikely to be considered acceptable by the community.	Not sustainable. Not supported in community consultation. Proposed Council decision: Disregard

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill
Level 2 actions					
14	<p>Buffers through vegetation removal/mgt. Vegetation mgt can be location specific ranging from pruning tree-limbs to removing trees.</p>	<p>Noise Smell Health/wellbeing Property devaluation Lost rental return</p>	<p><\$15K</p> <p>Can increase the distance of FF from residents properties. Can be undertaken quickly, limited maintenance costs.</p>	<p>Will impact visual and ecological values of the site, will not eliminate impacts, vegetation removal may not be favoured by the community. Requires external approvals.</p>	<p>Managing habitat was generally supported by the community.</p> <p>In other camps this has been reported as the most effective measure for mitigating conflict. Can reduce the direct exposure to impacts at the most sensitive receiving properties. To be in accordance with <i>Mgt and Restoration of Flying Fox Camps (2014)</i> Comm. Gov. Publication. Tree limb or tree removal can be considered and additional roosting habitat created elsewhere in the camp so there is no nett loss of roosting areas. Plant Figs, and other favoured plants, in areas away from residence.</p> <p>This involves the trimming or removal of whole canopy trees at the camp boundary to create a buffer between the flying-fox camp and areas of human settlement, to a maximum distance of 30 metres from any occupied building, to prevent flying-foxes roosting within that buffer</p> <p>Proposed Council decision: Adopt. Investigate and have options paper for managing and reducing roost trees adjoining residence ensuring there is no nett loss of roosting habitat. Seek necessary approvals for works.</p> <p>Additionally, the Code of Practice states that camp management actions are not authorised for the clearing or trimming of vegetation that results in damage to a TEC. Therefore, if any clearing or trimming of vegetation is proposed in plant community type 1281, the landholder or Council will need to apply for a licence for this activity.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
15	<p>Buffers without vegetation removal. Buffers can be created through such tools as visual deterrents in trees, noise emitters on timers, smell deterrents and canopy mounted water sprays (may also attract FF in extreme heat)</p>	<p>Noise Smell Health/wellbeing Damage to vegetation Property devaluation Lost rental return</p>	<p><\$15K</p>	<p>Successful creation of a buffer will reduce impacts, promotes FF conservation, can be undertaken quickly, options without vegetation removal may be preferred by the community.</p>	<p>May impact the site, buffers will not generally eliminate impacts, maintenance costs may be significant, often logistically difficult, limited trials so likely effectiveness unknown.</p>	<p>This option was not specifically canvassed but tools such as sprinklers and visual deterrents could be used to create buffers.</p> <p>Plant Figs, and other favoured plants, in areas away from residence.</p> <p>Proposed Council decision: Adopt. Investigate and develop an action plan. Support camp re-vegetation to establish favoured roosts and food trees away from residence.</p>
16	<p>Noise attenuation fencing</p>	<p>Noise Smell Health/wellbeing Property devaluation Lost rental return</p>	<p><\$15K</p>	<p>Will eliminate/significantly reduce noise impacts, will reduce other impacts, limited maintenance costs.</p>	<p>Costly, likely to impact visual amenity of the site, will not eliminate all impacts, may impact other wildlife at the site.</p>	<p>This option was not specifically canvassed and is not practical for the site.</p> <p>Proposed Council decision: Disregard</p>

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Management option		Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill
Level 3 actions						
17	Nudging	All	<\$20K	<p>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.</p> <p>If nudging is successful this may mitigate all impacts.</p>	<p>Costly, FFs will continue attempting to recolonise the area unless combined with habitat modification/ deterrents/ creating favourable habitat away from residents.</p>	<p>Nudging may be a viable option to move FFs away from residents.</p> <p>Nudging links to the more interventionist management options that are supported by heavily impacted community members.</p> <p>Trigger Point: when FF are within 20m of residential dwellings (or roosting within 5m of Richmond Crescent) for 2 seasons consecutively and where FF have a density of over 1 FF/m².</p> <p>Proposed Council decision: Adopt. Investigate and develop action plan for when trigger point is reached and external funds are available.</p>

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Management option	Relevant impacts	Cost	Advantages	Disadvantages	Suitability in Hunters Hill	
18	Active dispersal	All at that site but not generally appropriate for amenity impacts only (see Section 8 and Appendix 8)	<\$20K	If successful can mitigate all impacts at that site, often stated as the preferred method for impacted community members.	<p>May be very costly, often unsuccessful, ongoing dispersal generally required unless combined with habitat modification, potential to splinter the camp creating problems in other locations and possible accountability for the original site manager.</p> <p>FF Camps have years where camp numbers increase significantly due to scarcity (or abundance) of food resources elsewhere.</p> <p>Dispersal without understanding what proportion of the population are 'visitors' will result in 'moving' the situation throughout the urban areas (into areas where conflict is higher than here) when there may have been no need to as the visiting FF will leave naturally.</p> <p>Potential for significant animal welfare impacts, disturbance to community, negative public perception, unknown conservation impacts, unpredictability makes budgeting and risk assessment difficult, may increase disease risk (see Appendix 7), potential to impact on aircraft safety.</p>	<p>This option was strongly supported by a small number of impacted community. It was strongly opposed by a larger number of the community consulted. It will only be considered in extreme circumstances such as a large influx that persists in the Camp over many months.</p> <p>Not recommended and it would require State and Federal government approval.</p> <p>Proposed Council decision: Adopt. Seek and secure funding to undertake population monitoring so population dynamics are better understood.</p> <p>Have a plan ready for approval process to be implemented if FF population reaches 15,000 and stays that way for 2 or more seasons.</p>
19	Early dispersal before a camp is established at a new location	All at that site	<\$20K	<p>Potential advantages as per other dispersal methods, but more likely to be successful than dispersal of a historic camp.</p> <p>Early action can avoid the establishment of a camp in an area that would have very high conflict with existing users.</p>	<p>Potential disadvantages as per other dispersal methods, but possibly less costly and slightly lower risk than dispersing a historic camp. Potential to increase pressure on FFs that may have relocated from another dispersed camp, which may exacerbate impacts on these individuals.</p>	<p>Potential option if other camps form in the Council area.</p> <p>Proposed Council decision: Adopt. Seek funding to ID and map potential areas for where FF camps may naturally establish. Determine what sites are i) appropriate or ii) not appropriate for FF to Camp (permanently or temporarily). With this information determine action and approvals needed and take action if and when required.</p>

Where there are not specific triggers to determine a management action then the following decision making tool could be used to assist. It is noted though that environmental management is often multi-faceted with often unmanageable factors. For example if the region has climatic conditions that are resulting in flying-fox numbers crashing (sequence of extremely hot days) then the permits to disturb them will be less available. The costs provided in table 8.1 are indicative only. The estimates are based on research of recent literature and best practice methodology. The final cost of implementation for each action should be expected to vary above or below the price estimate provided.

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Decision Support Tool for Tarban Creek Flying Fox Camp

Consequences/Considerations

AFFECT	Insignificant	Minor	Moderate	Serious	Very Serious
People Affected-consider: Sensitive receivers Proximity to camp Extent of impacts	Slight effect	Contained area, Limited impacts	Major onsite	Major onsite and Moderate offsite	Major onsite and Major offsite
Environment - consider Cultural Ecological Amenity	Slight effect	Contained area, Limited environmental harm	Major onsite	Major onsite and Moderate offsite	Major onsite and Major offsite
Financial cost	Less than \$5,000	\$5,000 - \$20,000	\$20,000 - \$100,000	\$100,000 - \$500,000	More than \$500,000
Very high <i>Almost certain to/currently occurring and likely to continue in the mid-long term</i>	M	M	H	E	E
High <i>Known to have occurred - likely</i>	M	M	H	H	E
Medium <i>Could occur - possible</i>	L	M	H	H	H
Low <i>Not likely to occur - unlikely</i>	L	L	M	M	H
Very low <i>No incidents - rare.</i>	L	L	M	M	H

KEY

E (Extreme-RED)	<p>Level 3 Actions</p> <p>Immediate controls required.</p> <p>Provided legislative requirements met, consider dispersal if adequate and appropriate resources are available. Seek management advice.</p> <p>Implement education and communication strategy</p> <p>Implement subsidies program if appropriate</p> <p>Identify and implement mechanisms to reduce impacts e.g. buffers</p> <p>Monitor impacts</p>
H (High-AMBER)	<p>Level 2 Actions</p> <p>Implement education and communication strategy</p> <p>Implement subsidies program if appropriate</p> <p>Identify and implement mechanisms to reduce impacts e.g. buffers</p> <p>Monitor impacts</p>
M (Medium-YELLOW)	<p>Level 1 Actions</p> <p>Implement education and communication strategy</p> <p>Approval to proceeds required by Manager to implement subsidies program if appropriate</p> <p>Monitor impacts.</p>
L (Low-GREEN)	<p>Level 1 Actions</p>

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	Generally no action required Continue to monitor the impacts
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Considerations: Legislation and approval requirements, Tenure, Risks of management and likelihood of success

6. Planned Management Approach

Table 9.1: Management approach overview (updated March 1st 2019)

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.	Education and awareness Property modification (including providing subsidies if possible). Dense planting to create screens at boundaries. Revegetate and manage land to create alternative habitat. Provision of artificial roosting habitat away from conflict areas.	Buffers. Buffers include dense 3m tall plantings.	Nudging will be considered if necessary (e.g. FF within 5m of residence).
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 faecal drop by 50% (random quadrat sampling may be used to quantify). 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 (including providing subsidies if possible). Subsidise services to reduce impacts if funding available. Support research to understand site-specific movements / trials to influence fly-out/in.	Buffers.	Level 3 actions will not be considered to mitigate this issue.

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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.	Reduce odour by 70% (seasonal odour sampling required to quantify).	<p>Education and awareness programs (e.g. ensuring community understand not associated with uncleanliness).</p> <p>Property modification (including providing subsidies if possible).</p> <p>Dense planting at boundaries (including use of fragrant flowers to mask odour).</p> <p>Camp re-vegetation to establish favoured roosts away from residence.</p> <p>Revegetate to create alternative habitat.</p> <p>Provision of artificial roosting habitat away from conflict areas.</p> <p>Support research to determine odour masking techniques.</p>	Buffers.	Nudging will be considered if necessary.
Fear of disease	Promote awareness of actual low disease risk.	<p>All concerned community members have received and have access to factual information on disease.</p> <p>Surrounding community is no longer concerned about disease (poll may be required).</p>	<p>Education and awareness programs (e.g. ensuring community understand actual low risk of disease transfer and simple mitigation measures).</p> <p>Protocols to prevent incidents.</p> <p>Camp re-vegetation to establish favoured roosts away from residence.</p>	Trim roost vegetation overhanging properties where hygiene protocols may not be sufficient (e.g. child care centres).	Level 3 actions will not be considered to mitigate this issue.
Health and/or wellbeing impacts (e.g. associated with lack of sleep, anxiety)	Mitigate health and wellbeing impacts.	No negative human/flying-fox interactions.	<p>Education and awareness programs.</p> <p>Property modification (including subsidies if possible) to prevent wellbeing impacts associated with noise.</p> <p>Camp re-vegetation to establish favoured roosts away from residence.</p> <p>Protocols to prevent incidents.</p> <p>Routine management actions to improve the site.</p> <p>Revegetate land to create alternative habitat.</p>	Buffers.	Nudging will be considered if necessary.

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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).	Routine management actions to improve the site. Provision of artificial roosting habitat. Revegetate land to create alternative habitat.	Deterrents from select trees (e.g. netting, wires, sprinklers, etc.) (may constitute a Level 3 action, provide details).	Nudging considered for properties where FF are within 20m (at density of >1/m ² over 20m ²) and other modifications have been implemented.
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 (including subsidies if possible). Subsidise services to reduce impacts if funding available. Education and awareness programs to manage 'ungrounded-fear' perceptions and increased FF appreciation.. Dense planting to create screens at residential boundaries. Revegetate to create alternative habitat.	Buffers.	Nudging (frightening FF so that they leave the area) considered for properties where FF are within 20m (at density of >1/m ² over 20m ²) and other modifications have been implemented. Dispersal may be considered if this issue is unable to be mitigated in any other way where FF are within 20m (at density of >4/m ² over 100m ²)

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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
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.	<p>Property modification (including subsidies if possible).</p> <p>Subsidise services to reduce impacts if funding available.</p> <p>Education and awareness programs to result in FF appreciation.</p> <p>Appropriate land-use planning.</p> <p>Dense planting to create screens at residential boundaries.</p> <p>Revegetate to create alternative habitat.</p>	Buffers.	<p>Nudging considered for properties where FF are within 20m (at density of >1/m² over 20m²) and other modifications have been implemented.</p> <p>Dispersal may be considered where FF are within 20m (at density of >4/m² over 100m²)</p>

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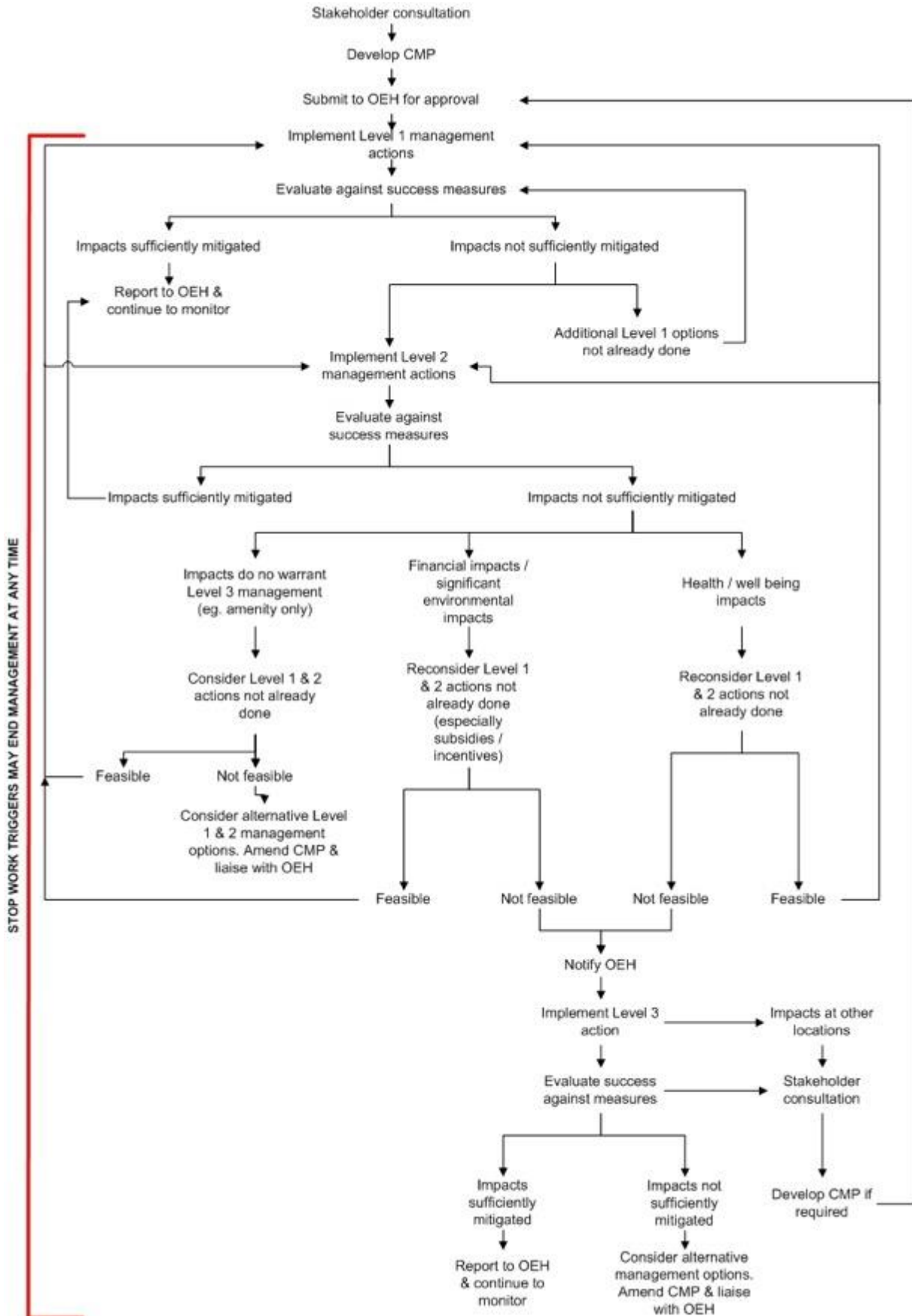


Figure 4.1: Flow chart to demonstrate the planned process for management decision-making

6.1 Stop work triggers

The management program will cease and will not recommence or progress to subsequent levels without consulting OEH 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 Appendix 9) 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.

Dispersal will cease if:

- in the opinion of the land manager or OEH, there is ongoing proliferation of splinter colonies in unsuitable locations (as determined by the land manager or OEH)
- splinter camps become established in inappropriate locations and for ecological, social or other reasons, a dispersal at the splinter location is not appropriate (as determined by the land manager or OEH).

If a dispersal program is stopped it may be permanently abandoned and other strategies considered, or reassessed and resumed in consultation with OEH.

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Table 9.2: Planned action for potential impacts during management. A person with experience in flying-fox behaviour (as per Appendix 5) 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: <ul style="list-style-type: none"> • panting • saliva spreading • located on or within 2 m of the ground 	Works to cease for the day.
Fatigue	In-situ management <ul style="list-style-type: none"> • more than 30% of the camp takes flight • individuals are in flight for more than 5 minutes • flying-foxes appear to be leaving the camp Dispersal <ul style="list-style-type: none"> • low flying • laboured flight • settling despite dispersal efforts 	In-situ management Works to cease and recommence only when flying-foxes have settled* / move to alternative locations at least 50 m from roosting animals. Dispersal Works to cease for the day.
Injury/death	<ul style="list-style-type: none"> • a flying-fox appears to have been injured/killed on site (including aborted foetuses) • any flying-fox death is reported within 1 km of the dispersal site that appears to be related to the dispersal • females in final trimester • dependent/crèching young present • loss of condition evident 	Works to cease immediately and OEH notified AND rescheduled OR adapted sufficiently so that significant impacts (e.g. death/injury) are highly unlikely to occur, as confirmed by an independent expert (see Appendix 5) OR stopped indefinitely and alternative management options investigated.

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

7. Evaluation and review

This Plan should be review annually, including evaluation of management actions against measures shown in Section 5.

The following will trigger a reactive review 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 OEH (as per reporting timing outlined in Appendix 9).

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 re-submitted to OEH.

8. Plan administration

8.1 Monitoring of the camp

Monitoring of the camp should establish a standard precedent for regular monitoring of the area, size and composition of the camp over the life of the Plan, as well as the results of any management actions undertaken (consolidating information from Appendix 9, and making reference to the [monitoring fact sheet](#) associated with the Policy).

Monitoring data sheets

To assess the success of actions there has to a process to [monitor, evaluate and report](#) on outcomes.

Threemonitoring datasheets for this work are included here as links and provide information to take action, or modify action to achieve effective ways to manage flying-foxes in the future.

- [Creation of buffers \(Level 2\) actions - Monitoring data sheet \(DOC 861KB\)](#)
- [Camp disturbance or dispersal \(Level 3\) actions - Monitoring data sheet \(DOC 1MB\)](#)
- [Responding to heat stress in flying-fox camps - Monitoring data sheet \(DOC 90KB\)](#)

8.2 Reporting

Reporting against this Plan, includes any reporting obligations related to licences or certificates associated with proposed works. The requirements will differ depending on the works planned/approved. When decisions/approvals are made for works the reporting requirements will be made known at the same time. Some reporting can be conducted by Council with OEH others would need to be by an independent consultant.

8.3 Management structure and responsibilities

Table 13.1 identifies who is responsible for what, including specific contractors and experts planned to be involved in management implementation. Specific contractors names have not be provided in this Plan, however they will be detailed in relevant licence applications for OEH approval.

A project health and safety plan that includes all relevant contact details will be developed prior to implementing the Plan, for team reference.

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Table 13.1: Roles and responsibilities

Role	Name	Required experience/approvals	Responsibilities/authority	Communication lines
Program Coordinator	[insert] TBA	Project management Human resource management Community engagement Reporting	Inform and consult with stakeholders and interested parties Community engagement Evaluate program Submit reports to OEH/DoE Ensure all landowners have provided consent prior to works	Reports to: [insert] Direct reports: Project Manager
Project Manager	[insert]	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 OEH and DoE Liaise with wildlife carers/veterinarians (for orphaned/injured wildlife only)	Reports to: Program Coordinator Direct reports: Supervisor, Contractor
Supervisor	[insert]	Knowledgeable in flying-fox biology, behaviour and camp management (see Appendix 5 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	[insert]	Recommended ABLV-vaccinated (employer to assess risk) Ideally all team knowledgeable in flying-fox biology, behaviour and camp management however not required	Attend daily site briefings Participate in relevant management activities	Reports to: Supervisor Direct reports: Nil
Contractor [insert type e.g. arborist]	[insert]	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	[insert]	Approval to access site	Provide care of injured/orphaned wildlife (under licence) if required	Reports to: Supervisor
Flying-fox expert	[insert]	See Appendix 5	On-site population assessment, monitor flying-fox behaviour and	Reports to: Supervisor

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Role	Name	Required experience/approvals	Responsibilities/authority	Communication lines
			ensure compliance with the Plan.	Direct reports: Nil

8.4 Adaptive management

Mechanisms for amending the Plan based on lessons from implementation, feedback from the community and results of monitoring and broad-scale FF population situations are required for plan success. While these have not yet been determined they will be linked to retained the Camp and the health of the FF as well as aiming to achieve the plans objectives.

8.5 Funding commitment

The Action Table has some cost estimated however other cost will need to be considered as detail on particular actions is included.

9. References and additional resources

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Appendix 1: Legislation and policy

9.1 State

9.1.1 Flying-fox Camp Management Policy 2015

The Flying-fox Camp Management Policy 2015 (the Policy) has been developed to empower land managers, primarily local councils, to work with their communities to manage flying-fox camps effectively. It provides the framework within which OEHL 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.

9.1.2 Biodiversity Conservation Act 2016

The objects of the *Biodiversity Conservation Act 2016* (BC Act) include to conserve biological diversity and protect the critical habitat of threatened species, populations and ecological communities. The grey-headed flying-fox is listed as threatened under the Act (see also [Why the Grey-headed Flying-fox is listed as a threatened species](#)).

The Act provides for the application of licences if the proposed action is likely to result in one or more of the following:

- a. harm to any animal that is of, or is part of, a threatened species, population or ecological community
- b. the picking of any plant that is of, or is part of, a threatened species, population or ecological community
- c. damage to critical habitat
- d. damage to habitat of a threatened species, population or ecological community.

9.1.3 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.

9.1.4 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 NSW Department of Planning 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 Biodiversity Conservation Act (BC).

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, land owners are not eligible to apply for development under Part 5 of the EP&A Act. Private land owners should contact Council to explore management options for camps that occur on private land.

9.1.5 Coastal Management SEPP 2016

Objective to retain the coastal ecosystems and aesthetics.

9.2 Commonwealth

9.2.1 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 DoE 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 (*Pteropus poliocephalus*; 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. DoE has developed the [Referral guideline for management actions in GHFF and SFF⁴ 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 $\geq 10,000$ GHFF in more than one year in the last 10 years, or
- been occupied by more than 2500 GHFF permanently or seasonally every year for the last 10 years.

Provided that management at nationally important camps follows the mitigation standards below, DoE has determined that a significant impact to 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 DoE 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.

⁴ spectacled flying-fox (*P. conspicillatus*)

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- The action must not occur during or immediately after climatic extremes (heat stress event⁵, cyclone event⁶), or during a period of significant food stress⁷.
- 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 make an assessment of 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.

⁵ 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.

⁶ A 'cyclone event' is defined as a cyclone that is identified by the Australian Bureau of Meteorology (www.bom.gov.au/cyclone/index.shtml).

⁷ Food stress events may be apparent if large numbers of low body weight animals are being reported by wildlife carers in the region.

Appendix 2: Community Engagement Feedback

10. Summary

It is a common misconception that most people feel the same way about a flying-fox camp in their district. Because of smell, noise and droppings we expect most people will be negative about the situation. Community consultation in Hunters Hill and Huntleys Cove reveals a different story.

This report describes the results of consultation undertaken by Hunters Hill Council (Council) during 2018. Council wanted to discover more about community experiences and perspectives on the flying-fox camp and to explore community views about options to resolve any issues.

The community living around or visiting Riverglade Reserve is interested in the management of the flying-fox camp at Tarban Creek. The four consultation events gave the interested community an opportunity to have their say about impacts they experience and their preferences for flying-fox camp management.

Community perspectives are complex, and the diversity of opinions indicates that there is currently no general agreement about the right approaches to flying-fox camp management. Consultation and an ongoing planning process will help build agreement for options that are most likely to reduce impacts on people and are supported by the community.

11. What the consultation tells us.

There is a difference between being exposed to the effects of flying foxes (noise, smell, and droppings and tree damage) and experiencing those factors as negative impacts. People with the same exposure can report quite different reactions. This was evident both within households and between neighbouring properties.

There are some people who feel the impacts of flying-foxes intensely, finding it hard to be at ease in their own home. These people need support to deal with the impacts they are experiencing. Most respondents (70-80%) indicated they were either somewhat or very concerned about common impacts people experience around flying-fox camps.

Other people, including some living with high exposure are relatively untroubled. Some people are fond of and positive about flying-foxes. A significant proportion of respondents (40%) agreed that flying-foxes are a natural part of the suburbs.

Compared to households living near the camp a larger proportion of park users were neutral or positive. 72% of park users neutral or positive compared to 47% of households. Among reserve users a smaller proportion disliked the flying-foxes (16% compared to 53% of nearby households).

Consultation tells us that people experiencing the impacts intensely are wary of the suggestion that education will fix the problem. They consider themselves to be well informed. However, it is probably true that allowing people to discover more information about flying-foxes will help alleviate their concerns. For example, many people are concerned about risk of disease, but health experts can advise that the risk of disease from flying-foxes is negligible with basic precautions. Supporting people to properly investigate the issue of health risk may be a key to reducing community concern about disease.

12. Implications for planning and management.

It will be challenging to select actions that align to the expectations of all people. However, the community can understand decisions when they can see the effort made to balance differing points of view and competing objectives and are given enough information.

Reducing impacts on people requires consideration of their needs. Targeted problem solving may be more achievable than attempting to provide solutions that are universally acceptable.

People want action, but action needs to fit with community expectations. Inaction risks perpetuating antagonism about the situation. Actions need to be sympathetic to the environment. The findings indicate the focus should be on working with people, so they experience fewer impacts.

13. Introduction

14. Background and purpose of community consultation

Over the years since flying-foxes first established a camp in Riverglade Reserve, Council has received a small but steady flow of emails and letters from residents about the flying-fox Camp. Most of these were complaints to council, raising concerns about the presence of the flying-foxes, their increasing numbers and the problems that they create for nearby residents. Most complaints were received from people living nearby or using the reserve.

Like most managers of land with a flying-fox camp in or near an urban areas, Council decided to undertake community consultation to gather feedback from the community. They wanted to discover more about community perspectives, experiences and opinions about the flying-fox camp and to explore community views about options to resolve any issues.

15. Scope of the consultation

Four different consultation activities were used to:

- provide a variety of opportunities for people to give their feedback to council,
- reach a reasonable cross-section of people who might have opinions and
- improve Council's ability to discover the range of perspectives that exist in the community.

Consultation took place from June 2018 and included two online surveys and two sets of face-to-face interviews using questionnaires. A description of the four consultation approaches and the results are provided in later sections of this report.

16. Overview description of the four consultation events

The consultation was undertaken so Council could better understand the breadth of opinions, the strength of feelings and some of the reasons behind people's views relating to the flying-fox camp at Tarban Creek. It will help Council identify actions to help people affected by the flying-foxes.

Consulting the community helps to:

- understand the different needs and expectations across the community,
- communicate more effectively about flying-foxes, the camp and actions that people and Council can take,
- draft a Camp Management Plan that is relevant and effective to address peoples concerns and
- work with the community to manage the impacts of flying-foxes over time and reduce the impacts on people who are sensitive to them.

The consultation was not merely trying to establish statistics about majority and minority views across the whole population. Rather it intentionally focussed on people who have, or are likely to have, an interest in the flying-fox camp. This focussed, qualitative approach is desirable for this project for two reasons.

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- Council primarily wants to understand and, where possible, address the needs of interested or affected parties and
- the consultation was targeted but still open to all. The two online surveys were publicised across the Council area and were open to anyone to 'opt-in' and complete

It is worth noting that individuals were free to participate in more than one consultation event and it is clear that a number did. Therefore, the samples for each consultation approach overlap and cannot be added together. Each event provided different ways to understand community perspectives.

17. Online Survey 1 June to 22 August 2018

This survey was created in Survey Monkey, a web-based survey program, and was open to anyone with internet access. The survey was promoted in the June 2018 edition of the Council newsletter delivered to all residents in the LGA, on the website and on a postcard sized flyer distributed opportunistically and left at addresses visited for the householder survey. It appears the survey was undertaken by people in the local area or very nearby.

119 responses were received. 59 responses were from people within 300 metres of the reserve.

There was no incentive provided to complete this survey and it is most likely completed by people with genuine interest and motivation to provide feedback. Survey Monkey allows only one response per computer.

18. Householder interviews at properties nearby the flying-fox camp

This questionnaire was structured to enable residents to freely express what they thought and felt about flying-foxes and the camp and to describe any impacts they experienced from flying-foxes. It also created an opportunity to inform respondents, in a general sense, about Council's intention to have a planned approach to managing impacts from the camp on nearby residents.

This interview questionnaire was used in a door-to-door survey undertaken by Council staff and volunteers in streets adjacent and close to the flying-fox camp. It was usually completed by one (occasionally two) respondent answering on behalf of people in the household. Interviews took between 5 minutes and 30 minutes, depending on the type of information respondents wanted to provide.

49 surveys were completed. The priority was to hear from as many households as possible in streets adjacent to the camp. Some households were surveyed at a greater distance to help gauge the spatial extent of direct impacts from the camp. When a householder was not home, repeat visits were made at differing times to increase the opportunity to hear from priority households. A postcard and some general information was left when a householder was not contacted, including a hand written message inviting them to complete the online survey.

Interviews were undertaken in Reserve Street, Fryar Place, Karrabee Avenue, Prince Edward Street, Mary Street, Richmond Crescent, Tarban Street and Manning Road.

19. Park visitor interviews within the reserve

The questionnaire was designed to enable park visitors to discuss their use of the reserve and how the presence of flying-foxes intersects with their use of the reserve. The questionnaire initially avoided raising the topic of flying-foxes thereby allowing people to freely describe issues affecting their use of the reserve. The questionnaire then allowed full discussion of any impacts that related to flying-foxes. The survey was designed to signal Council's intention to have a planned approach to managing impacts from the camp including impacts on nearby residents.

This interview questionnaire was conducted as an intercept survey among visitors to the reserve on a selection of weekend and week days. A high proportion of visitors agreed to undertake the survey. Very few declined, therefore the views captured are likely to be representative of park users.

20. Online interactive survey – Flyingfoxengage

Flyingfoxengage is an engagement platform that provides a mechanism for community members to learn about and rank management options and appreciate what is involved in decisions about management options for the Tarban Creek flying-fox camp. The results provide support for Council planning tasks, e.g. drafting a flying-fox camp management plan.

The online Flyingfoxengage consultation tool was launched on the 22 August 2018 with the website www.flyingfoxengage.com/huntershill remaining open for submissions until October 17 2018. During this consultation period the Flyingfoxengage website received 85 valid submissions.

Flying-fox engage is an online survey tool that invites each respondent to consider what they value and expect from management options. The tool then generates a list for each respondent of proven management options in rank order that aligns to those values. Finally, a respondent can re-rank those options according to their own preferences for camp management.

21. Overview of the consultation outcomes

22. Key insights and conclusions from the consultation.

Community perspectives vary widely.

Consultation showed a wide range of perspectives in the community about the Tarban Creek flying-fox camp. Some views are polarised within the community.

People's responses covered three aspects of living near flying-foxes: Whether they like flying-foxes, whether they care what happens to them and whether they can accept the flying-fox camp. Attitudes and opinions can be described as on a spectrum as follows:

- Appreciation of flying-foxes: *"I love flying-foxes"* to *"I detest flying-foxes"*,
- concern for flying-foxes: *"They need our help"* to *"I don't care what happens to them"*, and
- acceptance of the flying-fox camp in an urban setting: *"They are a natural part of our urban environment"* to *"they don't belong here"*.

Participants in the consultation held opinions across these spectrums. Some were at the extremes. Most were somewhere in between. Each person's position is multi-faceted and may shift somewhat according to circumstances and recent experiences. For example, people talked about being *"OK with them now but..."* dreading the breeding season when smell, activity and noise intensifies.

Consultation revealed a range of divergent views including some people who were extremely positive about flying-foxes, even among those with high exposure to factors that could negatively impact people. This contrasts to previous correspondence received by Council, which was generally negative about the flying-fox camp.

One surprising result was that people in broadly the same circumstance could express vastly differing viewpoints. Here are some examples:

A person living adjacent to the reserve is extremely distressed by the impacts of the flying-foxes on their lifestyle at home and wants them gone. Two doors away, and just as close the animals, a person is indifferent to the impacts. Two doors the other way, another person is

committed to accepting and protecting the animals as part of the environment, despite experiencing some of the impacts.

A parent with young children visiting the reserve feels repulsed by the animals, concerned about health risks for their children and tries to avoid getting close. Another parent with children deliberately stops and spends time admiring the animal.

A person in Huntleys Cove deeply resents the regular burden of cleaning spatter from their property while another person in Huntleys Cove expresses awe and wonder at the spectacle as flying-foxes fly out to feed each evening.

Strong emotions are involved. People have real needs for meaningful results.

Importantly, those who feel they are impacted by flying-foxes usually feel it intensely. We expect home to be a restful place, where we can be at ease. However, for these people the impacts from flying-foxes impinge upon that rest and ease. Decisions about camp management actions need to respect the seriousness of this situation.

Whether or not they are impacted, some people express strong feelings about human responsibility to care for animals. This could be wildlife or animals in general. Decisions about camp management also need to respect the strongly held feelings of empathy and responsibility people have for animals in the suburbs.

Impacts are confined to a relatively small of people.

The consultation was deliberately undertaken among people who, because they are in proximity to the flying-fox camp, are the most likely to feel they are impacted. Reasonable effort was made to speak to all households adjacent to the reserve where impacts are most likely.

26 households (53%) reported they were struggling with the impacts. At this scale it may be feasible to work closely with affected households to reduce the impacts on them.

Because households experience impacts differently, options to mitigate impacts will differ between households.

Households will have their own ideas about how proven management options could apply best to them. Community have explored common management options in flyingfoxengage (see other parts of this report).

Community knowledge and expert knowledge overlap but are not fully aligned. The link between understanding and belief is less clear.

A significant proportion of the community seems to understand some key information about flying foxes. The proportion is probably higher than in many other parts of NSW. Many people

- understand they are Australian native animals, an important part of the Australian ecosystem and a natural feature of the urban environment
- recognise that, in an overall sense, habitat is diminishing and populations are in decline.

Whether it is knowledge or belief there are some areas where community understanding diverges from expertise.

- Information about disease risk. A significant proportion of people are concerned about disease however expert knowledge identifies this risk as very low. People may be unnecessarily concerned given expert assessment of disease risk.

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- Wildlife management and the ability of humans to influence the behaviour of wild animals. People may not accept that it is difficult to shift a camp and impossible to guarantee the outcome. The successful dispersion at the Royal Botanic Gardens is reasonably well known.

People suspect management decisions are made for ideological reasons rather than using evidence and practical considerations.

Across the consultation, and in flyingfoxengage in particular, there is evidence that people doubt the integrity of how decisions will be made for camp management.

Some people are hoping for active dispersal or culling of flying-foxes. They worry that such strategies have already been ruled out because of the view that experts and decision makers tend to favour nature above people.

People concerned for the wellbeing of animals and the preservation of nature worry that the realities of wildlife and the environment will be ignored to provide amenity for people.

23. Main results from Initial Online Survey

The survey was open for 3 months from mid-May to mid-August 2018. 119 people participated.

Respondents were invited to agree or disagree with statements about the flying-fox camp. Around 55-60% of respondents agreed with statements that were NOT positive about the camp. 30-35% agreed with positive statements. 5-10% were neutral.

A significant proportion of respondents (40%) agreed that flying-foxes are a natural part of the suburbs.

Most respondents (70-80%) indicated they were either somewhat or very concerned about common impacts people experience around flying-fox camps.

To what extent are you concerned about the following?	Not Concerned		Somewhat Concerned		Very Concerned		Total
Tree health within the flying-fox camp in Riverglade Reserve	18.64%	22	26.27%	31	55.08%	65	118
Excrement/droppings within Riverglade Reserve	22.88%	27	16.10%	19	61.02%	72	118
Noise within or adjacent to Riverglade Reserve	33.05%	39	16.10%	19	50.85%	60	118
Useability of Riverglade Reserve	29.91%	35	25.64%	30	44.44%	52	117
Smell within or adjacent to Riverglade Reserve	22.03%	26	20.34%	24	57.63%	68	118
Impacts on people in properties surrounding the reserve when flying-foxes fly in and fly out of the camp (eg. droppings, feeding on fruit trees, noise)	18.64%	22	17.80%	21	63.56%	75	118
Risk of disease from flying-foxes	22.88%	27	20.34%	24	56.78%	67	118
Visual amenity of Riverglade Reserve (the appearance of the camp, damaged tree canopy etc.)	26.50%	31	16.24%	19	57.26%	67	117
						Answered	118
						Skipped	1

The survey succeeded in reaching local audiences. Participants were from Huntleys Cove, Hunters Hill and Gladesville except for one participant each from North Ryde and Huntleys Point. 50% of respondents lived within 300 metres of the reserve. Direct impacts from the camp are more likely within 300 metres, however disturbance caused by droppings and night time feeding can be more widespread.

The survey was completed by people who lived near the reserve and by people who visit the reserve. Most respondents use the reserve and visit it on at least a monthly basis, and most of those visit more than once a week or daily.

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Nearly all respondents were aware of the flying-foxes and based on proximity or use of the reserve were likely to be exposed to aspects of the flying-fox camp like noise, smell, visual appearance and droppings.

Respondents to the initial online survey can be characterised as highly engaged in the issue. 93 of 119 respondent provided additional comments. 75 provided email addresses to stay involved in further consultation.

24. Main results from Householder interviews in properties nearby the flying-fox camp

The results were more varied than expected by the interviewers who had anticipated that householders in the selected streets would consistently report problems living near the camp. Most respondents noticed some or all of the potentially problematic aspects of flying-fox camps, (noise, smell, droppings and tree damage). However, each of these aspects was not noticed by between 30% and 50% of respondents.

Even if an aspect was observed, level of concern about it varied.

The questionnaire was undertaken by four interviewers visiting households on weekends and weekday evenings over the two weeks from 1 June 2018 to 16 June 2018.

Interviews were completed at 49 households. Interviews usually took place with one or two members of the household.

All respondents were aware of flying-foxes. Respondents were asked what they notice about flying-foxes, interviewers recorded when respondents mentioned noise, smell, faecal drop and tree damage. Different people noticed different aspects. Three respondents, at some distance from the camp did not report noticing any of those aspects. Most noticed some or all aspects

	Aware of ff		Notice smell	Notice noise	Notice tree damage	Notice droppings
counts "Yes"	49		29	34	29	24
	100%		59%	69%	59%	49%
Counts "No and Blank"	0		19	15	20	25
			39%	31%	41%	51%

Interviewers also asked what they were were concerned about from the things they had noticed.

People who noticed these things were not equally concerned. Some people are highly concerned. These people reported being strongly impacted by the issue.

Two people with similar exposure to the same aspects experience them differently and are therefore impacted differently.

Levels of concern have been categorised. The issue is assumed to impact someones quality of life in categories, "Yes, I hope it improves" and "Yes, it is a problem".

In broad terms, among the households interviewed, people were concerned and experiencing problems with Noise (47%), Smell (49%), Tree Damage (58%), Droppings (39%), concern about disease risk (36%).

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			Concern smell	Concern noise	Concern tree damage	Concern droppings	Concern Disease
Blank			8	7	15	18	17
			16%	14%	31%	37%	35%
No			12	11	5	7	13
			24%	22%	10%	14%	27%
Yes can accept			5	8	1	5	2
			10%	16%	2%	10%	4%
Yes hope improves			8	8	13	6	2
			16%	16%	27%	12%	4%
Yes its problem			16	15	15	13	15
			33%	31%	31%	27%	31%

Householders were asked about their overall feelings towards flying-foxes. 47% were neutral, somewhat positive or fond of flying-foxes. 53% hated or disliked flying-foxes. People who disliked flying foxes tended to think everyone disliked them. However, these overall results show a different picture.

	Overall feeling	
Love them	1	2%
Like them	11	22%
don't bother	11	22%
dislike	17	35%
Hate	9	18%
Total	49	100%

25. Main results from Intercept interviews within the reserve.

99 people were interviewed in the reserve.

It is of interest to note that, when asked if anything concerns them about the reserve only 20% of respondents mentioned bats unprompted. This suggests that for most people choosing to use Riverglade Reserve, flying-foxes are not a major intrusion on their enjoyment of the reserve. This may not be surprising as they choose to use the reserve with flying foxes present.

When people were discussing flying-foxes the sentiments toward the flying-foxes were mixed. Twice as many people were positive about flying foxes as were negative. The results differ markedly from householder surveys.

Compared to households living near the camp larger proportion were neutral (40% compared to 22%) or positive (32% compared to 25%). Among reserve users a smaller proportion disliked the flying-foxes (16% compared to 53% of nearby households). We were unable to categorise the attitude of some (12%).

When discussing problems some park users report certain aspects of flying-foxes affecting their enjoyment of the reserve. Smell was a problem (27%), concern about tree damage (19%), concern about disease risk (17%), noise (16%), faecal drop was a concern for very few (6%).

26. Main results from online interactive survey – Flyingfoxengage.

A separate report on flyingfoxengage explains the findings in detail. The following summarises the results and how this consultation tool operates.

The results of flyingfoxengage indicate the three most commonly preferred management options are

- provision of flying-fox education and awareness programs
- subsidising property modification to reduce the impacts of flying-foxes
- health and safety guidelines to manage incidents related to the camp.
- subsidising services to reduce the impacts of flying-foxes.

Flyingfoxengage is an engagement decision support system. The online Flyingfoxengage consultation tool was launched on the 22 August 2018 with the website www.flyingfoxengage.com/huntershill remaining open for submissions until October 17 2018. During this consultation period the Flyingfoxengage website received 85 valid submissions.

The results provide insights about which management options respondents prefer and which they do not. Consistent with other consultation events there is evidence of strongly differing views within the group that responded and there are polarised views about some management options.

There are two main kind of results reported.

1. Aggregated rankings. Like ‘average scores’ aggregated rankings show the average ranked preference for management options when all 85 individual responses are brought together. Aggregated scores tend to mask the diversity views. Aggregate results indicate a wide base of support for education, awareness and guidelines and subsidies to help affected households adapt to impacts.
2. Cumulative rankings. A cumulative ranking shows how many times various options were ranked by individuals in their top 5 (most preferred) and how many times various options were ranked by individuals in the bottom 5 (least preferred). Cumulative rankings help reveal the diversity of views (and divergence) of views. Cumulative impacts show polarised views on actions to disperse or cull flying foxes and education and awareness.

Aggregated Rankings.

The table below compares two ranked lists produced by aggregating responses where management options are ranked from most preferred to least preferred on aggregate

The first list aggregates results from stage one where each respondent elects what is important to them about flying fox management and Flyingfoxengage generates a ranked list of management options for the respondent based on their information.

Next a respondent can ‘override’ the ranking and put the management options in order based on their own preference for the management options now they can see them. The second list aggregates that re-ranked list.

The table below shows that only a few management options were significantly re-ranked by respondents. Those that moved more than one rank position on aggregate are highlighted in colour.

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Ranking based the importance of performance criteria given by respondents	Ranking after respondents re-sorted according to their own judgement
1. Provision of flying-fox education and awareness programs	1. Subsidising property modification to reduce the impacts of flying-foxes
2. Subsidising property modification to reduce the impacts of flying-foxes	2. Provision of flying-fox education and awareness programs
3. Health and safety guidelines to manage incidents related to the camp	3. Health and safety guidelines to manage incidents related to the camp
4. Guidelines for carrying out operations, including human movement, adjacent to camps	4. Subsidising services to reduce the impacts of flying-foxes
5. Subsidising services to reduce the impacts of flying-foxes	5. Revegetate and manage land to create alternative flying-fox habitat
6. Research to improve knowledge of flying-fox ecology	6. Managing potential habitat to discourage habitation.
7. Revegetate and manage land to create alternative flying-fox habitat	7. Guidelines for carrying out operations, including human movement, adjacent to camp
8. Managing potential habitat to discourage habitation.	8. Routine maintenance to improve the condition of the site
9. Routine maintenance to improve the condition of the site	9. Research to improve knowledge of flying-fox ecology
10. Early dispersal before a camp is established at a new location	10. Early dispersal before a camp is established at a new location
11. Trimming vegetation at the camp boundary to create a small buffer	11. Trimming vegetation at the camp boundary to create a small buffer
12. Passive dispersal of a flying-fox camp through selective vegetation removal	12. Active dispersal of a flying-fox camp using disturbance
13. Do Nothing	13. Passive dispersal of a flying-fox camp through selective vegetation removal
14. Active dispersal of a flying-fox camp using disturbance	14. Actively nudging the camp to a nearby location using disturbance
15. Actively nudging the camp to a nearby location using disturbance	15. Culling flying-foxes
16. Culling flying-foxes	16. Do Nothing

Cumulative Rankings.

The table below shows the diverse and sometimes polarised views hidden within the aggregate rankings. Culling flying-foxes rises higher in the cumulative rankings because 12 of 85 respondents ranked 'culling flying-foxes' as their most preferred. 53 of 85 people ranked it least preferred. These tables reveal when even a relatively small number of respondents strongly prefer or do not prefer a management option.

Cumulative results help reveal those management options which appear to have strongly differing feelings attached and are likely to be polarising for management planning and implementation.

Options frequently ranked last or in the 'Bottom 5' A20:B31	Options frequently ranked last or in the 'Bottom 5'
1. Provision of flying-fox education and awareness programs	
2. Subsidising property modification to reduce the impacts of flying-foxes	
3. Active dispersal of a flying-fox camp using disturbance	
4. Culling flying-foxes	
5. Passive dispersal of a flying-fox camp through selective vegetation removal	

	12. Provision of flying-fox education and awareness programs
	13. Active dispersal of a flying-fox camp using disturbance
	14. Actively nudging the camp to a nearby location using disturbance
	15. Do Nothing
	16. Culling flying-foxes

Flyingfoxengage provides important information about how to help planners appreciate how the community understand and evaluate management options and can guide where extra explanation about decisions will be required.

Discussion/Interview Guide – Affected Residents.

ADDRESS of interview: _____

Hi, my name is _____, I live in Hunters Hill and I am council volunteer. Council wants to hear from residents about the flying-foxes. They are roosting in trees in Riverglade Reserve and fly out to feed at night.

If you agree to talk to me it will probably take between 15 minutes and 30 minutes.

Would now be a good time, or do you want to set another time?

PREFERRED TIME/DATE: _____

We are asking about it now because Council wants to have a plan in place. This will help them coordinate any activities that might be needed to manage the impacts from the flying-foxes in the future. Also Council are required by State and Federal Government to have a management plan before any management activities can happen.

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Council is interested to hear from you about the flying-foxes and to hear any other comments you want to make.

I have 7 questions to run through and I will write notes from your answers.

But before that, have you got any questions about flying-foxes and the intention to prepare a Camp Management Plan?

QUESTION 1.

Are you aware of flying-foxes in the district? YES/NO

What have you noticed and when do you noticed those things?

Do you visit the reserve? YES/NO _____.

- I don't really go to the reserve
- I go past the reserve, but not into it.
- I walk my dog in the reserve
- I walk, exercise or relax in the reserve
- I walk through the reserve on my way somewhere else.
- I am there mainly for the sports fields
- Other (please specify) _____

How often?

- Every day
- Once or twice a per week
- Once per month
- Irregularly
- Seldom or never
- Other (please specify)

QUESTION 2.

How do you feel about the flying-foxes based on your experiences?

QUESTION 3

You mentioned some of your concerns about the flying foxes.

What are you most concerned about?

What is it it about _____ that concerns you? (probe: how does that affect you? What about other people in the household?)

QUESTION 4 (If respondent attaches positive values to the flying foxes)

You mentioned you appreciate some things about the flying foxes.

What do you appreciate?

What is it it about _____ that you like? (What about other people in the household?)

QUESTION 5

As I mentioned at the start, Council is going to prepare a Flying-fox Camp Management Plan for Riverglade Reserve. Your input will help Council understand what residents need as they prepare the plan.

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- A. Would you like to stay in touch with progress on the plan?
What way do you think Council should use to keep you informed?

- B. Would you be interested in being involved in further consultation about managing the camp, such as a community workshop or an online survey about management options?
Would you like to give Council your email address so they can let you know about the project and upcoming consultation

QUESTION 6

Do you have any other comments at this stage.

QUESTION 7. Are there other people in the area you think I should be speaking to about Flying-foxes?

*Not everyone will be at home when we call, **please let your neighbours know** you spoke to me and **they can go onto Councils website** to complete an online survey, to request to be kept informed or to find out who to speak to in Council about the Flying-fox Camp Management Plan.*

Thank you for your information. It will help Council find workable solutions.

Discussion Guide – Park Users Riverglade Reserve.

Hi, my name is _____, I live in Hunters Hill and I am council volunteer. Council wants to check in to see how things are going for people using Riverglade Reserve. If you agree to talk to me it will probably take between 3 and 10 minutes, depending what you want to tell me.

1. **What have you come to this reserve to do?**
 - I walk my dog in the reserve
 - I walk, exercise or relax in the reserve
 - I walk through the reserve on my way somewhere else.
 - I am there mainly for the sports fields
 - Other (please specify)

2. **How often do you come here for that?**
 - Every day
 - Once or twice a per week
 - Once per month
 - Irregularly
 - Seldom or never
 - Other (please specify)

3. **Why do you choose this reserve/ what makes this reserve suitable?**
4. **What, if anything, concerns you about this reserve when you visit?**
5. **Specifically, have you noticed the bats in the reserve (which are also called flying foxes)?**
6. **When are you aware of them and what do you notice?**
7. **In what way, if any, do they change your use of the park?**
8. **What do you think about the flying foxes?**
9. **Is there anything else you would like to say about Flying foxes?**

Thanks so much. Council is checking in with a range of people about flying foxes because some people have raised concerns. Information from a range of people will inform Council as they prepare a Camp Management Plan. - *Offer information about flying foxes if relevant.*

Appendix 3: Species Profiles

26.1 Species profiles

26.1.1 Black flying-fox (*Pteropus alecto*)



Figure 5.1: Black flying-fox indicative species distribution, adapted from OEH 2015a

The black flying-fox (BFF) (Figure 5.1) has traditionally occurred throughout coastal areas from Shark Bay in Western Australia, across Northern Australia, down through Queensland and into NSW (Churchill 2008; OEH 2015a). Since it was first described there has been a substantial southerly shift by the BFF (Webb & Tidemann 1995). This shift has consequently led to an increase in indirect competition with the threatened GHFF, which appears to be favouring the BFF (DoE 2016a).

They forage on the fruit and blossoms of native and introduced plants (Churchill 2008; OEH 2015a), 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.

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

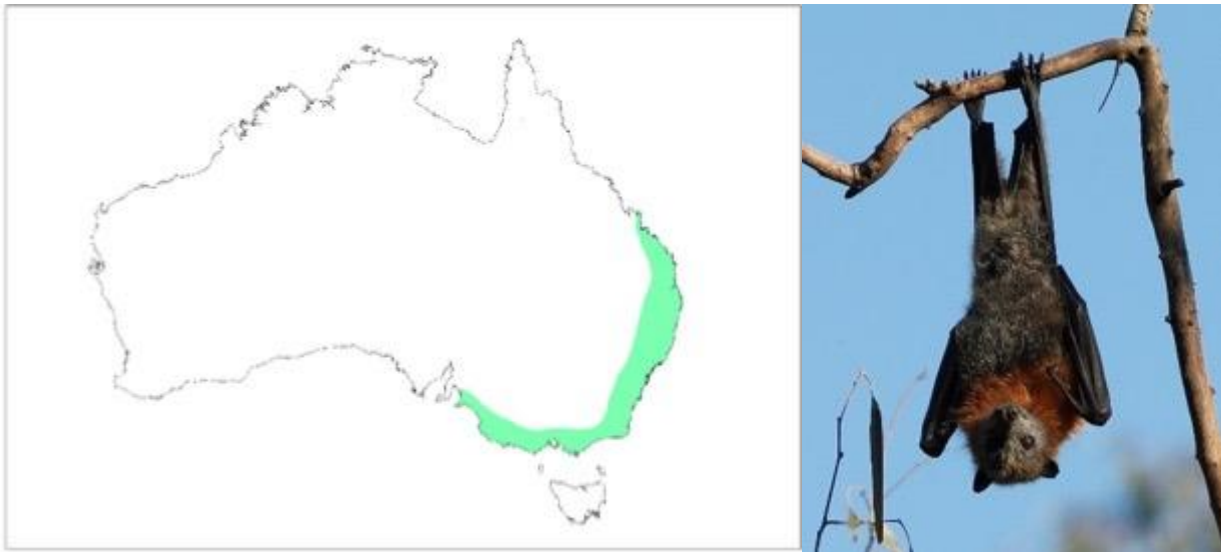


Figure 5.2: Grey-headed flying-fox indicative species distribution, adapted from OEH 2015a

The grey-headed flying-fox (GHFF) (Figure 5.2) is found throughout eastern Australia, generally within 200 kilometres of the coast, from Finch Hatton in Queensland to Melbourne, Victoria (OEH 2015d). This species now ranges into South Australia and has been observed in Tasmania (DoE 2016a). 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 raid orchards at times, especially when other food is scarce (OEH 2015a).

All the GHFF in Australia are regarded as one population that moves around freely within its entire national range (Webb & 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 & Augée 1992; Roberts et al. 2012). This results in large fluctuations in the number of GHFF in NSW, 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 NSW (DECCW 2009).

There is evidence the GHFF population declined by up to 30% between 1989 and 2000 (Birt 2000; Richards 2000 cited in OEH 2011a). There is a wide range of ongoing threats to the survival of the GHFF, including habitat loss and degradation, deliberate destruction associated with the commercial horticulture industry, conflict with humans, infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, power line electrocution, etc.) 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).

26.1.3 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. Young 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 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 6). 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 NSW).

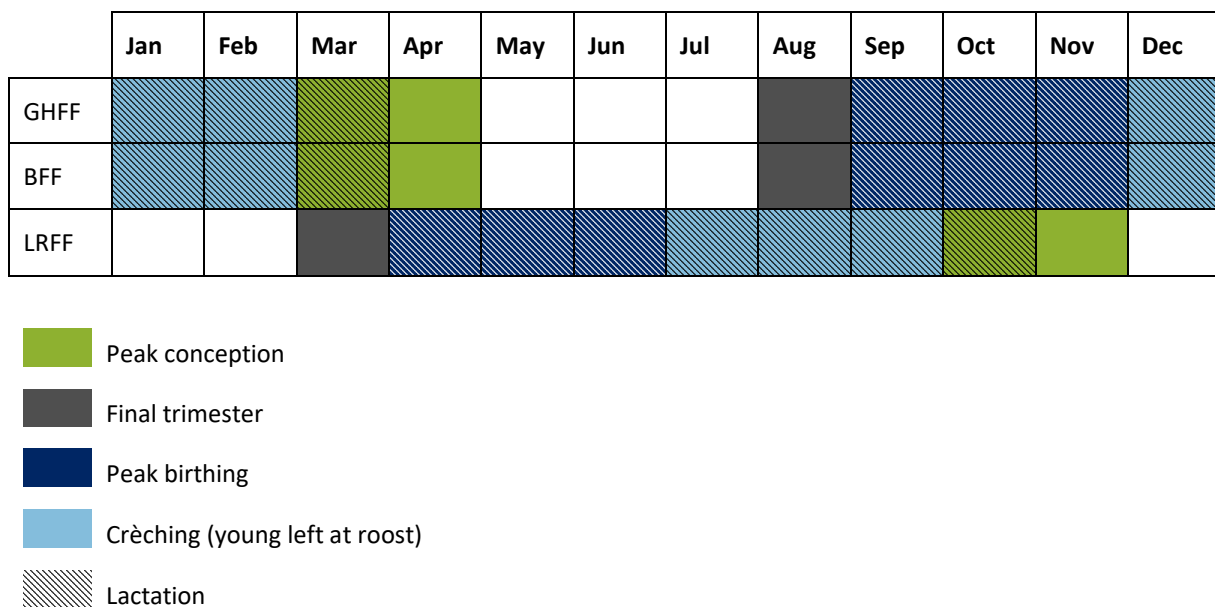


Figure 6: Indicative flying-fox reproductive cycle. Note that LRFF rarely birth and rear young in NSW. The breeding season of all species is variable between years and location, and expert assessment is required to accurately determine phases in the breeding cycle and inform appropriate management timing.

Appendix 4: Flying-fox ecology and behaviour

26.2 Ecological role

Flying-foxes, along with some birds, make a unique contribution to ecosystem health through their ability to move seeds and pollen over long distances (Southerton et al. 2004). This contributes directly to the reproduction, regeneration and viability of forest ecosystems (DoE 2016a).

It is estimated that a single flying-fox can disperse up to 60,000 seeds in one night (ELW&P 2015). 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 km in a single night with a foraging radius of up to 50 km from their camp (McConkey et al. 2012), and have been recorded travelling over 500 km 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 makes 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 (EHP 2012). 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, provide habitat for other fauna and flora, 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 (EHP 2012; ELW&P 2015).

Flying Fox stages of life-cycle can greatly influence both numbers in a Camp and the noise levels. In general animals are noisiest when males are establishing and maintaining territories. Numbers tend to swell during breeding time. Figure 7 show the life-cycle in a diagram. It is important to assess Camp characteristics (and management decisions) based on the life-cycle stage. For example noise will abate after territories are set up.

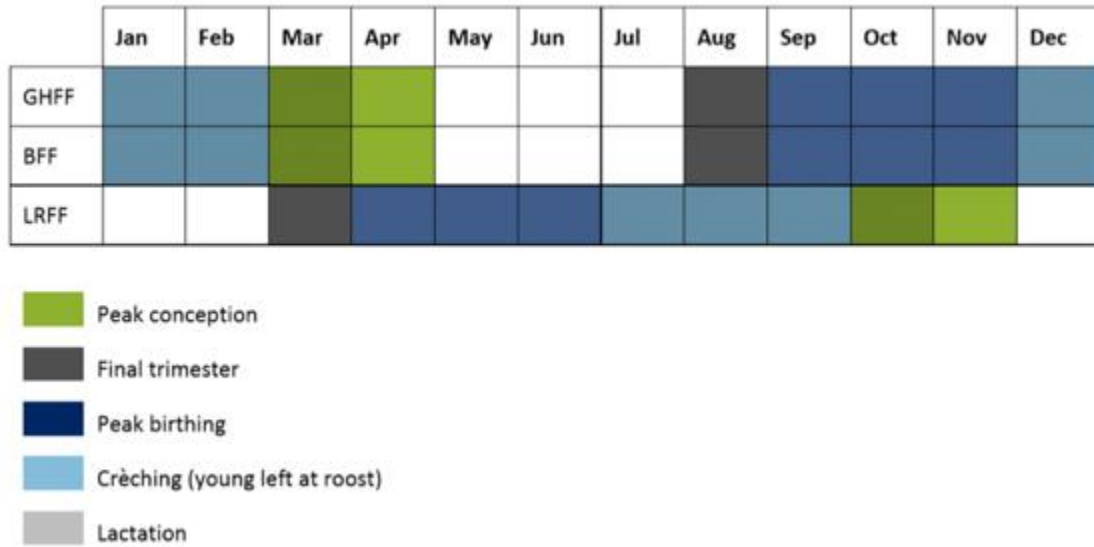


Figure 7 GHFF Life-cycle. February is the GHFF territorial time. The breeding season is variable between years and location and expert assessment is required to accurately determine phases in the breeding cycle and inform appropriate management timing.

26.3 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 or culling at non-urban roosts or 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.

26.4 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.

At the time of listing, the species was considered eligible for listing as vulnerable as counts of flying-foxes over the previous decade suggested that the national population may have declined by up to 30%. It was also estimated that 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 and culling.

The main threat to grey-headed flying-foxes in NSW is clearing or modification of native vegetation. This threatening process 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, and this threatening process continues.

There is a wide range of ongoing threats to the survival of the GHFF, 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.)
- predation by native and introduced animals
- exposure to extreme natural events such as cyclones, drought and heat waves.

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

26.5 Camp characteristics

All flying-foxes are nocturnal, 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 20–50 kilometre radius of a camp site will be a key determinant of the size of a camp (SEQ Catchments 2012). Therefore, flying-fox camps are generally 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):

- 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). See Species Profiles in Appendix 3.

Appendix 5: Requirements

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 4.1.5 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 and coordinate bush firefighting, while protecting persons from injury or death, and reduce property 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 2008 (Part 4, Division 2) 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 Lands Act 1989

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 Lands Act 1989 (including Ecological Consultants Australia ecologicalca@outlook.com 0488 481 929

vegetation management and dispersal activities) are an offence under the Act without prior authorisation obtained through the Department of Primary Industries (Lands).

Local Government Act 1993

The primary purpose of this Act is to provide the legal framework for an effective, efficient and environmentally responsible, open 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 which address specific planning issues within NSW. 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 Council 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 14 – Coastal Wetlands

This policy provides additional protection for coastal wetlands by requiring development consent to be obtained before any clearing, draining, filling or construction of levees can occur on a mapped wetland. Camps are unlikely to fall within the bounds of a SEPP 14 wetland, but additional restrictions for vegetation management in these areas may be required if they do.

SEPP 26 – Littoral Rainforests

SEPP 26 aims to protect coastal rainforests (littoral rainforests) by requiring development consent for activities within or adjacent to mapped coastal rainforest. It is unlikely that clearing for flying-fox management would be considered significant enough to trigger this SEPP but this should be confirmed if the site is within a mapped SEPP 26 area.

SEPP 19 – Bushland in Urban Areas

The aim of this policy is to protect and preserve bushland within urban areas which are 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 and 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.

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. OEH may be able to provide assistance with 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 Biobanking Assessor under the *Biodiversity Conservation Act 1995*.
- 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 5b. Biodiversity Conservation Licence

At the time the Plan is submitted to OEHL for approval, it should include a completed section 91 licence application form. The form can include information already contained in the Plan. Alternatively, the land manager should inform OEHL that the proposed works are to be assessed under Part 5 of the EP&A Act and will not require a licence application under the *Biodiversity Conservation Act 1995*.

Note that OEHL is obliged to place licence application forms on its website, and the application, accompanying documentation and approval, form part of the public register for the BC Act. The licence application is available at: [Section 91 Licence](#).

Appendix 5c. 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. OEHL may be able to provide assistance with 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.

Flying-fox Camp Management Plan Tarban Creek

- Local knowledge and experience.
- Accredited Biobanking Assessor under the *Biodiversity Conservation Act 1995*.
- 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 6: Desktop ecological assessment guideline

Buffer

Desktop assessments should include the camp and a suitable buffer area. The suggested buffer for ecological assessments is 10 km, however this may be reviewed on a case by case basis.

Sources of information for database searches

Depending on the location and extent of the project, the following databases may provide information on flora and fauna species and ecological communities for the site and surrounds.

Sources of ecological information

Source	Description	Links
Atlas of Living Australia	Biodiversity knowledge contributed by Australia's academic, scientific, environmental and general communities	www.ala.org.au , page provides a link to a mapping and analysis page where you can view records within an area of interest
Protected Matters Search Tool	Used to generate a list of matters of national environment significance within an area of interest	www.environment.gov.au/epbc/protected-matters-search-tool
NSW BioNet	Contains government-held information about plants and animals in NSW. The following organisations provide data: Office of Environment and Heritage; National Parks and Wildlife Service; Royal Botanic Gardens and Domain Trust; Department of Primary Industries; Forests NSW; Australian Museum. Users can register for a log-in version which provides additional detail and functionality.	www.bionet.nsw.gov.au/
Critical Habitat Register – Office of Environment and Heritage	Declarations of critical habitat and maps of these sites for species listed under the BC Act	www.environment.nsw.gov.au/criticalhabitat/criticalhabitatprotectionbydoctype.htm
Vegetation Information System: Maps	Statewide regional scale vegetation map, and for some areas, a local fine-scale map SEEDat Portal	www.environment.nsw.gov.au/research/PlantCommunityIDsoftware.htm
OEH – Spatial data portal	Spatial datasets available for download, supplied in GDA	data.nsw.gov.au/data/dataset/nsw-oeh-spatial-data-portal
SIX maps	Provides maps showing cadastral and topographic information	six.nsw.gov.au/wps/portal/
Threatened Species Profile Database	Provides a search tool for NSW threatened species including a description and indicative distribution	www.environment.nsw.gov.au/threatened-species/
SEPPs 14 & 26	Available on the OEH spatial data portal	data.nsw.gov.au/data/dataset/nsw-oeh-spatial-data-portal

Other sources of data

Depending on the type of project and location, the local council, or National Parks and Wildlife Service may hold more detailed vegetation mapping than publicly available. The relevant authority should be contacted to confirm if the most detailed mapping and data records have been obtained.

Appendix 7 - Human and animal health

Flying-foxes, like all animals, carry pathogens that may pose human health risks. Many of these are viruses which cause only asymptomatic infections in flying-foxes themselves but may cause significant disease in other animals that are exposed. In Australia the most well-defined of these include Australian bat lyssavirus (ABLV), Hendra virus (HeV) and Menangle virus.

Outside of an occupational cohort, including wildlife carers and vets, human exposure to these viruses is extremely rare and similarly transmission rates and incidence of human infection are very low. In addition, HeV infection in humans apparently requires transfer from an infected intermediate equine host and direct transmission from bats to humans has not been reported. Thus despite the fact that human infection with these agents can be fatal, the probability of infection is extremely low and the overall public health risk is judged to be low (Qld Health 2016).

26.6 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 HeV prevalence and flying-fox disturbance. However the consequences of chronic or ongoing disturbance and harassment and its effect on HeV 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 which 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 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.

26.7 Additional human and animal health information

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 2013) 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 2013).

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 2013).

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 2013).

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 classical 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-vaccination and have their level of protection regularly assessed. Like classical 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 (HeV), 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 2014). There is no evidence that the virus can be passed directly from flying-foxes to humans or to dogs (AVA 2015). Clinical studies have shown cats, pigs, ferrets and guinea pigs can carry the infection (DPI 2015a).

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 primarily with flying-fox urine (CDC 2014).

Humans may contract the disease after close contact with an infected horse. HeV 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 2014). Since 1994, 81 horses have died and four of the seven people infected with HeV have lost their lives (DPI 2014).

Previous studies have shown that HeV spillover events have been associated with foraging flying-foxes rather than camp locations. Therefore risk is 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 2014), 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 HeV 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 HeV via aerosol of heavily contaminated substrate should consider additional PPE (e.g. respiratory filters), and potentially dampening down dry dusty substrate.

Menangle virus

Menangle virus (also known as bat paramyxovirus no. 2) was first isolated from stillborn piglets from a NSW piggery in 1997. Little is known about the epidemiology of this virus, except that it has been recorded in flying-foxes, pigs and humans (AVA 2015). The virus caused reproductive failure in pigs and severe febrile (flu-like) illness in two piggery workers employed at the same Menangle piggery where the virus was recorded (AVA 2015). The virus is thought to have been transmitted to the pigs from flying-foxes via an oral–faecal matter route (AVA 2015). Flying-foxes had been recorded flying over the pig yards prior to the occurrence of disease symptoms. The two infected piggery workers made a full recovery and this has been the only case of Menangle virus recorded in Australia.

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 disease.

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 8: General Camp Management Options

26.8 Level 1 actions: routine camp management

26.8.1 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.

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.



Figure 8: Possible components of an education program

An education program may include components shown in Figure 8.

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 better understanding flying-fox ecology and applying that understanding to careful urban planning and development.

26.8.2 Property modification without subsidies

The managers of land on which a flying-fox camp is located would promote or encourage the adoption of certain actions on properties adjacent or near to the camp to minimise impacts from roosting and foraging flying-foxes (note that approval may be required for some activities, refer to Appendix 1 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 5 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. BBQs and tables) within close proximity to a camp or foraging tree to avoid contamination 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 NSW Department of Primary Industries [Hendra virus web page](#) (DPI 2015a).
- Include suitable buffers and other provisions (e.g. covered car parks) in planning of new developments.
- Turn off lighting at night which may assist flying-fox navigation and increase fly-over impacts.
- Consider removable covers for swimming pools and ensure working filter 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.

26.8.3 Property modification 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.

The level and type of subsidy would need to be agreed to by the entity responsible for managing the flying-fox camp.

26.8.4 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, car washing or power bills. Rate reductions could also be considered.

Critical thresholds of flying-fox numbers at a camp and distance to a camp may be used to determine when subsidies would apply.

26.8.5 Routine camp maintenance and operational activities

Examples of routine camp management actions are provided in the Policy. These include:

- removal of tree limbs or whole trees that pose a genuine health and safety risk, as determined by a qualified arborist
- weed removal, including removal of noxious weeds under the *Noxious Weeds Act 1993*, or species listed as undesirable by a council
- trimming of understorey vegetation or the planting of vegetation
- minor habitat augmentation for the benefit of the roosting animals
- mowing of grass and similar grounds-keeping actions that will not create a major disturbance to roosting flying-foxes
- application of mulch or removal of leaf litter or other material on the ground.

Protocols should be developed **for carrying out operations that may disturb flying-foxes, which can result in excess camp noise. Such protocols could include limiting the use of disturbing activities to certain days or certain times of day in the areas adjacent to the camp, and advising adjacent residents of activity days. Such activities could include lawn-mowing, using chainsaws, whipper-snippers, using generators and testing alarms or sirens.**

26.8.6 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.

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, whilst 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.**

When improving a site for a designated flying-fox camp, preferred habitat characteristics detailed in Section 6.4 should be considered.

Foraging trees planted amongst and surrounding roost trees (excluding in/near horse paddocks) may help to attract flying-foxes to a desired site. They will also assist with reducing foraging impacts in residential areas. Consideration should be given to tree species that will provide year-round food, increasing the attractiveness of the designated site. Depending on the site, the potential negative impacts to a natural area will need to be considered if introducing non-indigenous plant species.

The presence of a water source is likely to increase the attractiveness of an alternative camp location. Supply of an artificial water source should be considered if unavailable naturally, however this may be cost-prohibitive.

Potential habitat mapping using camp preferences (see Section 6.4) and suitable land tenure can assist in initial alternative site selection. A feasibility study would then be required prior to site designation to assess likelihood of success and determine the warranted level of resource allocated to habitat improvement.

26.8.7 Provision of artificial roosting habitat

This management option involves constructing artificial structures to augment roosting habitat in current camp sites or to provide new roosting habitat. Trials using suspended ropes have been of limited success as flying-foxes only used the structures that were very close to the available natural roosting habitat. It is thought that the structure of the vegetation below and around the ropes is important.

26.8.8 Protocols to manage incidents

This management option involves implementing protocols for managing incidents or situations specific to particular camps. Such protocols may include 'bat watch' patrols at sites that host vulnerable people, management of pets at sites popular for walking dogs or heat stress incidents (when the camp is subjected to extremely high temperatures leading to flying-foxes changing their behaviour and/or dying).

26.8.9 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.

26.8.10 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.

26.8.11 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.

26.9 Level 2 actions: in-situ management

26.9.1 Buffers

Buffers can be created through vegetation removal 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 camp. The amount required to be removed varies between sites and camps, 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 (further to desktop searches, see Appendix 8) 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 camp and noise issues for neighbouring residents which may create further conflict.

Suitable experts (Appendix 5) should be consulted to assist selective vegetation trimming/removal to minimise vegetation loss and associated impacts.

The importance of under- and mid-storey 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 – For example, bagged python excrement hung in trees has previously had a localised effect (GeoLINK 2012). The smell of certain deterrents may also impact nearby residents, and there is potential for flying-foxes to habituate.
- Canopy-mounted water sprinklers – This method has been effective in deterring flying-foxes during dispersals (Ecosure personal experience), and a current trial in Queensland is showing promise for keeping flying-foxes out of designated buffer zones. This option can be logistically difficult (installation and water sourcing) and may be cost-prohibitive. Design and use of sprinklers need 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.

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.

26.9.2 Noise attenuation fencing

Noise attenuation fencing could be installed in areas where the camp is particularly close to residents. This may also assist with odour reduction, and perspex fencing could be investigated to assist fence amenity. This option could negate the need for habitat modification, maintaining the ecological values of the site, and may be more cost-effective than ongoing management.

However, heritage and cost considerations may make this option unfeasible.

26.10 Level 3 actions: disturbance or dispersal

Level 3 actions will only take place if and when specific triggering events occur. An example of a triggering event could be the Camp expanding to occupy the Villa Maria property. Other triggering events will be defined based on further community consultation.

26.10.1 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).

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

Despite these risks, there are some situations where camp dispersal may be considered. Dispersal can broadly be categorised as 'passive' or 'active' as detailed below.

Passive dispersal

Removing vegetation in a staged manner can be used to passively disperse a camp, by gradually making the habitat unattractive so that flying-foxes will disperse of their own accord over time with little stress (rather than being more forcefully moved with noise, smoke, etc.). This is less stressful to flying-foxes, and greatly reduces the risk of splinter colonies forming in other locations (as flying-

foxes are more likely to move to other known sites within their camp network when not being forced to move immediately, as in active dispersal).

Generally, a significant proportion of vegetation needs to be removed in order to achieve dispersal of flying-foxes from a camp or to prevent camp re-establishment. For example, flying-foxes abandoned a camp in Bundall, Queensland once 70% of the canopy/mid-storey and 90% of the understorey had been removed (Ecosure 2011). Ongoing maintenance of the site is required to prevent vegetation structure returning to levels favourable for colonisation by flying-foxes. Importantly, at nationally important camps (defined in Section 4.2.1) sufficient vegetation must be retained to accommodate the maximum number of flying-foxes recorded at the site.

This option may be preferable in situations where the vegetation is of relatively low ecological and amenity value, and alternative known permanent camps are located nearby with capacity to absorb the additional flying-foxes. While the likelihood of splinter colonies forming is lower than with active dispersal, if they do form following vegetation modification there will no longer be an option to encourage flying-foxes back to the original site. This must be carefully considered before modifying habitat.

There is also potential to make a camp site unattractive by removing access to water sources. However at the time of writing this method had not been trialled so the likelihood of this causing a camp to be abandoned is unknown. It would also likely only be effective where there are no alternative water sources in the vicinity of the camp.

Active dispersal through disturbance

Dispersal is more effective when a wide range of tools are used on a randomised schedule with animals less likely to habituate (Ecosure pers. obs. 1997–2015). Each dispersal team member should have at least one visual and one aural tool that can be used at different locations on different days (and preferably swapped regularly for alternate tools). Exact location of these and positioning of personnel will need to be determined on a daily basis in response to flying-fox movement and behaviour, as well as prevailing weather conditions (e.g. wind direction for smoke drums).

Active dispersal will be disruptive for nearby residents given the timing and nature of activities, and this needs to be considered during planning and community consultation.

This method does not explicitly use habitat modification as a means to disperse the camp, however if dispersal is successful, some level of habitat modification should be considered. This will reduce the likelihood of flying-foxes attempting to re-establish the camp and the need for follow-up dispersal as a result. Ecological and aesthetic values will need to be considered for the site, with options for modifying habitat the same as those detailed for buffers above.

Early dispersal before a camp is established at a new location

This management option involves monitoring local vegetation for signs of flying-foxes roosting in the daylight hours and then undertaking active or passive dispersal options to discourage the animals from establishing a new camp. Even though there may only be a few animals initially using the site, this option is still treated as a dispersal activity, however it may be simpler to achieve dispersal at these new sites than it would in an established camp. It may also avoid considerable issues and management effort required should the camp be allowed to establish in an inappropriate location.

It is important that flying-foxes feeding overnight in vegetation are not mistaken for animals establishing a camp.

Maintenance dispersal

Maintenance dispersal refers to active disturbance following a successful dispersal to prevent the camp from re-establishing. It differs from initial dispersal by aiming to discourage occasional over-

flying individuals from returning, rather than attempting to actively disperse animals that have been recently roosting at the site. As such, maintenance dispersal may have fewer timing restrictions than initial dispersal, provided that appropriate mitigation measures are in place (see Section 10).

26.11 Unlawful activities

26.11.1 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.

Dispersal results summary

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

1. In all cases, dispersed animals did not abandon the local area⁸.
2. In 16 of the 17 cases, dispersals did not reduce the number of flying-foxes in the local area.
3. Dispersed animals did not move far (in approx. 63% of cases the animals only moved <600 m from the original site, contingent on the distribution of available vegetation). In 85% of cases, new camps were established nearby.
4. In all cases, it was not possible to predict where replacement camps would form.
5. 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.
6. Repeat dispersal actions were generally required (all cases except where extensive vegetation removal occurred).
7. 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 findings⁹ 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 Code was introduced has increased by 6250%.
- Dispersal methods included fog¹⁰, birdfrite, lights, noise, physical deterrents, smoke, extensive vegetation modification, water (including cannons), paintball guns and helicopters.

⁸ Local area is defined as the area within a 20 km radius of the original site = typical feeding area of a flying-fox.

⁹ This was based on responses to questionnaires sent to councils; some did not respond and some omitted responses to some questions.

¹⁰ 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.

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- 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 6 km 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 that they feel this resolution is only temporary.
- The financial costs of all dispersal attempts, regardless of methods used were considerable, ranging from \$7500 to more than \$400,000 (with costs ongoing).

Appendix 9: Assessment of impacts to flying-foxes

26.12 Regional context

Potential impacts of planned management actions should be assessed in a regional context with respect to flying-fox distribution (known flying-fox camp sites within 25–50 kilometres depending on location and the number of camps in the surrounds) and potential habitat in the local area. The National Flying-fox Monitoring Program mapping can assist with identifying other camps in the region.

Potential habitat may be identified by modelling camp preferences provided in Section 6.3 and/or mapping habitat in the local area that is similar to habitat at the current camp. Identifying and assessing the likely suitability of potential habitat in the local area (minimum 6 km radius from the camp), with respect to both likelihood of flying-foxes using the habitat and likelihood of alternative sites impacting the community, is required prior to any Level 3 action.

In order for OEHL to assess potential cumulative impacts, a proposed Level 3 action must include detail on any other Level 3 action that has occurred (e.g. in the past five years), or is planned to occur at known camps within a 50 kilometres radius. OEHL can assist if required. Similarly, prior to early intervention dispersal an assessment should consider whether other nearby camps have recently been abandoned for another reason. If this is found to be the case, resources may be better directed at reinstating preferred conditions at the initial camp site.

26.13 Flying-fox habitat to be affected

Flying-fox habitat to be effected by the proposed management actions outlined in Table 9.1 is not known and will only be known:

- i) after monitoring both numbers and behaviours of FF over a period of time.
- ii) or post monitoring for the required time / duration to see that the suggested trigger points for action are reached or exceeded for the stated time periods.

The level of impact on habitat, as a result of actions, should be measured in a systematic way. Standard bush regeneration condition classes should suffice for this purpose. Other methods, such as Biodiversity Assessment Method plots are not suitable at Tarban Creek due to the small size and level of disturbance.

26.14 Standard measures to avoid impacts

The following mitigation measures will be complied with at all times during Plan implementation.

26.14.1 All management activities

These flying-fox specific measures are required to avoid impacts. Additional site-specific measures may also be required. N.B. Timing has been set around GHFF breeding time.

- 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.

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- Works will cease and OEH 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 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.).
- OEH will be immediately contacted if LRFF are present between March and October, or are identified as being in 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, in very cold temperatures or during periods of likely population stress (e.g. food bottlenecks). 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 $\geq 35^{\circ}\text{C}$. 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 OEH fact sheet on [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 OEH'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 OEH.
- Any proposed variations to works detailed in the Plan will be approved, in writing, by OEH before any new works occur.
- OEH 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 OEH fact sheet on [Monitoring, evaluating and reporting](#).

Further information on management activities is provided in the following OEH factsheets:

- [Routine camp management \(Level 1\) actions](#)
- [Creation of buffers \(Level 2\) actions](#)
- [Camp disturbance or dispersal \(Level 3\) actions](#)

26.14.2 Risk Assessment

It is the responsibility of the land manager and contractors to conduct a risk assessment and determine workplace health and safety requirements. However, minimum requirements are provided below.

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 Australian bat lyssavirus 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 OEH annually. Reports for Level 2 and 3 actions will be submitted to OEH 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 assessment¹¹ 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 7).

26.14.3 All Level 2 and 3 actions

Level 3 actions include those that actively displace or disturb flying foxes, such as nudging. Prior to works

¹¹ 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.

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- 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.
- OEH will be notified at least 48 hours before works commence.
- A protocol, in accordance with the [NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes](#) (OEH 2012), for flying-fox rescue 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 11 for an example protocol.
- A licensed wildlife carer 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
 - ratio of females in 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 OEH 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 make an assessment of 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.

26.14.4 Vegetation trimming/removal

- Dead wood 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).

26.14.5 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 the National Arborists Association).
- 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 OEH for approval at least two months prior to commencing works.

26.14.6 Bush regeneration

- 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 for Level 1 and 2 actions.
- 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.

26.14.7 Additional measures for Level 3 actions

Prior to dispersal

- Prepare a communications plan (see Section 3) in relation to the program and provide a copy to OEH.

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- Councils that manage camps within 50 kilometres, and airports within 50 kilometres, will be informed of the intended start date and likely duration, and encouraged to report any change in flying-fox movements.
- Council will liaise with the Environment Protection Authority (EPA) in regard to management of noise issues.

Monitoring

Additional monitoring requirements for dispersal actions (including maintenance dispersal and splinter camp dispersal):

- potential flying-fox habitat within three kilometres of the site monitored within two weeks of works commencing and at the completion of works
- daily checks of 'potential flying-fox habitat' within 600 metres, twice weekly checks of 'potential flying-fox habitat' within three kilometres and weekly checks of known camps within 20 kilometres of the site
- where weekly counts are already being undertaken by flying-fox experts at other camps within 20 kilometres, counts at these camps are not required, provided there is an agreement with these experts to access these data.

A count is also required at any known camp site within a 25 kilometres radius once within two weeks of works commencing and again at the completion of works.

During dispersal

- At least one person experienced in dispersal, vaccinated against ABLV and able to rescue flying-foxes if required, is to be present at all times. For maintenance dispersals only, this person may be on-call rather than on site, however maintenance dispersal personnel will still have suitable experience in flying-fox behaviour and monitoring.
- Dispersal of an occupied camp will only occur when females are not in final trimester and dependent young are not present (generally May and July). If flying-foxes in the region are recorded as being visibly pregnant dispersal will cease.
- Dispersal methods will not have the potential to harm flying-foxes and may include only noise, spotlights, laser pointers, smoke from contained fires, canopy-mounted sprinklers, and visual deterrents such as balloons.
- Dispersal may continue for up to a total of 2.5 hours in a 12-hour period, early morning and/or in the evening. Morning dispersal will not continue past sunrise. Evening dispersal will not begin before sunset. If flying-foxes are showing signs of distress or are tiring, dispersal will cease for the day as per 'stop work triggers' in the Plan.
- The duration of dispersal each day will be minimised as much as possible.
- A section of the camp will be designated as a rest area for flying-foxes during dispersal, to be progressively reduced in size over time, unless the nominated flying-fox expert justifies a reason not to do so.
- During any dispersal action, liaison with wildlife carers is required to monitor whether there is an increase in the number of flying-foxes being taken into care or showing signs of stress. If increases are apparent, OEH will be consulted before continuing the action.
- Maintenance dispersal activities (i.e. deterring flying-foxes from recolonising a dispersed or otherwise empty camp) may be undertaken. During November to February it is essential that camps are checked to ensure there are no crèched young in the camp or individuals in visibly poor health, as determined by a suitably qualified expert. While females are likely to be in final trimester or carrying young (generally August to January), maintenance dispersal will be implemented at a reduced intensity using smoke, lights, continuous noise (no sudden noises) and

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passive deterrents (e.g. canopy mounted sprinklers turned on prior to possible fly-in, visual deterrents, etc.).

- Residents will be notified of a maintenance action, within a timeframe as agreed to by the residents.
- Splinter camp dispersals are subject to the conditions above. Adequate consultation will be undertaken with neighbouring landowners and land managers.
- No actions are to be undertaken at any splinter camps without consulting OEH.

Appendix 10: Assessment of impacts to other threatened species or communities

For developments likely to affect other threatened species or ecological communities (identified in Section 5), a Biodiversity Development Assessment Report may be required as outlined in section 6.12 of the Biodiversity Conservation Act 2016 (BC Act).

All statements:

- need to conform to the requirements of the legislation under which the project will be assessed
- must be prepared by either a project applicant or by a qualified consultant working on their behalf.

Appendix 11: Example flying-fox rescue protocol

Reference documents:

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

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 Australian bat lyssavirus (ABLV)-vaccinated fauna spotter catchers (FSCs) or 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 person qualified in wildlife rehabilitation.

Requirements

FSC and wildlife rescue personnel involved in flying-fox rescue must:

- be trained and experienced in 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 all 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

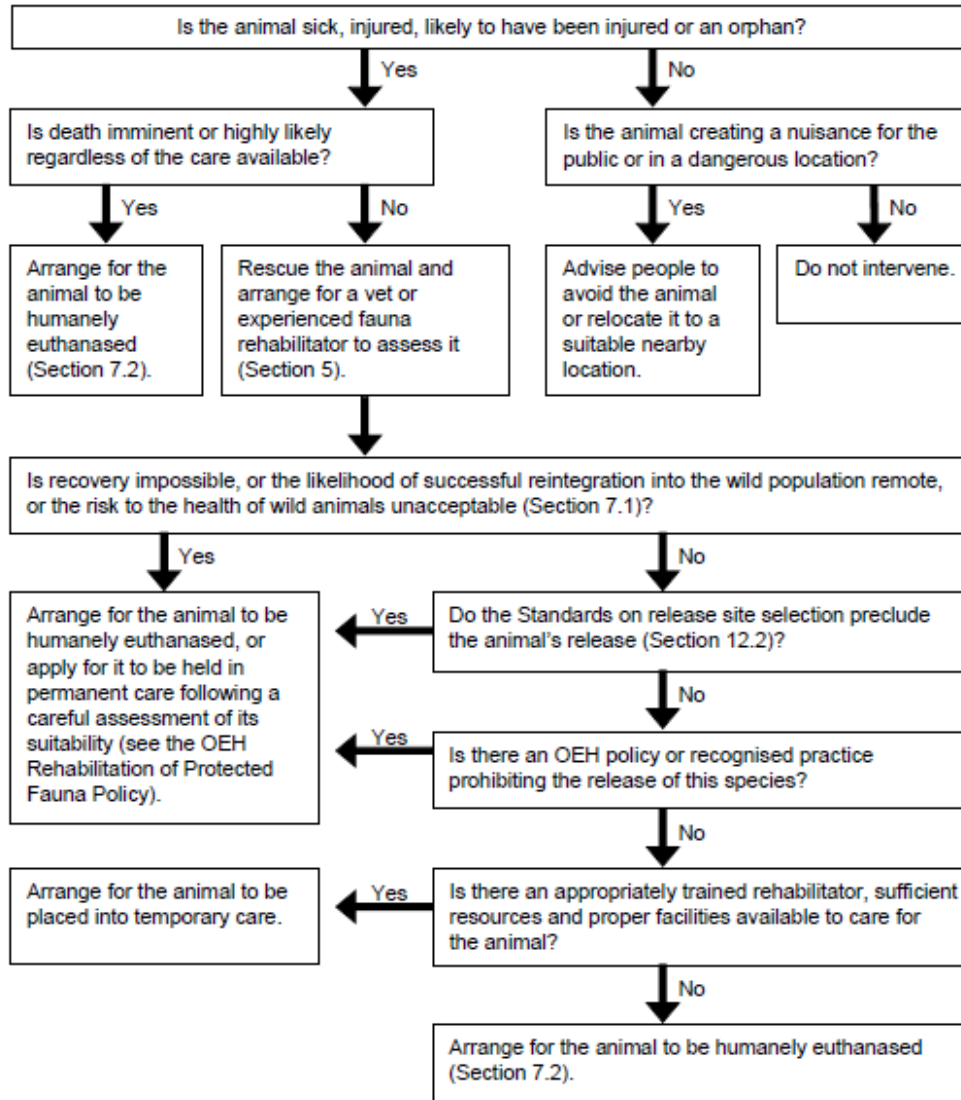
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- bat first aid kit – juice drink/glucose powder, syringes, cloths for wounds, Betadine/saline, dummy for baby bats. FFs only to be offered liquids under advice from a licensed wildlife carer.

Work instructions

Case assessment

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



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

- 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):

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- 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

11. Bat low in tree:

- o quickly place towel around bat before it can move away
- o grab hold of feet, toes may curl over rescuers fingers
- o place in carry basket / transport container.

12. Bat high in tree:

- o place pole wrapped in towel in front of bat
- o coax bat onto towel
- o once on towel, quickly move away from branches and lower to ground
- o once on ground, cover with towel and place into carry basket / transport container.

13. A bat caught on barbed wire fence:

- o two people only – one to restrain with towel, while the other untangles
- o put towels on the wire strands under or around to avoid further entanglement
- o if the membrane has dried onto wire, syringe or spray water onto wing
- o 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.

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- 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 fauna rehabilitation group's contact details should be written on the transport container in case of an emergency.