City of Ipswich

Flying-fox Roost Management Plan

2024

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City of Ipswich

DOCUMENT CONTROL

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GLOSSARY OF TERMS

Flying-fox Roosts

The Department of Environment, Tourism, Science and Innovation's (DETSI) Operational Policy Interim policy for determining when a Flying-fox congregation is regarded as Flying-fox roost under Section 88C of the *Nature Conservation Act 1992* provides the State Government legislative definitions for a Flying-fox roost. The below definitions have been included from version 2.0 (July 2021) of this Policy.

The Ipswich City Council (council) definitions for a Flying-fox roost, as below in the definitions, refers to a discrete spatial area where Flying-foxes (50 or greater) congregate during the hours of 6am to 6pm, regardless of breeding or temporal status. This definition will be utilised by council in the first instance where consideration of these definitions is required in assessment of council's capacity to complete roost management actions.

TERM	DEFINITION	SOURCE
Appropriately trained person	Means a person with experience and training in the safe handling of Flying-foxes, who is appropriately vaccinated	Code of practice - Ecologically sustainable management of Flying-fox roosts
As-of-right authority	In the context of Flying-fox roost management, is a legal right to carry out a Flying-fox roost management activity, provided the activity is carried out in accordance with the relevant Queensland Government code of practice and roost management guidelines, within the urban Flying-fox management area (UFFMA), by a Local Government.	Adapted from Flying-fox roost management guideline
Buffer zone	Refers to physical separation between humans and Flying-foxes (such as an area cleared of roost trees) aimed at reducing conflict with the surrounding area, providing visual separation or mitigating noise and smell.	Council defined term
Buffering	Creation or maintenance of a physical separation between humans and roosting Flying-foxes aimed at reducing conflict with the surrounding area, providing visual separation or mitigating noise and smell.	Council defined term
Common use area	Refers to areas of a property which are accessed and/or actively used by residents, visitors or occupants, for example outdoor seating areas or veranda areas. Common use areas do not include backyards associated with a dwelling.	Council defined term
Commonwealth-owned or Commonwealth-managed land	Is property which is under Australian Government control.	Council defined term
Containment	Refers to management actions (such as creation of cleared buffer zones) which are aimed at containing Flying-foxes within an area of a roost which reduces the impact of the roost on sensitive receptors.	Council defined term
Council-owned or Council-managed land	Is property which is under Ipswich City Council control. This can include land owned by the State Government but managed by Council as trustee.	Council defined term
Creche	Is a tree or other place where females leave dependent young.	Council defined term
Dependant young	Are juvenile flying-foxes unable to independently fly.	Council defined term

TERM	DEFINITION	SOURCE
Dispersal	Refers to management actions which result in temporary or permanent relocation of Flying-foxes to alternative roosts (driving away Flying-foxes from a high-conflict roost site).	Adapted from Flying-fox Roost Management Guideline 2020
Flying-fox camp or roost	Refers to a discrete spatial area where Flying-foxes (50 or greater) congregate during the hours of 6am to 6pm, regardless of breeding or temporal status. Where this plan refers to a 'roost' the council defined term is to be utilised.	Council defined term
Flying-fox Roost Management Plan (FFRMP)	Refers to a document which outlines the management approach/strategy for a singular roost or several related roosts (this document).	Council defined term
Food tree	Is a tree or other plant which Flying-foxes use as a source of food, typically at night.	Council defined term
Juvenile flying-foxes	Are Flying-foxes up to 6 months of age.	Council defined term
Low impact activities	Means mulching, mowing, weeding, watering under or near roost trees, minor trimming of roost trees, and installation, maintenance or removal of infrastructure, where the activities are not directed at destroying a flying-fox roost, driving away, or attempting to drive away, a Flying-fox from a Flying-fox roost, or disturbing a Flying-fox in a Flying-fox roost.	Code of practice – Low impact activities affecting Flying-fox roosts
Management actions	Means non-lethal actions intended to stop Flying-foxes from making use of a site or part of a site, and include destroying and/or trimming vegetation at a site, as well as coordinated action to drive Flying-foxes away from a site or move Flying-foxes within a roost site.	Code of practice – Ecologically sustainable management of Flying-fox roosts
Maternity roost	A roost with a high proportion of pregnant females or females with dependent young.	Council defined term
Maternity roost	A roost with a high proportion of pregnant females or females with dependent young. Dependent young are juvenile Flying-foxes unable to independently fly.	Council defined term
Owner (of a property)	In the context of this document may refer to the person or organisation who owns, manages, occupies, leases or is otherwise responsible for the property in question (e.g. trustee)	Council defined term
Person in charge	Means 1. If the management actions are being performed by a local government— the local government officer on site and leading the management actions (or the local government officer directing a contractor to undertake the management actions); or 2. If the management actions are being performed by a person under an approved Flying-fox roost management permit— the person on site who is leading the management actions.	Code of practice - Ecologically sustainable management of Flying-fox roosts

TERM	DEFINITION	SOURCE
Person knowledgeable about Flying-fox behaviour	Means a person, who may also be the person in charge, able to demonstrate experience in successfully: (a) classifying Flying-fox species; and (b) assessing Flying-fox population numbers in particular roosts; and (c) identifying Flying-fox breeding cycles including evidence of breeding and rearing activity in particular roosts; and (d) recognising signs of (and circumstances which may result in)— i) distress in Flying-foxes, and ii) harm to Flying-foxes, and iii) abandoned dependent young Flying-foxes.	Code of practice - Ecologically sustainable management of Flying-fox roosts
Preferred roosting location (PRL)	Means areas of suitable vegetation: 1. which support, or which may support the long-term, permanent roosting of Flying-foxes; and 2. with an appropriate setback distance from incompatible land uses.	Council defined term
Pollarding	Is the removal of the upper branches of a tree. This may include reducing the tree back to only its basic structural components (the trunk).	Council defined term
Private property	In the context of this document is a property which is owned by a member of the public or a private entity, and the property is occupied by an owner, tenant or manager.	Council defined term
Residential dwelling	Is a permanent, approved place of residence, and does not include temporary living facilities, sheds or other constructs on private property.	Council defined term
Sensitive site (public or private)	A public or private facility where high volumes of people congregate, who may be disrupted, or perceived to be disrupted by flying-foxes (e.g. hospitals, schools, aged care facilities, child care centres, parks, etc. It also includes equestrian facilities or aviation facilities who's intended primary function may be disrupted or perceived to be disrupted by flying foxes.	Council defined term
Statement of Management Intent	The Statement of Management Intent (SoMI) will articulate the approach the local government intends to take with respect to roost management across the UFFMA, any rationale the local government considers appropriate to declare and any specific plans local government has in relation to roost management. A copy of Ipswich City Council's Statement of Management Intent is provided at **Error! Reference source not found.**.	Flying-fox Roost Management Guideline
Splinter roost	Refers to a roost which contains a smaller number of Flying-foxes which have established in close proximity to an existing roost, typically as a consequence of dispersal actions.	Council defined term
State-owned or State-managed land	Is property which is under Queensland Government control.	Council defined term
Urban Flying-fox management area (UFFMA)	Refers to the Queensland Government Urban Flying-fox Management Area (**Error! Reference source not found.**). An UFFMA delineates where a local government maintains as 'as of right authority' to undertake Flying-fox management actions without an approved FFRMP.	Flying-fox Roost Management Guideline

LIST OF ACRONYMS

EHP: Department of Environment and Heritage Protection (former) (State)

ABL: Australian bat lyssavirus (ABLV)

ACPA: Animal Care and Protection Act 2001 (State)

DAFF: Department of Agriculture, Forestry and Fisheries (State)

DCCEW: Department of Climate Change, Energy, the Environment and Water (Cth)

DETSI: Department of Environment, Tourism Science and Innovation (formerly the Department of Environment, Science and Innovation/Department of Science/Department of Environment and Heritage Protection)

DMP: Damage Mitigation Permit

EFFMT: Electronic Flying-fox Monitoring Template

EPBC Act: *Environmental Protection and Biodiversity Conservation Act 1999* (Cth)

FFRMP: Flying-fox Roost Management Plan

HeV: Hendra virus

ICC: Ipswich City Council

LGA: Local Government Area

NAT: Natural Areas Team (Council)

NCA: *Nature Conservation Act 1992* (State)

NES: National environmental significance

PPE: Personal Protective Equipment

SoMI: Statement of Management Intent

UFFMA: Urban Flying-fox Management Area

VMA: *Vegetation Management Act 1999* (State)

1. INTRODUCTION

Ipswich City Council's (council) regional Flying-fox Roost Management Plan (FFRMP) has been developed to provide up to date best practice advice to guide council's management of current and future flying-fox roosts within the region. It contains the key information and management processes necessary to implement council's Statement of Management Intent (SOMI) – Flying-fox Roost Management in Ipswich City (provided at Appendix A) and ensures that where council does seek to undertake roost management actions that these are completed in an equitable and balanced manner, and in accordance with Queensland and Commonwealth requirements.

1.1 GOALS AND OBJECTIVES

This plan is designed to guide council's management of Flying-foxes and, in particular flying-fox roosts. It aims to ensure that any and all management actions undertaken are lawful, well informed and consistent throughout the city.

Council's primary objectives through the development and implementation of this plan are to:

- Implement appropriate conservation strategies to protect flying-foxes within the Ipswich region
- Address concerns of residents within the Ipswich region who are experiencing impacts associated with flying-foxes
- Develop and provide advice on roost management strategies which assist residents while adhering to State and Commonwealth legislation
- Improve education and appreciation within the community regarding the ecological importance of flying-foxes
- Improve council's knowledge and understanding of local flying-fox roosts through increased monitoring and research
- Achieve endorsement of the plan by the Department of Environment, Tourism, Science and Innovation (DETSI).

The regional FFRMP was developed to provide effective, long-term management of flying-fox roosts, particularly in potential and realised high-conflict areas. The key objective of the regional FFRMP is to balance community expectations of council, public amenity and conservation of flying-fox species across the region. This regional FFRMP has been informed by a SOMI, which outlines council's framework for management of roosts. The SOMI has been incorporated into this document and is provided in Appendix A.

1.2 ECOLOGICAL IMPORTANCE OF FLYING-FOXES

Flying-foxes are essential pollinators, by transporting pollen grains between tree species while feeding (Eby 1991; Fujita & Tuttle 1991; Wescott et al. 2008). Fruit seeds are also digested and spread over large areas as they feed and move between roosts (McConkey et al. 2011; Wescott et al. 2008). The ecological function of flying-foxes maintains native forest ecosystems, including hardwood species which are commercially important (Hall & Richards 2000; Rose 2011).

Flying-foxes are able to maintain genetic diversity of forest ecosystems as they have high mobility and can travel long distances regularly, allowing for transport of genetic material to isolated forest patches. This genetic movement/exchange is becoming even more important with increased habitat fragmentation (Eby 1995).

1.3 MANAGEMENT RESPONSIBILITIES

The responsibility to manage flying-foxes lies with the owners of lands containing a flying-fox roost. Council is not responsible for the management of flying-foxes on land which is not controlled by the council (e.g. private, State, or Commonwealth-owned or controlled lands).

Council will provide advice (e.g. provision of education materials) to private landowners with flying-fox roost management issues where roost management activities are sought. Council will not extend its 'as or right' authority to private landholders unless management actions are joint exercises across both council and private lands completed with council's approval, following the processes described in this plan.

Where landholders seek to conduct roost management actions on their land they will require a flying-fox roost management permit from the State Government. The contribution, and extent made by council in these circumstances are at the discretion of council and will be assessed on a case-by-case basis.

1.4 MANAGEMENT APPROACH

There is a significant level of uncertainty around the success of management actions along with high financial costs to intervention, and as such council's preferred position is to minimise interference with flying-fox roosts. Council will consider further management actions where necessary (e.g. roosts posing a high risk to public health [Section 6]), however interventions must have a reasonable probability of success not just at the target location but within Ipswich more broadly.

Central to implementation of the plan, is a risk-based approach to flying-fox roost management. This plan seeks a balanced delivery of council's key policy objectives. Actual levels of risk and associated requirements for management actions are informed by an ongoing program of roost monitoring.

A hierarchical approach to the application of management actions is used throughout this plan to achieve appropriate community outcomes whilst minimising the potential of unnecessary harm or disturbance to Flying foxes, or needlessly transferring the site of conflict. Flying-fox roosts are highly dynamic with number, species composition and location of flying-foxes subject to frequent change. As such this dynamic requires management actions to be based on individual site circumstances and consideration of impacts to the community.

1.5 MANAGEMENT PLAN STRUCTURE

This FFRMP has a key goal of facilitating education of council staff and the community on flying-fox roost management opportunities and challenges. Four key knowledge pillars are identified in this plan which establish the legislative and policy setting for management of flying-fox roosts, the ecology of flying-foxes and reactive and proactive management opportunities and limitations (Figure 1).

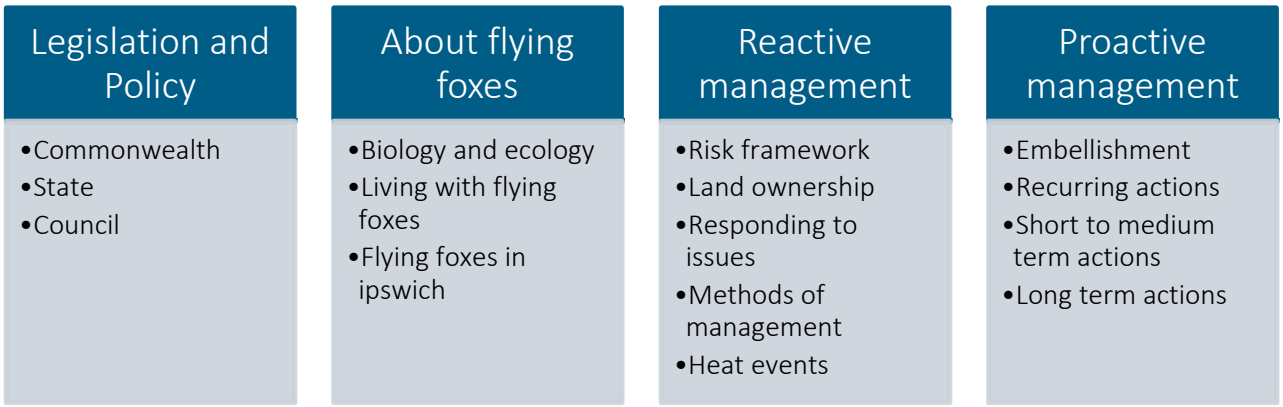

Figure 1: Key knowledge pillars of FFRMP document

This plan provides an overview of the following relevant information:

- State and Commonwealth Government legislative requirements
- Flying-fox ecology
- Living with flying-foxes
- Regional context
- Council's approach to roost management
- Reactive and proactive management actions
- Short, medium and long-term actions
- Recommendations

- Further information and resources

This plan is supported by several additional documents including, but not limited to:

- Flying-fox roosts of the Ipswich region
- GIS analysis of alternate roost and foraging habitat areas EHP: Department of Environment and Heritage Protection (former) (State)

2. LEGISLATION AND POLICY

2.1 FEDERAL LEGISLATIVE CONSIDERATIONS

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects the environment in relation to Matters of National Environmental Significance (MNES) which include listed threatened species and ecological communities. This includes the Grey-headed flying-fox, which is listed as 'vulnerable' under the Act.

Under the EPBC Act, actions that are likely to result in a significant impact to Grey-headed flying-foxes and its habitat must be referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment against the Act.

The EPBC Act *Policy Statement: Referral guideline for management actions* in Grey-headed and Spectacled flying-fox camps (DoE 2015) provides assistance for assessing whether an action may require approval under the EPBC Act. Impacts within roosts which are not identified as nationally significant roosts or which constitute low impact activities such as mowing, minor vegetation trimming, or other activities which apply best practice mitigation standards (outlined in the EPBC Act Policy Statement) are unlikely to require referral to DCCEEW. Flying-fox roosts which are occupied by 10,000 of more Grey-headed flying-foxes more than once within the past ten years or are occupied (either permanently or seasonally) by more than 2,500 Grey-headed flying-foxes each year for the past ten years are considered nationally important.

The National Flying-fox Monitoring Viewer identifies nationally important roosts. However, due to the variability of roost populations, and lag times between data collection and data update on the viewer, project proponents are strongly encouraged to perform a manual assessment of the significance status of local flying-fox roosts prior to commencing works.

Foraging habitat for the Grey-headed flying-fox is protected under the EPBC Act. A significant impact assessment against the relevant Commonwealth guidelines is recommended to be undertaken where an ecological values assessment identifies Grey-headed flying-fox habitat is likely to be impacted by a project proposal.

2.2 STATE LEGISLATIVE CONSIDERATIONS

All species of flying-fox in Queensland are protected under the State *Nature Conservation Act 1992* (NCA).

Flying-fox roosts are protected under Section 88C of the NCA. Under the Act a person must not:

- destroy a flying-fox roost unless the person is an authorised person or the destruction is authorised under this Act;
- drive away, or attempt to drive away, a flying-fox from a flying-fox roost unless the person is an authorised person or the driving away is authorised under this Act; or
- disturb a flying-fox in a flying-fox roost unless the person is an authorised person or the disturbance is authorised under this Act.

However, local governments are permitted to interfere with flying-fox roosts within their designated Urban Flying-fox Management Areas (UFFMA) under an 'as of right authority' (extent of Ipswich UFFMA shown in Appendix B). Where management actions are proposed these are required to be undertaken in compliance with one of the two relevant codes of practice:

- Code of Practice – Ecologically sustainable management of flying-fox roosts
- Code of Practice – Low impact activities affecting flying-fox roosts

Where local governments interfere with a Flying-fox roost, methods are limited to non-lethal techniques with implemented controls to avoid harm or death occurring to an animal. The DETSI Flying-fox Roost Management Guideline (DES 2020) aids the assessment of viable management options, and the planning of safe and effective management actions in relation to Flying-fox roosts.

Table 1: Approvals required under legislation for management activities

Entity undertaking activity	Location of activity	Type of activity: Low impact activities*	Other activities**	Activities affecting GHFF
Councils	Within UFFMA	Allowed	Allowed under as-of-right authority	EPBC Act referral and/or application may be required by DCCEEW
	Outside UFFMA	Allowed	Flying-fox Roost Management Permit required from DES	EPBC Act referral and/or application may be required by DCCEEW
Others (e.g., private, State department owned land)	Within UFFMA	Allowed	Flying-fox Roost Management Permit required from DES	EPBC Act referral and/or application may be required by DCCEEW
	Outside UFFMA	Allowed	Flying-fox Roost Management Permit required from DES	EPBC Act referral and/or application may be required by DCCEEW

* In accordance with Code of Practice: Low impact activities affecting flying-fox roosts, *Nature Conservation Act 1992* https://environment.des.qld.gov.au/__data/assets/pdf_file/0029/89453/cp-wl-ff-low-impact-roosts.pdf

** In accordance with Code of Practice: Ecologically sustainable management of flying-fox roosts, *Nature Conservation Act 1992* https://environment.des.qld.gov.au/__data/assets/pdf_file/0033/89853/cp-wl-ff-roost-management.pdf

Under the Queensland planning framework vegetation clearing is regulated under the *Planning Act 2016*, subordinate regulation, and associated legislation. Where clearing of vegetation is proposed, this must be completed in accordance with the requirements of the *Planning Act 2016* and subordinate regulation.

Further constraints which need to be taken into account in flying-fox roost management include native vegetation, fauna and environmental protection under Queensland legislation:

- *Vegetation Management Act 1999*
- *Nature Conservation Act 1992*
- *Environmental Protection Act 1994*
- *Animal Care and Protection Act 2001*
- *Water Act 2000*
- *Land Act 1994*

2.2.1 Timing of management activities at roosts

2.2.1.1 Requirements of Codes of Practice

In Queensland, there are two (2) Codes of Practice which must be adhered to when flying-fox management works are being undertaken. The purpose statement 1.1. of both Codes of Practice is "to ensure that the chance of low impact activities under this code resulting in harm to flying-foxes is minimised and that appropriate welfare standards are upheld" (DES 2020).

In accordance with the Code of Practice – Low impact activities affecting flying-fox roosts and Code of Practice - Ecologically sustainable management of flying-fox roosts, both management actions and low impact activities may be undertaken at any time of year. However, as further discussed in Section 3.6, the person in change must avoid the consequences of conducting both low impact activities and management activities:

- where possible during certain periods of the year, for example—when females are in the late stages of pregnancy or there are dependant young (e.g. crèched young, pups) that cannot sustain independent flight
- during or immediately after climatic extremes, or weather events that may cause food shortages, such as periods of unusually high temperatures or humidity, droughts, cyclones and fires, and
- which may negatively impact the conservation of flying-fox species which are listed as threatened under the NCA.

Council gives due consideration of the likely and potential impacts of works and will ensure works are undertaken in a manner which minimises potential to negatively impact the conservation of flying-fox species.

2.3 COUNCIL POLICY

Council's actions are guided by iFuture, council's Corporate Plan for 2021-2026.

This plan is guided by council policy and strategy including, but not limited to, the Natural Environment Policy and Natural Environment Strategy.

As part of the amendments to the *Nature Conservation Act 1992* in 2014, council developed a Statement of Management Intent (SOMI) for flying-fox roost management within their UFFMA (Appendix A – Document No: A3853164). The SOMI has been updated with new definitions as per the new FFRMP.

Council's document hierarchy (Figure 2), outlines the role and context of the flying-fox roost management plan in council's policy context.

Figure 2: Council document hierarchy

2.3.1 Protection of viable flying-fox roost locations

Council supports retention and protection of Flying-fox roosts unless a high risk to public health can be demonstrated. Where significant impacts to sensitive receptors can be demonstrated and the roost is on council managed land, council will provide a tailored management strategy to manage conflict at the site.

Cost sharing arrangements will be sought with the State Government (including through grant programs) to support provision of management actions in identified roosts where these are to be undertaken. Where roost or foraging habitat embellishment works is sought to be undertaken cost sharing arrangements with the State Government will be requested.

2.3.2 Identification and establishment of alternative long-term Flying-fox roost locations

Council supports identification, rehabilitation and establishment of low-conflict, long-term Flying-fox roost locations throughout the region. Long-term roost locations are preferred on council or state managed lands to ensure effective, long-term sustainable management of roosts. Long-term roosting locations may also be supported on high-conservation value properties which are registered with council or the Department of Environment, Tourism, Science and Innovation (such as properties with Voluntary Conservation Agreements, Nature Refuges or Special Wildlife Reserves).

2.3.3 Protection and restoration of Flying-fox foraging habitats

Protection and restoration of foraging habitats for Flying-foxes is supported by council. This approach also provides protection for habitat used by other species of conservation significance.

2.3.4 Support for additional research

Council supports provision of additional research to fill knowledge gaps in Flying-fox ecology, roost choice behaviours, foraging tree species preferences and management strategies. Council will seek to partner with the Department of Environment, Tourism, Science and Innovation, neighbouring Local Governments, industry and research organisations to facilitate region-based research opportunities. Research topics of high interest to council include the following:

- GPS tracking research, focusing on the following study areas;
    - Identifying additional roost locations
    - Understanding regional population dynamics
    - Understanding foraging patterns
- Roost impact mitigation and ongoing management measures;
- Roost habitat characteristics;
- Human conservation psychology;
- Heat stress monitoring and assessments, determining at-risk roost locations; and
- Detailed further assessment and modelling of long-term, low-conflict alternative roost locations.

2.4 Council Planning Scheme

Vegetation protection provisions may also apply under the local planning scheme in addition to State restrictions. Vegetation clearing within areas of local biodiversity significance may be assessable development. It is recommended that any private landholders looking to conduct vegetation clearing on their land should seek pre-lodgement advice from council and the State Government.

In association with future amendments of Ipswich City Council local planning instrument (the Planning Scheme), performance outcomes associated with impacts to Flying-fox roosts and reverse amenity considerations may be included. Incorporation of considerations related to Flying-fox roosts within the Planning Scheme ensures that residents of the region are protected from adverse impacts of Flying-fox roosts and that future development does not negatively impact existing roosts (e.g. unintentionally dispersing them elsewhere). Locating development outside of buffers (e.g. 50 metres from the edge of a known roost extent), may assist in reducing human-wildlife conflict such as impacts from Flying-fox noise, odour and mess.

Lockyer Valley Regional Council has included performance outcomes associated with the protection of Flying-fox camps as Matters of Local Environmental Significance (MSES) in the Lockyer Valley Planning Scheme. Incorporation of considerations relating to Flying-fox camps within planning schemes is expected to limit further increases in conflict which can be associated with intensification of surrounding land uses.

3 FLYING-FOX BIOLOGY AND ECOLOGY

Australia's Flying-foxes belong to *Pteropodidae*, a family of megabats also known as fruit bats. Three species reside and visit South-East Queensland and the Ipswich region, with their national distributions depicted in Figure 3. Species present in the Ipswich region include Grey-headed flying-fox (*Pteropus poliocephalus*), Black flying-fox (*P. alecto*) and the Little red flying-fox (*P. scapulatus*).

The size of Flying-fox roosts range from a few hundred individuals to hundreds of thousands (Hall & Richards 2000). Roosts are generally located within dense vegetation with thick, native or weedy understorey, close to sources of water where humidity is high (Loughland 1993). Roost choice is also closely associated with the proximity and abundance to foraging resources (Palmer & Woinarski 1999). Given that Flying-foxes are highly mobile, they often migrate large distances to follow the availability of foraging resources (Markus & Hall 2004).

All of Australia's major cities along the east coast, along with many other towns, contain continuously occupied Flying-fox roosts (Plowright et al. 2011). As a result of continuing urban development, a greater proportion of Flying-fox camps are becoming urbanised (Parry-Jones & Augee 2001; Markus & Hall 2004; McDonald-Madden et al. 2005). Following increased contact, the number of people concerned about the implications of living in close proximity to Flying-fox roosts has also grown.

Flying-foxes deliver important ecosystem services. Flying-foxes have a pivotal role in the maintenance of various forested ecosystems (Hall & Richards 2000). Primarily through their function as long distance dispersers and pollinators of numerous native plant species (Eby 1991; Fujita & Tuttle 1991). Areas which may provide foraging habitat within the Ipswich region are shown in Figure 4.

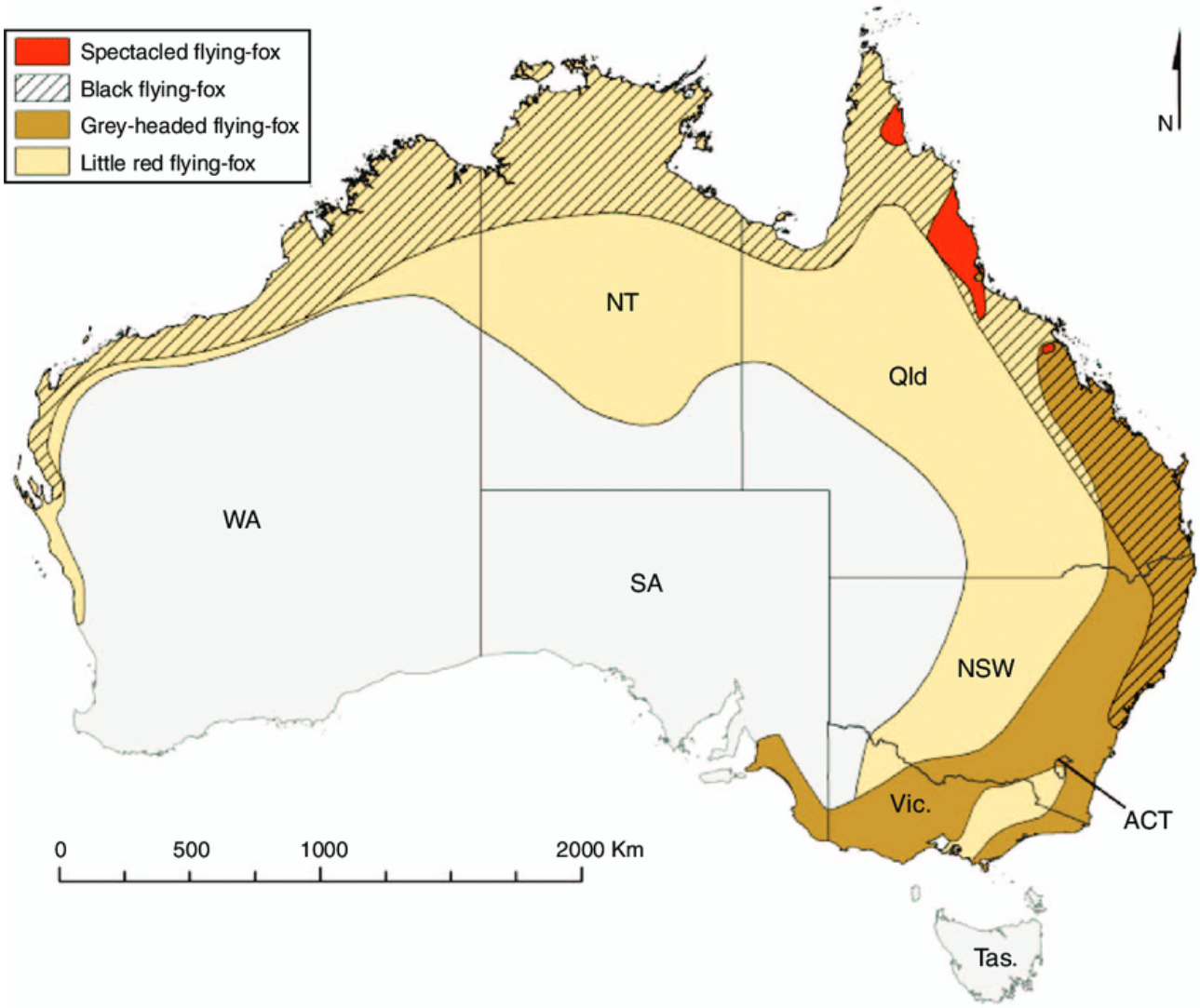

Figure 1: Distribution map of Australian flying-foxes (Lentini & Welbergen 2018)

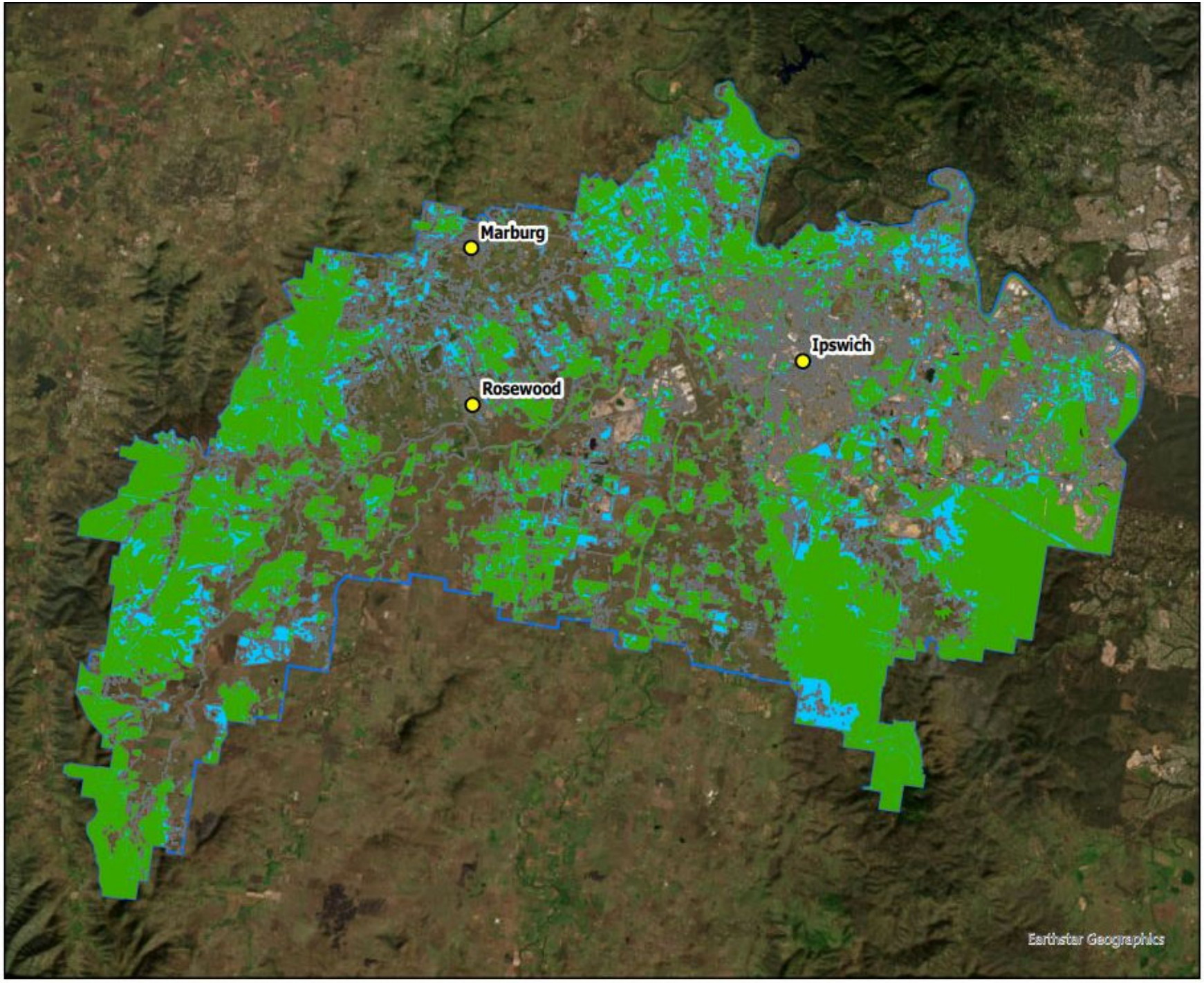

Figure 4
Potential Foraging Flying-fox Habitat within the Ipswich City Council Region

Ipswich City Council

Flying-Fox Management Plan (2024)

Compiled by: SkyeMelton Date: 12/06/2024
Approved by: Will Gibson Date: 12/06/2024

Metres
0 3,000 6,000

Legend

- **Ipswich City Council Region**
- **Regulated Vegetation Management areas**
- **Other Woody Vegetation Values (shown by SLATS 2019 mapping)**

The content of this document includes third party data. Range Environmental Consultants does not guarantee the accuracy of such data.

Source: Cadastral data sourced from DNRME (2024). Aerial imagery sourced from NearMap (2024).

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range environmental consultants

3.1 BLACK FLYING-FOX

The Black flying-fox (*Pteropus alecto*), within Australia, ranges from sub-tropical to tropical latitudes spanning the entire northern coast and the majority of the east coast of the mainland (Palmer & Woinarski 1999). Both Grey-headed and Black flying-foxes have a similar diet, feeding within tree canopies on various fruits, nectar and pollen (Richards 1995; McDonald-Madden et al. 2005). These species especially favour blossoms and fruits of eucalyptus, melaleuca and rainforest trees. The blossoms and fruits from introduced tree species (such as those found in commercial orchards) or in urban gardens are also consumed, particularly in times of limited native food sources (Harden et al. 2004).

Black flying-foxes give birth to only one young per year, as do other Flying-fox species. The timing of births varies considerably based on location. Around South-East Queensland most births occur between October and November (Vardon & Tidemann 1998). Generally the peak birth rates for Black flying-foxes are strongly associated with maximum food availability however other environmental factors may also be influential (Vardon & Tidemann 1998).

Approximately two thirds of Black flying-foxes reach maturity (Vardon & Tidemann 2000). Given this mortality rate, it is estimated that each breeding female would need to produce six young in their lifespan to ensure a stable population - meaning all young would need to survive until at least age seven (Vardon & Tidemann 2000). This raises concerns that *P. alecto* may be suffering rapid population decline leaving it more vulnerable to extinction (Vardon & Tidemann 2000).

Black flying-foxes are also vulnerable to mass mortality events following extreme heat events. A temperature above 37°C has a substantial effect on Flying-foxes and upwards of 42°C is considered a critical point where mortality increases exponentially (Welbergen et al. 2008). These events have increased in frequency as Black flying-foxes habituate areas further south where temperatures are highly variable and often spike in summer (Welbergen et al. 2008). It is suggested that this southern expansion can be attributed to a decrease in the number of days with frost, in southern parts of the east coast, which Black flying-foxes cannot tolerate (Tidemann 1999).

Across the Ipswich region, Black flying-foxes are the typical roost inhabitants, with this species recorded year-round.

3.2 GREY-HEADED FLYING-FOX

The Grey-headed flying-fox, *Pteropus poliocephalus*, is found only in Australia ranging along the east coast from Finch Hatton in the north to Melbourne in the south (Paris & Hazell 2005; Snoyman & Brown 2010). Interestingly this makes it the most southerly distributed member of the *Pteropus* genus (Peacock 2004). The distribution of Grey-headed flying-foxes aligns with some of the most heavily populated areas of Australia, which often leads to conflict with residents who interact with the species (Snoyman & Brown 2010).

Their diet is very similar to the Black flying-fox, feeding on various fruits, nectar and pollen (McDonald-Madden et al. 2005). Consequently, Grey-headed flying-foxes also migrate long distances in response to available food supplies (Tidemann & Nelson 2011). Like Black flying-foxes they are also important pollinators and seed dispersers (Schmelitschek et al. 2009).

The Grey-headed and Black flying-foxes often inhabit the same roost sites and are similar in size, making it often difficult to tell them apart. Figure 5 provides an identification key that can be used when trying to distinguish between the local species.

Grey-headed flying-foxes have an average life expectancy estimated at 7.1 ± 3.9 years (Tidemann & Nelson 2011). Females generally have a single offspring annually around September to October. Young are carried until about four weeks of age, after which they are left in roosts overnight while females leave to forage at dusk. Young may begin to fly at eight weeks of age, however, are dependent on their mothers for at least three months.

Loss of foraging and roosting sites due to urbanisation, forestry and agriculture has led to a rapid decrease in the size of the Grey-headed flying-fox population (Duncan et al. 1999). In 2002 it was estimated that numbers were 35 per cent lower than they were a decade prior (Eby & Lunney 2002). Grey-headed flying-foxes appear to have a greater capacity to deal with extreme heat events compared to Black flying-foxes, although they too often perish in heatwave events.

In a study, Tidemann and Nelson (2011) found that 18.6 per cent of their Grey-headed flying-fox study sample died of electrocution and nearly 10 per cent died from entanglement in either fruit-tree protective netting or barbed wire. The Grey-headed flying-fox is currently listed as a vulnerable species under the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act).

3.3 LITTLE RED FLYING-FOX

The Little red flying-fox, *Pteropus scapulatus*, has the widest geographical range of Australia's Flying-foxes encompassing more than 3-5 million km² across a variety of different climates throughout eastern, northern and north-western Australia (Hall 1987; Vardon and Tideman 1999). Little red flying-foxes are highly migratory and are considered to be more nomadic than Black flying-foxes and Grey-headed flying-foxes. The movements and duration of time spent in a single location by Little red flying-foxes is understood to be influenced by the availability of food sources (Roberts et al. 2012). It has been suggested that the Little red flying-fox exists as one giant meta population, based on the little genetic variation between sub-populations (Sinclair et al. 1996).

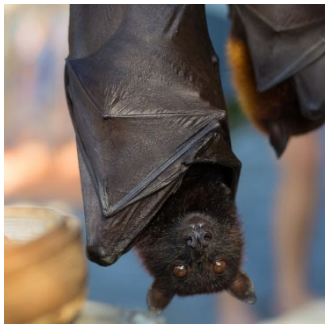
Considering they have an overall population estimated in the millions, roosts tend to swell in size when Little red flying-foxes arrive (Sinclair et al. 1996). Similar food sources are also shared with other Flying-fox species, as is the trend of moving to follow the changing food supply (EHP 2011). Unlike the other two species, Little reds do not often consume fruit as part of their diet, instead primarily feeding on eucalypt blossoms (Hall and Richards 2000; Birt et al. 2008 & Bradford et al. 2022).

Little reds are the smallest Flying-foxes in Australia, with large males weighing around 550g, and the majority between 200-600g (Sinclair et al. 1996). They are easily distinguished next to other species due to their smaller size, reddish brown body fur, semi-transparent wings and hairless legs (See Figure 5).

Mating season also differs from the other species, with the majority of mating occurring in November-December (O'Brien 1993). Gestation periods usually last 5 months with young being born between April and May (O'Brien 1993).

Whilst Black and Grey-headed flying-foxes usually roost an arm's length apart, Little reds clump together with numerous individuals on a single branch (EHP 2011). They also roost lower to the ground than other Flying-fox species (EHP 2011). In general, Little red flying-foxes have been poorly studied, with the majority of academic focus centred on their Grey-headed counterparts. However, the Little red flying-foxes are currently considered to be of least concern from a conservation status perspective.

Little red flying-foxes arrive in the Ipswich region in the warmer summer months as flowering eucalypts provide a ready source of foraging resources. During this period, they may temporarily join camps of Grey-headed or Black flying-foxes, appearing suddenly in large numbers and remaining from a few days to several months. Considerable damage may occur to trees as Little red flying-foxes roost in dense clusters on individual branches. Where large congregations of this species occur significant community concerns may arise due to the rapid expansion of the roost footprint and the number of animals contained therein intensifying noise and odour impacts to nearby residents.

DISTINGUISING CHARACTERISTIC	GREY-HEADED FLYING-FOX (*Pteropus poliocephalus)*	BLACK FLYING-FOX (*Pteropus alecto)*	LITTLE RED FLYING-FOX (*Pteropus scapulatus*)
			
Head	Head covered in light grey fur. Large, dark brown eyes.	Head covered in thick black fur. Large, dark brown eyes.	Thinner fur ranging from dark brown to a light grey in colour. Large, dark brown eyes. Ears very prominent
Neck	Thick, prominent, scarf like band of bright orange fur, wrapping the entire neck. Sharp colour contrast between head, neck and the rest of the body.	Often messy patches of dark brown to dark orange fur on the back of the neck. Does not wrap the entire neck.	Thin, auburn coloured hair, which often wraps the entire neck. Contrast between head, neck and body fur, not as pronounced as *P. poliocephalus*.
Body	Long, light to dark grey fur extending from the base of the neck to the toes. Often a similar colour to the head. Weight between 600-1000g.	Shorter, dark black fur, spanning from the head to the inner thighs. Legs and ankles are hairless. Weigh between 600-1000g.	Light to dark brown fur (sometimes dark reddish) spanning from the neck to the thighs. Legs are hairless. Significantly smaller, weighing between 200-600g.
Wings	Large black wings, connected from the forefingers to the ankles. Wings are opaque.	Large black wings, connected from the forefingers to the ankles. Wings are opaque.	Smaller, lighter coloured wings. Wings are semi-transparent.
Roost behaviour	Often roost in the mid to lower canopy. Roost a wingspan apart.	Often roost higher than other Flying-fox species. Roost a wingspan apart.	Always found roosting in the lower canopy, wherever space is available. Roost in tight clusters.

NOTE: When nursing young, all species of Flying-fox rest their babies on the inside of the wings attached to either armpit. Young are easily spotted in flight or when observing from below roosting adults.

Figure 5: Flying-fox species identification key (Ipswich City Council 2014)

3.4 THE VARIABLE NATURE OF FLYING-FOX ROOSTS

Flying-fox roosts are highly variable in species composition, numbers and distribution over time. The seasonal migration of nomadic Little red flying-foxes is one of the main reasons for this variation. Camps often swell in size dramatically in summer due to an influx of Little red flying-foxes but these changes are often short-lived. This is a key factor for consideration in any management action, with a large proportion of Flying-fox related complaints driven by this seasonal influx which is often resolved as foraging resources are depleted and Flying-foxes move out of the area, or region.

The behavioural ecology of Flying-fox species also causes variability. Their ability to fly and tendency to migrate large distances in search of food means that many Flying-foxes change their roosting site frequently. A study by Tidemann and Nelson (2004) followed two radio collared Grey-headed flying-foxes with results supporting this variability. One of the tracked Flying-foxes moved from Dallis Park near Murwillumbah in April 2000 and roosted in a total of 15 other roosts before returning to its original roost in September 2000 (Tidemann & Nelson 2004). Another Flying-fox made similar movements

between seven different roosts (Tidemann & Nelson 2004). Both Flying-foxes travelled more than 2,000km between roosts during this period, and moved through 4° (440km) of latitude (Tidemann & Nelson 2004).

The management of Flying-fox roosts must consider their variable and dynamic nature. Large shifts in a roosts' population, or potential for large shifts may make evaluating the appropriate course of action difficult. This is because the management action chosen may be unsuitable by the time it's time to implement it, or the variable nature makes evaluating the chance of success of any chosen action difficult. Often, successful Flying-fox dispersals have been confused with the animals moving and or migrating based on their natural behaviour (Thiriet 2005). In addition to this Flying-foxes have a high fidelity to the roosts in which they occupy and may attempt to reoccupy roosts from which they have been dispersed. This has led to situations in which Flying-foxes are frequently recorded moving back in days or weeks later, along with some of the roost splintering to new locations.

Historical events recorded in Ipswich provide an insight this nature of Flying-fox roosts. Following a heat related mortality event in the Queens Park Nature Centre in January 2014, nearly the entire camp, totalling over 3,000 Flying-foxes succumbed to heat stress. However, less than a week later, the site was recolonized with more Flying-foxes than had ever been previously recorded. Further, while planning a dispersal of this roost, council officers recorded changes in Flying-fox species composition, total numbers, and roosting locations on a frequent and sometimes daily basis.

A case-by-case assessment is essential to identify and implement the most appropriate, site-specific management action for a roost experiencing human wildlife conflict, without further exacerbating conflict levels within the greater community.

3.5 FLYING-FOX MOVEMENTS

Flying-foxes are understood to predominantly forage within 25km from a roost (Roberts 2012 & Welbergen unpub. data). Flying-foxes can travel hundreds of kilometres over several nights when moving between roosts, which allow them to arrive in large numbers overnight to local flowering events. (Welbergen et al. 2020).

Grey-headed and Black flying-foxes have typically roosted year-round within the region, with regular summer arrivals of Little red flying-foxes. Limited radio tracking of Flying-foxes has been conducted across the region to inform discussion of inter-roost dynamics. Based on the results of other South-East Queensland based tracking projects regular movement between roosts is highly likely, with constant turnover of individuals at each roost location (Moreton Bay Regional Council 2022). Thinking of roosts as regional 'airports' for Flying-foxes, with large amounts of different visitors coming and going all the time can help appreciate the management complexities for management of roosts.

3.6 FLYING-FOX BREEDING CYCLES

Flying-fox breeding cycles have a major influence on dynamics within the roost. In addition, several animal welfare considerations, statutory requirements and best practice considerations are associated with any management of the species during periods of mating, birthing or raising of young.

Flying-foxes reach reproductive maturity between two to three years of age, with females producing a single offspring each year, resulting in slow population growth (Westcott et al. 2018).

Flying-fox young are carried by their mothers 'under wing' for approximately four weeks following birth (Markus and Blackshaw 2002). As young grow and become too heavy for their mothers to carry while foraging they are left in crèches within roosts overnight, for up to 8 weeks (Churchill 2008).

The following table is based on Birt (2005) and shows the critical periods in the lifecycle of local Flying-fox species. Disturbance, particularly sustained, in the form of shifting or relocation attempts should be avoided during mating and birthing seasons to avoid lifecycle impacts. However, breeding cycles may be varied in response to environmental conditions and nutritional stress, so site specific assessment is important prior to planning any management action.

Black and Grey-headed flying-foxes both birth their young at roosts across the region.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
BFF												
GHFF												
LRFF												

KEY	STAGE OF BREEDING
	Peak conception
	Pregnant
	Late-stage pregnancy
	Birthing and young under wing
	Young creched at roost (i.e. 24 hour occupation of roost)
	Young capable of short flight
	Period of least impact on breeding in Ipswich (unless LRFF are present)

Figure 6: Birthing and breeding cycle for flying-fox species present within the region

Where works are undertaken adjacent to or within camps across the region works should predominantly be undertaken in May to July/mid-August, minimising impacts to breeding cycles and dependent young.

As can be seen from the table, the breeding cycle of little red flying-foxes is not aligned with that of black and grey-headed flying-foxes. Where all three species are present in a roost, opportunities for intensive roost management actions such as vegetation removal or dispersal are significantly restricted during times of breeding.

3.7 THREATS

3.7.1 Loss of foraging habitat

Flying-fox foraging habitats include a broad range of eucalypt woodlands, rainforests, semi-evergreen vine thickets and urban green spaces. These habitats have historically been threatened through clearing for agriculture, heavy industry, infrastructure, and urban development. The introduction of the *Vegetation Management Act 1999* was significant in slowing and minimising clearing of remnant and high-value regrowth native vegetation values and has played a key role in slowing the loss of foraging habitat values for Flying-foxes.

Within urban areas where most of the vegetation comprises regrowth, gardens and parks, streetscape areas and landscape feature trees, limited protection is generally afforded to potential foraging trees. These trees play a potentially significant role in providing food resources for local populations during periods of drought and heat stress.

3.7.2 Roost fragmentation

Flying-fox roosts have been historically disturbed to remove populations from urban and rural centres where noise, odour and disease impacts to residents and landowners can cause significant disruption (Lane 1984). Through these roost management actions, large, significant roosts have been disturbed and fragmented resulting in numerous splinter or offshoot roosts. Along waterway corridors this may have resulted in increased 'roost hopping', where a roost seasonally shifts up and down a vegetated corridor.

As a result of historic camp disturbances, amongst other factors, roost sized have potentially decreased, particularly in very large roosts. However, due to the splintering of roosts the number and overall spatial impact of roosts on residents and land managers has likely increased, especially in urban areas.

3.7.3 Heat stress and climate change

Long-term changes to the climate of the Ipswich region may lead to increased incidence of extreme weather events including flooding, bushfires, temperature extremes and altered weather patterns. Flying-foxes are extremely vulnerable to high temperatures above 38°C and have suffered widespread mass mortality events where temperatures exceed 42°C. Increases in the frequency and intensity of extreme heat events may result in a rapid population decline, and possible extinction of flying-foxes through death of individuals and reduced reproductive capacity (Welbergen et al. 2008).

Of the three Flying-fox species found in the Ipswich region, Black flying-foxes are the most susceptible species to heat stress, followed by Grey-headed flying-foxes (Welbergen et al. 2008). This increased vulnerability to heat stress events is potentially a result of increasing dispersal ranges to regions where these species were not previously found with increased temperature extremes (Welbergen et al. 2008). Evidence suggests that Black flying-foxes have lower species-specific physiological limits, which reduces their ability to cope with higher temperatures (Welbergen et al. 2008). When Flying-foxes are experiencing higher metabolic activities (e.g. when pregnant or lactating), resting core body temperature is higher, increasing susceptibility to heat stress events (Welbergen et al. 2008). Little red flying-foxes may have increased resilience to heat stress events through their regular exposure to high temperature, high humidity climates in northern Australia.

In 2019 and 2020, broad-scale food shortages contributed to mass mortalities of Flying-foxes across Australia, with significant mortalities across greater South-East Queensland. Climate-change impacts temperature and rainfall, which influences the timing and volume of flowers and fruit produced by eucalypt species, a primary food source for Flying-foxes (DAWE 2021). During periods of food shortages, Flying-foxes may be more likely to utilise foraging and roosting resources within urban locations (e.g. fruit trees within backyards), increasing human-wildlife interactions and conflicts.

3.8 HEAT STRESS EVENTS

3.8.1 Signs of heat stress in flying-foxes

Welbergen et al. (2008) described various signals and behaviours exhibited by Flying-foxes suffering from heat stress during the heat events of 2002. The actions were noted in the following order:

1. Fanning with wings
2. Seeking shade
3. Panting; and
4. Spreading their saliva (e.g. wrist licking)

Often, after these stages, species unable to cope with temperatures were observed to descend or drop from branches some 15-20 minutes later. The timing and extent of these Flying-fox behaviours, as well as the number of mortalities, will depend not only on the temperature of the day and the evening, but also the influence of the microclimate within a particular roost (Welbergen et al. 2008).

Of particular importance to Flying-fox survival are good canopy cover for shade, a dense understorey to regulate the microclimate, and access to water. Past mortality events have revealed that camps with access to a large water body, thick understorey and denser canopy cover retain a larger proportion of the population after a heat event (Stanvic et al. 2013).

3.8.2 Historical heat stress events

In 1994, Ipswich recorded its highest ever temperature at 44.3°C, which was followed by the deaths of around 1,000 Flying-foxes from throughout the city (Welbergen et al. 2008). A similar event in 2000 (40.7°C) killed around 500 individuals (Welbergen et al. 2008).

In 2014, a series of days over 40°C peaked at 43.9°C on Saturday 4 January. This heatwave resulted in unprecedented loss of Flying-foxes with almost every roost within the city suffering substantial losses. Worst hit were the roosts located at Lorikeet Street Reserve, Pan Pacific Peace Gardens, Woodend Flying-fox precinct and the Queens Park Nature Centre, all of which lost the majority of their Black flying-fox populations.

Estimated mortalities of approximately 15,000 were collected at this time. An additional unknown number of Flying-foxes perished on private property, high in trees or at unknown locations. Information collated by Welbergen et al. (2014) suggests that around 45,500 flying-foxes perished throughout the entire South-East Queensland region.

Unfortunately, around 98 per cent of mortalities were Black flying-foxes, with the remainder being Grey-headed and a few Little reds. The combined estimate of Black flying-fox mortalities in South-East Queensland indicates this species has suffered a major population decline. The loss of large numbers of juveniles will also impact on the future viability of the species.

In areas of Australia where mass mortality events have occurred, temperatures have noticeably increased by around 0.17°C per decade (Jones et al. 1999). This trend is expected to continue increasing and it is therefore assumed that the frequency and intensity of extreme weather events will also increase (Easterling et al. 2000). Areas such as Ipswich where Flying-fox mass mortality events have occurred in the past have seen a 0.17°C temperature increase per decade (Jones et al. 1999). These trends are expected to continue along with a possible increase in the frequency and intensity of extreme weather events (Easterling et al. 2000).

4 IMPACTS OF LIVING WITH FLYING-FOXES

Where Flying-fox roosts are close to urban or residential land uses, potential exists for human/wildlife conflict. Typical impacts reported include noise, odour, disease concerns and impacts to infrastructure and vegetation. Droppings from flying-foxes and loss of fruit from fruiting trees can also be a source of annoyance to both residents near roosts and residents with significant feed trees within or around their properties or which are within regular flight paths of Flying-foxes.

4.1 NOISE

Flying-fox roosts can often be a source of nuisance to adjacent residents due to loud vocalisations from individuals within roosts. Where roosts are disturbed regularly by human activities or by other animals (such as ibis, crows, sea eagles/birds of prey and domestic dogs) a near consistent level of vocalisation can be heard during the day. Roosts can also become disturbed where individual animals are competing over territorial spaces or mating partners. Flying-fox roosts are generally quiet when undisturbed; however, can be noisier, particularly after midnight, during peak mating season, for a period of approximately 4 weeks between March and April. During this time the males come back from foraging earlier in the evening and can be vocal while jostling for prime positions within a roost (Pearson and Cheng 2018).

During the summer months when Little red flying-foxes arrive roost noise levels can increase rapidly as the roost size and extent increase. These impacts typically subside as the seasonal Little red flying-foxes continue to follow the flowering eucalypts south.

4.2 ODOUR

The smell of Flying-foxes is not from being unclean or urine, but is a scent the Flying-foxes produce as another form of communication, including identification, marking of territory or mate attraction. Odour of Flying-fox roosts is particularly strong following rain, during hot and humid weather, and large population events (e.g. Little red flying-foxes temporarily joining a camp). Juvenile Flying-foxes also emit scent to help mothers correctly identify their young upon returning from foraging activities.

4.3 DROPPINGS

Flying-foxes often defecate at feeding sites and when arriving back at their roosts, which can impact residents property, including; outdoor furniture, cars, swimming pools, solar panels, washing and roofs. When Flying-foxes consume fruit of the introduced Cocos palm (*Syagrus romanzoffiana*), their faeces become particularly sticky and more difficult to remove (DAFF 2013). The Cocos palm is commonly planted in gardens for ornamental purposes and has been spread and become naturalised throughout South-East Queensland as Flying-foxes and birds spread its seeds.

4.4 VEGETATION DAMAGE

Where Flying-foxes roost in large numbers, impacts to vegetation values have been recorded. Impacts typically consist of temporary defoliation (loss of leaf cover) and damage (cracking or snapping of branches). Concern generally is raised where impacts to heritage or locally significant trees (i.e. street trees) are observable. However, Flying-foxes often adjust their core roosting locations within permanent roosts. Within intact forests, damage to vegetation opens the canopy, and initiates a natural cycle of vegetation regeneration in the impacted area (SEQ Catchments 2012). In small remnant vegetation patches with edge effects, damage to vegetation caused by Flying-fox activity may increase the impact of invasive weeds within the site (particularly vines) (SEQ Catchments 2012).

From observations of historical Flying-fox roosts which have been abandoned, disturbed areas of native and exotic vegetation often naturally regenerate, allowing for cycling of the vegetation community back to a typical mature status.

Similar to any impacts to the community as a result of local Flying-fox roosts, where heritage or locally significant trees are at risk, management options will be considered on a case by case basis. Management options may include the use of tree trimming to ensure safety of staff and patrons of public spaces where trees are at risk of poor health as a result of roosting. Where long-term occupation of these trees occurs, pre-emptive replacement plantings may be considered depending on the Roost Risk Rating.

4.5 FLYING-FOXES AND PUBLIC HEALTH

Concern about Flying-foxes spreading disease and threatening human and animal (pets and livestock) health is often raised by members of the community impacted by Flying-foxes. While a small proportion of Flying-foxes may carry diseases such as Australian bat lyssavirus and Hendra virus, the risk of those diseases being transmitted to people or animals can be effectively controlled through education, basic hygiene measures, management protocols and personal protective equipment (PPE).

The perceived health risk from Flying-foxes is often exacerbated by the media (Thiriet 2005). However, genuine risks may be present and community requests for management action resulting from fear of disease must be carefully considered and assessed. Council must assess whether the risk of infection from Flying-foxes has the potential to become realised and what mitigation strategies and actions are appropriate. In doing so, council will rely on expert agencies such as Queensland Health and Biosecurity Queensland and ensure the public have access to the most up to date sources of information.

While flying-foxes may carry viruses and bacteria which can be harmful to humans, with appropriate management, the risk of infection is low. People should avoid assisting or handling Flying-foxes directly. If a sick, injured or orphaned Flying fox is found the RSPCA should be called immediately. If a person is bitten or scratched by a Flying-fox, Queensland Health should be called immediately.

The rapid emergence of human pathogens from a single host genus in a short period of time suggests that recent changes in host ecology may play a role in their emergence (Plowright et al. 2008). Namely this refers to the increasing urbanisation of the Flying-fox roosts due to large scale development and deforestation (Wynne & Wang 2013). Logically the emergence of these viruses has coincided with increasing human to bat contact meaning that the recent discovery of these diseases does not necessarily indicate that they are newly developed (Tidemann et al. 1997).

In general, the potential for disease exposure from infected Flying-foxes does not relate to the size of the Flying-fox camp (Streicker 2013). A common historically stated management approach where Flying-foxes generate community conflict is to reduce the size of populations through culling or dispersal as an attempt to reduce disease exposure. However, studies have shown that culled camps often display a higher viral exposure than other camps due to the increased dispersal and spread (Streicker et al. 2012; Blackwood et al. 2013). Culling is not supported by the Queensland Government as an accepted management action for management of Flying-fox roosts.

4.5.1 Queensland Health advice on Australian bat lyssavirus (Queensland Health 2022)

Australian bat lyssavirus (ABLV) is a virus closely related to the rabies (classical rabies) virus which causes serious and usually fatal disease in humans. Australia is free from classical rabies in land-dwelling animals. However, ABLV has been found in several bat species including Flying-foxes/fruit bats and microbats. Surveys of wild bat populations have indicated less than one per cent of bats carry ABLV. In sick and injured bats, around seven per cent have been found to carry the virus. However, it must be assumed that any bat (sick, injured or healthy) in Australia could be infectious with ABLV.

Cases of human infection of ABLV were all associated with being bitten or scratched by a bat. Do not touch bats, even if they are injured. Only trained and vaccinated handlers should touch bats to prevent the risk of infection.

4.5.2 Queensland Health advice on Hendra virus (Queensland Health 20221)

Hendra virus was discovered following an outbreak of illness in horses in a large racing stable in the suburb of Hendra, Brisbane in 1994. The natural host for Hendra virus is the Flying-fox. The virus can spread from Flying-foxes to horses, horses to horses and rarely, from horses to people.

Since Hendra virus was identified, more than 90 horses are known to have been infected. These animals have either died as a direct result of their infection or have been euthanised. Several hundred people have been exposed to Hendra virus infected horses but have not been infected. However, seven people have been confirmed to have Hendra virus following high levels of exposure to infected horses (excessive contact with horse bodily fluids). Four of these people died, the most recent in 2009.

Evidence of exposure to Hendra virus has been identified in asymptomatic dogs on two occasions. These dogs were identified as contact animals on properties with infected horses. Research and testing of many other animals and insects has shown no evidence of Hendra virus infection occurring naturally in any other species.

Methods of managing the potential risks associated with living near flying-foxes is discussed in section 6.

5 IPSWICH REGION AND ITS FLYING-FOX ROOSTS

5.1 CONTEXT OF THE IPSWICH REGION

Subject to changes in season and food availability, Ipswich generally contains between 4 and 10 Flying-fox camps across the region at any given time. Roosts are generally found along natural or artificial watercourses in urban, peri-urban and rural areas of the city. The highest number of both camps and individual Flying-foxes occurs during the summer months with the seasonal influx of Little red flying-foxes.

Research undertaken in the preparation of this plan has identified several temporal and spatial associations between local roosts. This is first understood to have commenced with the mass movement of Flying-foxes from Sapling Pocket to Woodend following a roost destruction/dispersal action in 1984. Following degradation of roosting habitat at Woodend, several smaller local roosts have emerged. In several instances of historic roost-based management actions, these actions appear to be the catalyst for the formation of new roost locations.

5.1.1 Climate

Ipswich's (Bureau of Meteorology site number 040101) mean average maximum summer temperatures range from approximately 21.1°C in July to 32°C in December. The highest temperatures recorded across the region is 44.6°C (26 December 1972). Mean minimum temperatures range from 7°C in July to 20°C in December. Ipswich's coldest recorded day is -0.8°C (28 June 1971). Ipswich's annual mean rainfall is 877.8mm, with an annual highest recorded rainfall of 1794.8mm (1893), and lowest of 358.1mm (1902).

Since 1910, when national records began, Australia on average has warmed by 1.47 ± 0.24°C. Every decade since 1950 has been warmer than the preceding decades (Bureau of Meteorology, 2024).

5.1.2 Vegetation

The region contains a variety of vegetation communities with the pre-clear dominant vegetation community comprised of eucalypt forest and woodland. Areas of Swamp Tea-tree (*Melaleuca irbyana*), Brigalow (*Acacia harpophylla*), semi-evergreen vine thicket (SEVT) and notophyll to microphyll vine forest also occur across the region and provide potentially suitable roosting habitat for Flying-foxes.

Current known occupied Flying-fox roosts predominately occur in remnant/regrowth eucalypt woodland/forest and in association with landscaped parklands and urban areas. The historic Sapling Pocket roost was understood to be associated with previously occurring *Eucalyptus tereticornis* dominated watercourse vegetation and complex notophyll to microphyll vine forest.

5.1.3 Population

As of the 2021 national census the Ipswich region contains approximately 229,208 residents (Australian Bureau of Statistics 2023). By 2046 Ipswich is expected to be home to 528,000 residents, more than doubling in size over a 25-year period (ShapingSEQ 2023 update). As Ipswich grows, managing the interaction between the built environment and the region's natural areas will be more important than ever.

5.1.4 Land use

The Ipswich region contains a range of varied land uses including residential, light, medium and heavy industry, commercial, aviation/military, rural, conservation and open space.

To the east of Amberley, the region contains existing urban and industrial development with areas of retained conservation lands and undeveloped lands. To the west of Amberley, the region contains rural landholdings predominately, with associated conservation and township uses.

The Warrego Highway/Ipswich Motorway passes through the centre of the region, passing from the Lockyer Valley in the west, to Brisbane and Logan in the east.

In the southeast of the region are large contiguous conservation reserves which form part of the Greenbank-Karawatha Corridor known as the largest remaining continuous stretch of open eucalypt forest in South-East Queensland. On the western boundary, the Little Liverpool Range contains large areas of intact remnant vegetation linking Main Range National Park and the Great Eastern Ranges.

5.2 ROOSTS OF IPSWICH

A total of 18 Flying-fox roosts have previously been recorded within the Ipswich region as of November 2024. Roost locations have been determined through a combination of access to the national Flying-fox monitoring viewer, council records and Department of Environment and Science and Innovation records.

The location of known current and historical roosts is provided in the supporting document 'Flying-fox roosts of the Ipswich Region'.

5.3 REGIONAL CONTEXT – ANALYSIS AND OVERVIEW OF ADJACENT LOCAL GOVERNMENT AREA ROOSTS

Within 20km of the boundaries of the Ipswich City Council Local Government Areas (LGA) there are numerous mapped Flying-fox roosts across six adjacent and nearby LGAs (Queensland Government 2023). The recorded Flying-fox roosts within 20km of the Ipswich City Council LGA (October 2023) is shown in Figure 7. To achieve successful conservation and management of Flying-fox roosts it is imperative that all council LGAs cooperate for successful management practices. Over time this number may increase or decrease reflecting Flying-fox roost dynamics are constantly changing and evolving within the broader landscape of South-East Queensland.

5.4 SHIFTING CLIMATE AND FLYING-FOXES – IMPACTS OF CLIMATE CHANGE

Extreme weather events have increased in frequency and resulted in significant mass mortalities within local flying-fox roosts. As this continues to occur within the Ipswich region, the likelihood of heat-stress related deaths of flying-foxes will increase.

The availability of foraging resources may be impacted due to changing weather patterns which result in drought impacts to locally occurring vegetation communities.

Flying fox mortalities were observed across Southeast Queensland during the 2019/2020 food shortage along high-speed state-controlled roads. This was due to flying foxes attempting to access the flowering melaleucas associated with roadside landscaping works. With a shifting climate, these knock-on effects will continue to place pressure on flying-fox populations.

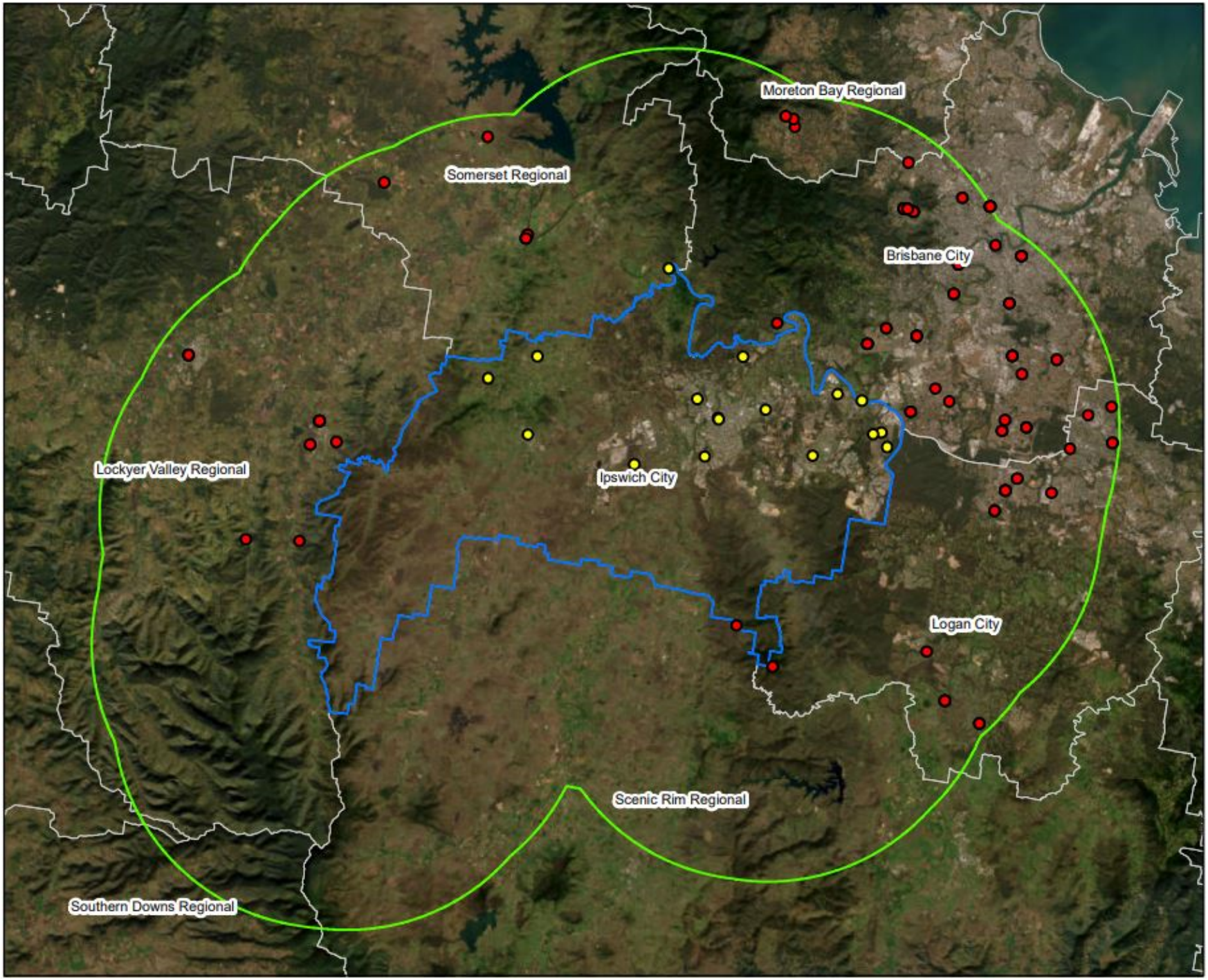


Figure 7 Flying-fox roosts within 20 km of Ipswich City Council Region (October 2023)

Ipswich City Council

Flying-Fox Management Plan (2024)

Metres
0 6,200 12,400

Legend

- Local Government Areas
- Ipswich City Council Region
- 20 km buffer
- Flying-fox roosts outside of Ipswich Region
- Flying-fox roosts within Ipswich Region

Source: Cadastral data sourced from DNRME (2021)

N

City of Ipswich

6 REACTIVE MANAGEMENT OF FLYING-FOX ROOSTS

The size, context and impacts of a Flying-fox camp must be carefully considered before planning and commencing any roost management actions. Larger populations will likely be harder to manage due to the potential size of roost footprints and scale of impacts to nearby residents. The likely success of any management action must be strongly considered against the risk of an adverse outcome.

6.1 MANAGEMENT RESPONSIBILITIES AND APPROACH

Where a Flying-fox roost is located on council owned or managed land, Ipswich City Council assumes management responsibility of that roost. Where the roost falls on both council owned land and private property council will seek to lead implementation of any actions.

Council will not permit any private entity to complete roost management works on council owned land.

Where a Flying-fox roost is located on private property, management responsibilities are assumed by the landholder, and any management activities must occur in accordance with the state and commonwealth requirements.

6.2 RISK-BASED MANAGEMENT FRAMEWORK

Flying-foxes roosting in large camps within urban and rural areas often generates community concerns and or conflict. Excessive noise at dusk and dawn, odour and risk of disease spread are a common cause of complaint. In addition, the rural areas of Ipswich have large numbers of horse owners for whom the potential spread of Hendra virus is also of concern.

Strong seasonal trends are also evident with public concerns spiking during the summer months, particularly with the arrival of Little red flying-foxes. This is a key aspect of Flying-fox management as this species is nomadic and changes roosts regularly. Concerns for large colonies of roosting Flying-foxes are often allayed when Little reds commence their northern migration at the end of summer.

The extent to which an individual roost creates a risk to public health or generates community conflict may depend on a number of factors. These can include species numbers and location, camp structure, camp health and surrounding land use. Media coverage and the level of knowledge and or sensitivity of the surrounding community are also important factors.

To protect public health while also maintaining a consistent approach to Flying-fox roost management council will employ a risk-based management approach. This recognises that some land uses are less compatible with Flying-fox roosts than others and that physical separation between people and roosting Flying-foxes is an effective risk management tool. The following sections describe a hierarchy of risk-based management zones identified by the proximity of Flying-foxes roosting on council owned or managed land to a range of surrounding land uses.

Table 2: Roost Risk Rating categories of Flying-fox roosts across the Ipswich region

RISK CATEGORY	DESCRIPTION	CRITERIA / EXAMPLES
High	Flying-fox roosts may be located in areas that are considered to be in high conflict with the potential to have considerable adverse implications for the local community. Examples of such localities include roosts located on council owned or managed land within 50 metres of sensitive public or private facilities.	Located within 50m from sensitive public or private facilities which may include: ▪ Hospitals ▪ Medical facilities ▪ Childcare centres ▪ Aged care homes ▪ Schools ▪ High profile public places (e.g. sporting facilities, public pools, restaurants, parks, children's playground, areas of historical or cultural significance, etc.) ▪ Formal equestrian facilities ▪ Aviation facilities
Medium	Flying-fox roosts located greater than 50 metres from sensitive public or private facilities may still be capable of generating conflict within the community in certain circumstances. Roosting Flying-foxes on council owned or managed land will be considered to be in medium conflict where they meet with the following criteria:	▪ Located between 50 to 150 metres from a sensitive public or private facility; and ▪ Within 150 metres of a place of residence or commercial facility; or ▪ Within 150 metres of an area where horses commonly graze; or ▪ Within 150 metres of public facilities such as barbeques and toilets
Low	Flying-fox roosts with a low potential for community conflict will be considered to be low conflict roosts. These roosts will generally have significant roost separation consistent with the following criteria:	▪ Located greater than 150m from a sensitive facility; and ▪ Located greater than 150m from any place of residence or commercial facility; or ▪ Greater than 150 metres from an area where horses commonly graze; or ▪ Greater than 150 metres from public facilities such as barbeques and toilets
Preferred location	In some situations roosting Flying-foxes create minimal community conflict and should be left alone to perform their important ecological role as pollinators and seed dispersers. The former Sapling Pocket roost is a good example of a location with limited impacts to the public. Council will seek to minimise disturbance to Flying-foxes in identified preferred roosting locations (potential low risk locations) and preserve potential preferred locations. Areas which contain suitable vegetation and a combination of potentially suitable bio spatial features (such as proximity to water, vegetation patch size, slope, proximity to foraging	▪ Greater than 150 metres from a sensitive facility; and ▪ Greater than 150 metres from any place of residence or commercial facility; and ▪ Greater than 150 metres from an area where horses commonly graze; and ▪ Greater than 150 metres from public facilities such as barbeques and toilets; or ▪ On a Protected Area declared under the *Nature Conservation Act*

	resources) will be considered highly suitable, preferred locations for retention of Flying-fox roosting habitat where these criteria are met:	*1992*, and greater than 150m from a sensitive receptor.

6.3 LAND TENURE AND FLYING-FOX MANAGEMENT

Flying-fox roosts are highly dynamic, expand and contract and are colonised or potentially abandoned on a frequent and irregular basis respectively. Flying-foxes are also blind to land tenure, moving or spilling from one to another in ignorance of the potential impacts and likely consequences.

The following section describes the relationship of this management plan to some of the key land tenures on which Flying-foxes may roost. Where applicable, an overview of council's intent to respond to Flying-foxes roosting in these situations is also provided.

The following table sets out the maximum level of advice or action which may be provided or undertaken by council, based on property tenure and ownership. The actual level of advice or action is determined by an assessment process.

Officers should familiarise themselves with the requirements of the codes of practice in relation to the prescribed methods for management actions and prescribed methods for low impact activities. In all situations council will provide advice on minimising the impacts of Flying-fox roosts.

Table 3: Scenarios where Council action may be considered** (Council pays cost).

	AFFECTED PROPERTY TYPE			
Tenure of property where roost is located	Type 1 Private property – sensitive sites For example: • Residential dwelling • Day care centre • Nursing home • Private school • Private hospital	Type 2 Private property – other land uses For example: • Commercial • Retail • Industrial • Agricultural • Animal husbandry	Type 3 Australian or Queensland Government owned or managed property – sensitive site For example: • Public school • Public hospital • National Park	Type 4 Council owned or managed property – sensitive site For example: • Public children's playground • Public pool • Council library
Private Property	✗	✗	✗	?*
Council owned or managed land (within or outside UFFMA)	✓	✓	✓	✓
Australian or Queensland Government owned or managed land	✗	✗	✗	✓

* Council has an as-of-right authority and may allow third party use of this authority where the roost location is on private land but is impacting a Type 4: Council owned or managed property – sensitive site.

** Level of action (no action, low impact, high impact, affecting GHFFs) determined by assessment and case-by-case consideration

✓ = yes

✖ = no

? = possibly, depending on situation

6.3.1 Private, State or Commonwealth owned or managed lands

The management of Flying-foxes and their roosts on lands under private, State, or Commonwealth control is beyond the scope of this management plan. Where these matters arise, they should be discussed directly with the respective landowner or manager. Where feasible and where landowner consent is provided, council will endeavour to monitor these roost locations to maintain a comprehensive understanding of regional Flying-fox roost dynamics.

Council will not undertake vegetation management, dispersal or significant roost destruction activities on private lands where they are impacting other private sensitive land uses. Council may provide advice and assistance to landowners and residents about Flying-fox ecology (education), buffer management options and asset protection measures. Where a roost is sited over private and council lands, council will seek to lead management of the roost and may assist with weed management and minor vegetation works on private lands where a clear community benefit is able to be demonstrated.

Council may seek to assist landowners to obtain their own Flying-fox roost management permit from the State Government where they seek to obtain one to conduct roost management actions on private lands. Private landowners are able to conduct low impact activities in accordance with the *Nature Conservation Act 1992*, Code of Practice: low impact activities affecting flying-fox roosts. Private landowners who wish to destroy of disperse a Flying-fox roost is required to apply for a Flying-fox roost management permit issued by DETSI to manage Flying-fox roosts irrespective of the roost location.

To apply for a Flying-fox roost management permit from the State Government a Flying-fox management plan is required to be prepared. It is recommended that persons wishing to apply for a Flying-fox roost management permit engage a person knowledgeable about Flying foxes, such as a suitably qualified and experienced ecologist.

Council may also support landowners through the following:

- Provision of detailed advice on the vegetation composition of their properties (native/exotic species) and options for management
- Advice on Flying-fox ecology and roost information.
- Opportunities for wildlife conservation, such as involvement in council's Land for Wildlife program.
- Assistance to landowners in developing an implementation strategy (plan) for low impact activities within the roost, under the Code of practice - Low impact activities affecting Flying-fox roosts.

At the same time, council will endeavour to make landowners aware of the relative risks and likely outcomes of their proposed actions. In these cases, council may provide technical assistance to landowners wishing to apply a Flying-fox roost management permit but will not make application to the State or Commonwealth on behalf of a property owner.

6.3.2 Council owned or managed land

Council is responsible for management of Flying-fox roosts on land under its ownership and control or where council is the trustee. To maintain knowledge of their current status these roosts will be subject to regular monitoring and evaluation. In addition, council will remain cognisant of community concerns and expectations surrounding these roosts.

Where concerns about Flying-fox roosts on council owned or managed lands are raised these will be assessed in accordance with Section 6.4 of this document.

6.3.2.1 Works conducted under 'as of right authority'

Council's as-of-right authority allows for management of roosts within Urban Flying-fox Management Areas (UFFMA) within the Local Government Area. Where council undertakes management of roosts outside of the UFFMA a roost specific Flying-fox Roost Management Plan (roost specific FFRMP) shall be developed and approved by the state prior to commencement of works. Roosts within and outside the UFFMA are to be managed in a manner consistent with council's approach to roost management (Section 1.4). Council will not extend their as-of-right authority to private landholders/organisational entities to manage any roosts that are wholly located on private or state managed lands.

Council will attempt, where possible, to avoid management actions and works believed likely to cause Flying-foxes roosting on council land to spill over onto private property. In particular, techniques such as 'buffering' may be used to encourage roosts to remain on council property. While every effort will be made to ensure success of management works when undertaken, there is no guarantee that management actions will be effective to resolve human-wildlife conflicts. Where conflicts may not be completely resolved from direct management of roosts (e.g. buffering may resolve visual concerns, but not odour) alternative solutions may be required (e.g. the use of air conditioning to allow windows to be closed during summer to minimise odour impacts or the use of double glazed windows to minimise noise impacts).

In some circumstances it may be possible to establish managed buffers between Flying-fox roosts and sensitive receptors which adequately reduce impacts to neighbouring landholders (subject to tenure, vegetation protection, amenity, cost and conservation considerations). A buffer can provide an appropriate balance in retention of local vegetation values and provision of setbacks to minimise nuisance to sensitive receptors. Determination of an appropriate buffer distance (where proposed) is determined on a case-by-case basis. There are clear situations where establishment of managed buffers may not be possible, desirable, or appropriate for the circumstances such as where roosts occur in narrow, isolated vegetated corridors and the establishment of buffers will result in the shifting of the roost up or down the corridor, or where vegetation management restrictions apply.

Council will first undertake community engagement and education actions to understand impacts to sensitive receptors and any other impacted parties. Council will implement the following staged approach where management of a roost is undertaken in accordance with the relevant code of practice.

Where works are to be undertaken, they are to be completed in a manner consistent with the following:

- Code of Practice – Low impact activities affecting flying-fox roosts (DETSI)
- Code of Practice – Ecologically sustainable management of flying-fox roost (DETSI)
- Flying-fox Roost Management Guideline (DETSI)
- Any relevant guidance under the *EPBC Act 1999* in relation to management of grey-headed flying-fox roosts

6.3.2.2 Retention of low-risk roosts

Flying-fox roosts on council owned or managed land which meets preferred roost location criteria will be encouraged and may be embellished as Flying-fox habitat. This process may involve works to enhance native vegetation, remove exotic (weed) vegetation and manage fire. A selection of Flying-fox roost and feed plants suitable for revegetation in the Ipswich area is detailed in the supporting document Regional preferred Flying-fox foraging tree species.

6.3.3 Adjoining council owned or managed land

Council will seek to work in co-operation with private property owners where roosts occupy council owned or managed land and adjoining private property. Again, in these instances, the process outlined in Section 6.4 will form the basis for evaluating the need for, and most appropriate form of management action.

In these circumstances, council will assist adjoining private property owners through provision of a range of support services. These include access to educational and research materials, technical advice regarding key management strategies and referral to sources of expertise on Flying-fox management and public health.

Where a roost exists on council land and an adjoining private property requires management actions to be undertaken, council will seek to identify and implement management actions in conjunction with property owners, consistent with council's policy and this management plan. This may involve council taking the lead in obtaining any permit approvals and or co-ordinating delivery of on ground works. In these circumstances, council, at their discretion may seek to enter into cost sharing arrangements where works are undertaken on private land.

However, should a landowner be dissatisfied with council's preferred course of management action in regards to management actions where a roost is located on both council owned or managed, and private property, the private landowner may still apply for a Flying-fox roost management permit directly through the Department of Environment, Tourism Science and Innovation (DETSI) for their own property. Council will not permit private residents to conduct roost management actions such as vegetation clearing on council-controlled lands.

6.4 REACTIVE MANAGEMENT APPROACH

6.4.1 Considerations for management approach

Council will consider the management of individual roosts in a balanced manner to ensure equitable and responsible governance is provided for the region. Council will consider the following factors when determining a management approach:

- Whether a roost is permanently occupied or seasonal
- The period of occupancy, and roost dynamics (do populations naturally fluctuate significantly in size, extent or location, breeding status)
- The proximity of sensitive receptors/sites
- The level of impacts to adjacent sensitive receptors/sites
- The probability of success in providing enhanced health, amenity and environmental outcomes as a result of the management actions (i.e. addressing community concerns)
- Regulatory factors (including vegetation management legislation)
- The status of the roost (nationally significant and/or maternity roost)
- The cost of management actions, and opportunities to receive assistance with funding from the State Government

Requirements for roost interventions on council land will be assessed on a case-by-case basis. Council will assess concerns raised by residents and members of the public in accordance with the following processes:

- An initial customer service engagement (collection of information about where the roost is located and what the matter of concern for the customer is).
- An assessment or review of the Roost risk assessment decision process map to confirm the roost risk category – detailed in Section 6.4.3.
    - In association with the preparation of this FFRMP roost risk categories have been assigned to all identified roosts and are included within the supporting document Flying-fox roosts of the Ipswich region.
- Where a roost is identified as a medium or high-risk roost, assessment against the management action assessment process – detailed in Section 6.4.4.

This assessment process will ensure council achieves the goals and objectives established in its policy and management plan while also complying with legislative requirements.

Again, it must be emphasised that roosts are highly dynamic and subject to frequent change. As such the management action assessment process will be used as a guide to be applied to a particular set of circumstances, at a given point in time.

Several Flying-fox roosts on council owned or controlled land are also heavily constrained by State vegetation protection requirements or occur in circumstances where vegetation removal actions would likely result in significant environmental harm through loss of watercourse bank stability or reduction in threatened species habitat or cultural heritage values. Additionally, roosts may have previously been subject to management actions which have exhausted acceptable available options to council.

6.4.2 Customer request process

The Customer request process map depicted in Figure 8 separates community concerns into common categories raised by the community. Appropriate responses are then identified based on council's SOMI and this plan. Where the most appropriate response is referral of the matter to expert agencies such as Queensland Health or Biosecurity Queensland these agencies are also identified.

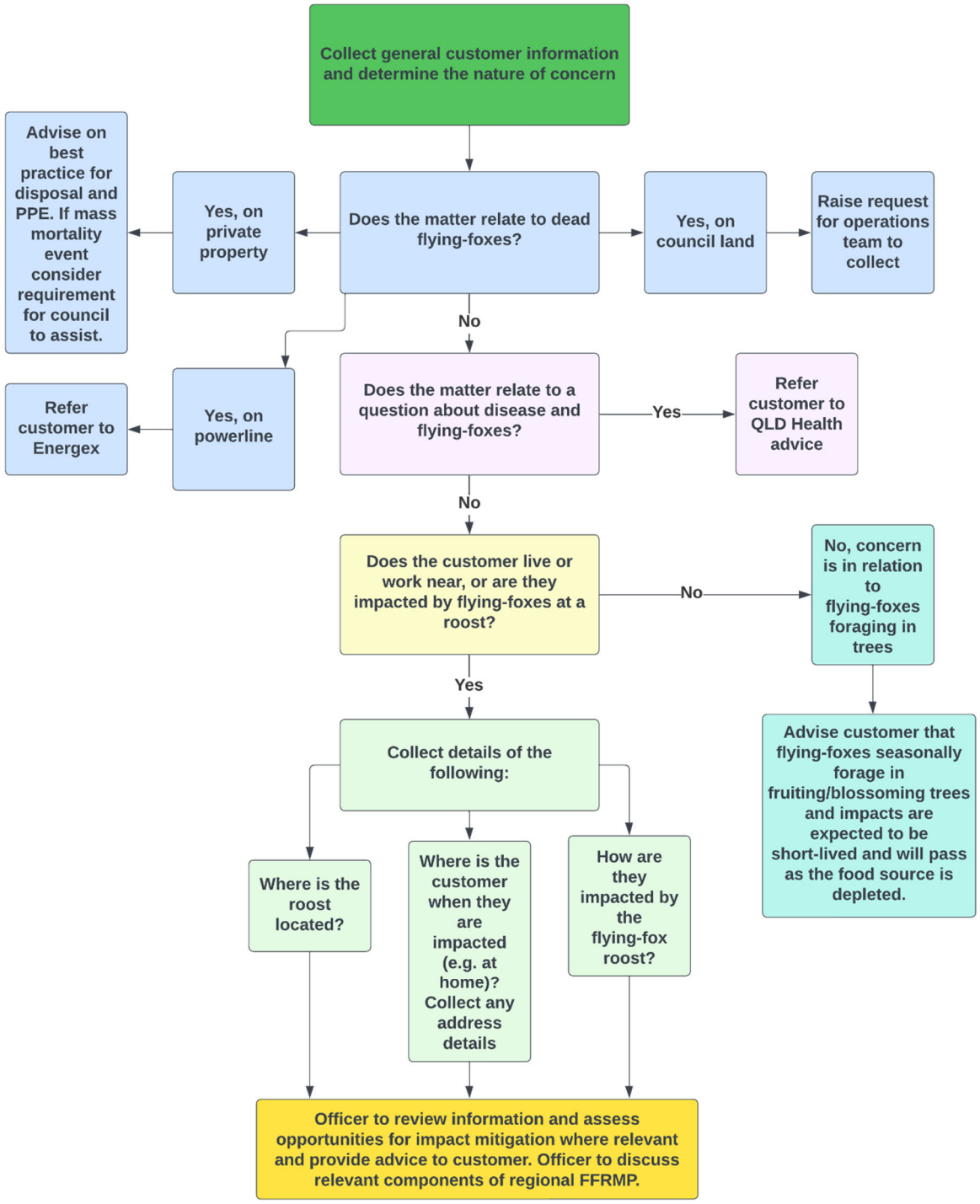


Figure 2: The customer request process map is used to inform and guide council in considering and responding to community concerns for Flying-foxes roost issues.

6.4.3 Roost risk assessment decision process

Local governments have an ‘as-of-right authority’ to manage flying-fox roosts within a defined UFFMA, where they choose to do so. This potentially involves a broad range of roost management issues, land tenures, community interests, risk settings and costs.

To guide council through this process, and to achieve consistency with council's SOMI and management plan, a Roost risk assessment decision process map has been developed (Figure 9). The hierarchy utilises the roost risk categories to determine the priority setting and most appropriate form of management response. This assessment is to be conducted in concurrence with Table 2, which outlines the criteria for risk categories of flying-fox roosts across the Ipswich region. Review of individually assigned Roost Risk Rating categories in the supporting document Flying-fox roosts of the Ipswich region should also be undertaken.

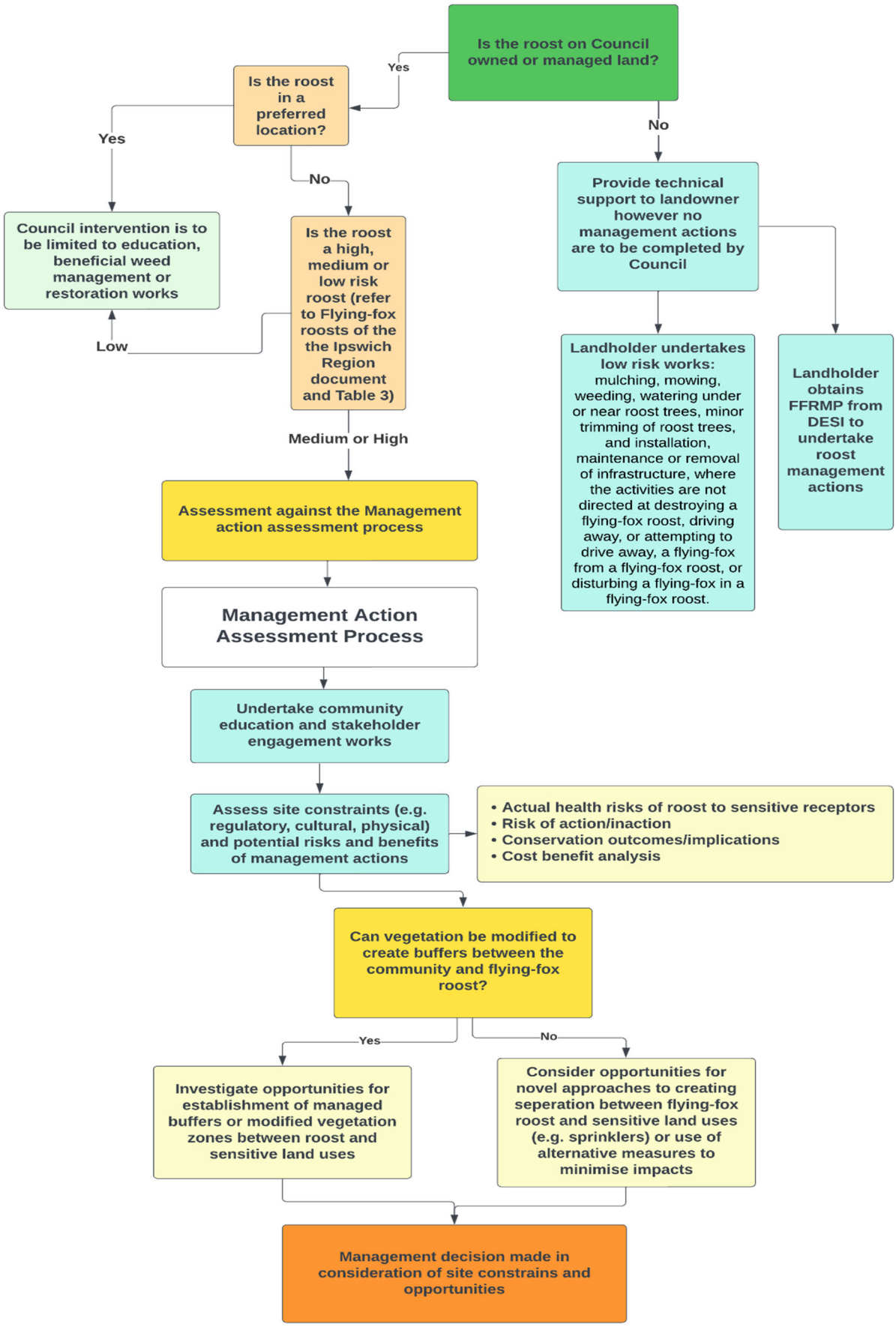


Figure 3: The roost risk assessment decision process map displays the key considerations required, to identify the management action pathway for a roost

6.4.4 Management action assessment process

Identifying the most appropriate form of management action requires careful consideration of the underlying issues, particular circumstances, suite of potential actions, their likely outcomes, risk levels and costs. Council will use the management action assessment process depicted in Figure 9 to evaluate and determine the requirements for action on a case-by-case basis. The process map establishes a formal process for identifying balanced and consistent Flying-fox roost management actions across the region.

Council has an obligation to ensure public monies are allocated and used in a responsible and efficient manner. As such, costs will form an important overlay to council's determination of the most appropriate form of management action. Council will be vigilant in identifying and avoiding management actions which require costly, ongoing efforts with limited opportunities for a successful outcome.

6.5 METHODS OF MANAGEMENT

The hierarchy of management utilises the roost risk categories described in Section 6.2 to determine the priority setting and most appropriate form of management response.

The following sections outline the possible management actions which council may take in relation to management of Flying-fox roosts through implementation of this plan. Potential actions are presented in a hierarchical order from least to most invasive.

As depicted in Figure 10 there is a strong correlation between increasing level of roost intervention and increasing costs and risks. More intrusive actions will only be considered where passive management actions have been tried unsuccessfully. This approach is intended to balance community needs while ensuring management actions demonstrate value for money and have a high probability of management intent success.

ACTIONS / SOLUTIONS	IMPACTS	OUTCOMES	RESPONSIBILITY	COST	RISK TO COUNCIL
HIGHEST PREFERENCE					
Education Living with Flying-foxes, vaccinations etc	Cost: LOW Flying-foxes: LOW Quality of life: LOW	No containment (roost remains)	Owner / occupier / manager of affected property		
Code of Practice – Low impact activities Mulching, weeding etc	Cost: LOW Flying-foxes: LOW – MEDIUM Quality of life: MEDIUM				
Fence around trees Barrier for children, dogs, horses etc	Cost: LOW – MEDIUM Flying-foxes: LOW Quality of life: MEDIUM				
Building improvements Double glazing, air conditioning, relocate water tank etc	Cost: MEDIUM – HIGH Flying-foxes: LOW Quality of life: MEDIUM - HIGH				
Understorey vegetation modification (minor clearing) Pruning / removal, replanting	Cost: MEDIUM Flying-foxes: MEDIUM Quality of life: MEDIUM - HIGH	Containment			
Nudging (low intensity disturbance Canopy mounted sprinklers etc	Cost: MEDIUM Flying-foxes: MEDIUM Quality of life: MEDIUM - HIGH		Roost on private land: Owner / occupant / manager with permit from DESI/DCCEEW		
Canopy thinning (minor to moderate clearing) Selective branch removal	Cost: MEDIUM Flying-foxes: MEDIUM Quality of life: MEDIUM - HIGH				
Selective tree removal (moderate to major clearing) Removal, replanting	Cost: MEDIUM Flying-foxes: MEDIUM Quality of life: MEDIUM - HIGH	Dispersal / significant roost modification	Roost on council land: Council using as-of-right authority and/or with permit from DESI/DCCEEW		
Removal of all vegetation (major clearing) Removal, replanting	Cost: HIGH Flying-foxes: HIGH Quality of life: LOW - HIGH				
Dispersal Light, noise, smoke, etc	Cost: HIGH Flying-foxes: HIGH Quality of life: LOW - HIGH		Roost on State / Commonwealth land: State / Commonwealth responsibility		
Relocate people Mutually beneficial location, acquisition	Cost: HIGH Flying-foxes: LOW Quality of life: HIGH	No further conflict			
LOWEST PREFERENCE				$ HIGH	RISK HIGH

Figure 4: Management action hierarchy matrix

6.5.1 Proactive actions

Council undertakes regular monitoring of occupied, known roosts across the region. Roosts which are wholly on private land, and which are unable to be accessed or viewed publicly are not monitored unless landholder consent is provided to access and monitor. Council is supportive of extending monitoring of roosts to additional roosts across the region and encourages residents to contact council to notify of any unrecorded roosts.

Quarterly monitoring will be undertaken at minimum in February, May, August and November each year. Additional monitoring may be conducted throughout the summer months. Local Flying-fox roosts often swell at this time with the seasonal influx of Little red flying-foxes. This is also the time when community concerns are heightened and requests for council information, advice and interventions peak. Monitoring the movements of Little red flying-foxes will increase understanding of their roost dynamics and interactions with other Flying-fox species increasing council's ability to respond to community concerns. In addition, where a Flying-fox roost is identified as being of medium or high conflict more frequent monitoring (e.g. monthly) may be undertaken to advise and inform potential management actions.

Council monitors roosts to maintain an understanding of roost dynamics, local breeding observations and potential impacts to the community which allows for informed management decisions to be made. As more roosts are recorded across the region these are to be added to the existing quarterly monitoring schedule.

Data collected by council officers is provided to the State Government.

6.5.2 Education

Typical community education on Flying-foxes as a reactive management action is associated with print and digital media releases, mailouts and temporary signage aimed at addressing concerns about increases in roost size or extent, significant seasonal fluctuations and where works are proposed which may impact residents. Where residents seek further information about Flying-foxes council will make available a range of print media resources (such as factsheets, flyers or information packages).

6.5.3 Engagement with impacted parties (landholders) and reactive education

Council will seek to respond and engage with landowners and residents concerned about Flying-foxes. Council will share information on Flying-fox ecology, roosts and management with interested parties. As camps swell in summer, and media coverage increases, council may expect an escalation in community concerns and requests for intervention. Questions or concerns regarding human health and Flying-foxes will be referred to Queensland Health and Biosecurity Queensland where detailed advice is sought.

Council will provide advice to landowners and residents on options they may take to mitigate impacts of nearby Flying-fox roosts or individual Flying-foxes. Options for residents to consider include fruit tree netting, car and vehicle covers, building treatments (glazing improvements and insulation), air conditioning, bringing the washing in at night, trimming of trees, clearing of roofs and water tanks and landscaping which does not attract or support Flying-fox roosting behaviour.

To ensure that council responds to community requests in a fair and balanced manner a community concerns customer request process has been developed. This focuses on gathering appropriate information to inform and guide council's response including the provision of appropriate information and advice to the community.

The Customer Request Process map (Figure 8) separates community concerns into common categories. Appropriate responses are then identified based on council's SOMI and this plan. Community concerns for Flying-foxes roosting on council owned or managed land will be subject to assessment under this management plan.

6.5.4 Vegetation management

Management of vegetation within Flying-fox roosts is a costly, resource intensive and often frustrating experience for land managers due to the uncertainty in management success and potential for unintended impacts such as roost shifting. Where council seeks to undertake vegetation management works on council owned land this will be completed in a staged approach commencing with low risk weed management works. Council will plan works with due regard to any local, State or Commonwealth vegetation or species protection requirements and consideration of amenity and cultural heritage values of vegetation proposed to be managed.

6.5.4.1 Minor vegetation management (weed management)

Minor vegetation management may occur to modify edges of roosts or to increase separation between roosts and sensitive receptors. Minor vegetation management is limited to non-native vegetation within the understorey layers and trimming of roost trees (less than 10 per cent of canopy). Minor vegetation management is unlikely to require State or Commonwealth approval. Examples of works include:

- Control of non-native understorey species (e.g. slashing or spraying);
- Removal and disposal of non-native tree saplings; and
- Minor trimming of native and non-native roost trees (in accordance with low-impact guidelines), for example when a large native tree branch is overhanging a private property.

Minor vegetation management works are to be designed to reduce densities of Flying-foxes in proximity to sensitive receptors or to modify understorey vegetation to minimise suitable roost habitat features in buffer areas. Flying-fox roosts are highly sensitive, and measures will be undertaken to avoid significant reduction in roosting habitat where no suitable replacement habitat is available as this may splinter roosts. This may include completing weed management works over a staged period, allowing for establishment of alternative native roosting habitat within areas with greater separation from sensitive receptors.

Impacts to microclimates in respect to heat-stress management should also be considered when planning works, with significant modification of understorey vegetation potentially increasing risk of heat stress within roosts, therefore timing of works in relation to climate and breeding cycle is important.

6.5.4.2 Moderate vegetation management

Council may conduct moderate vegetation management works to deliberately modify roost environments to create buffers or areas which support lower densities of Flying-foxes in proximity to sensitive receptors. Moderate vegetation management actions include removal of non-native vegetation (all stratum) and removal of native understorey vegetation. Moderate vegetation management may require approval and conditions set by either the State or Commonwealth Governments depending on the extent of works. Examples of works include:

- Removal of portions of understorey vegetation (native/non-native);
- Removal of saplings (non-native);
- Removal of canopy tree species (non-native); and
- Trimming of native and non-native roost trees above the low impact guidelines.

Moderate vegetation management actions are likely to impact roosting habitats within sites and are to be undertaken in a strategic manner, minimising impacts to vegetation values which provide ancillary environmental benefits such as creek bank stabilisation.

At this level of works potential for unintended impacts is readily present and roosts may splinter or change location. Consideration of breeding cycle and potential heat stress impacts from vegetation removal is recommended to be made at this stage of works.

6.5.4.3 Major vegetation management and establishment or other novel setback methods (i.e. canopy mounted sprinklers).

Major vegetation management may occur to significantly modify roost extent and to create large, cleared buffers in proximity to sensitive receptors. This may also include 'nudging' of Flying-fox roosts to a preferred roost extent location. Major vegetation management actions include removal of native and non/native vegetation over all strata. These works do not have the objective of destroying a roost and are predominately in relation to creating cleared buffers, allowing for nudging of roosts to achieve greater separation distances. Major vegetation or roost management works may require approval and conditions set by either the State or Commonwealth governments. Examples of works include:

- Removal of all understorey vegetation (native/non-native);
- Removal of saplings (native/non-native);
- Removal of canopy tree species (native/non-native);
- Pollarding or major trimming of native and non-native roost trees;
- Installation of canopy mounted sprinklers or other novel deterrent methods.

Following major vegetation works, actions are to be undertaken to establish a native understorey cover inconsistent with Flying-fox roosting (such as a native grassland or low height shrub layer). This is likely to incur additional ongoing costs and responsibilities to the party undertaking works and should be planned in conjunction with the initial vegetation management works.

Major vegetation works are likely to result in high levels of disturbance to Flying-foxes, potentially resulting in shifting or long-term changes to roost population and dynamics. At this level of on-ground works, significant impacts to a roost microclimate are likely, with potential heat stress event impacts. Consideration of species breeding cycles is to be made when planning these works.

Buffers between Flying-fox roosts and sensitive receptors generally have the specific aim of increasing separation between roosting Flying-foxes and site users/residents. The creation of buffers is unlikely to fully resolve concerns about noise and odour and may result in fragmentation of roost habitat areas. Buffers to a maximum of 35m may be considered to facilitate direct physical separation between roosting areas and adjacent sensitive receptors. Site-specific factors may not permit the establishment of a buffer, or result in the use of reduced buffer distances when regulatory, environmental or riverine clearing restrictions limit clearing within the roost footprint.

6.5.5 Dispersal

Flying-fox roost dispersal, which is the permanent exclusion of Flying-foxes near human settlements, is a management tool historically utilised to mitigate human-wildlife conflict (Roberts et al. 2021). Attempts to remove or disperse a Flying-fox camp are rarely successful. Often the animals will have developed attachment to a roost site and therefore remain at the site despite substantial levels of disturbance (Thiriet 2005). Alternatively, Flying-foxes may have nowhere else to go and will begin roosting in even less desirable locations, such as backyards. Many apparently successful management actions are confused with Flying-foxes leaving on completely natural migratory patterns in response to changing food supplies (Thiriet 2005).

In their review of 48 dispersal attempts at Flying-fox roosts across Australia, Roberts et al. (2021), found that in 88 per cent of cases alternative roosts formed within 1km of the original roost site following management actions, transferring conflict to alternative residents. Of the 48 roost dispersal attempts only 23 per cent were considered successful, generally after expensive destruction of roost vegetation.

Costs were poorly documented; however, no roost attempt costing less than $250,000 was successful. The authors of this review paper concluded roost dispersal is a high-risk, high-cost tool for mitigating human–wildlife conflict.

Dispersal is unlikely to provide positive long-term outcomes for the community in terms of conflict management. As the majority of modelled potential high suitability roosting habitat within the Ipswich region is identified as occurring within potential high conflict areas near existing sensitive uses this approach is considered likely to shift conflict rather than resolve conflict.

6.5.6 Lethal management action

Lethal management actions are actions directly intended at killing or taking Flying-foxes, often referred to a culling. Under current State provisions these actions are not available to councils.

Council views lethal management of flying-foxes as an ineffective, non-practical and an unethical form of management. Lethal management will not be undertaken or supported by council under any circumstances.

6.6 ADDITIONAL REACTIVE ACTIONS AND MANAGEMENT

6.6.1 Significant influx of Flying-foxes

Following a significant influx of Flying-foxes to a roost or area, council will seek to engage with the community, staff and any additional impacted parties to provide educational materials and advice on opportunities to mitigate any adverse impacts.

Due to the short-term nature of most significant population influxes which are typically associated with regional flowering patterns which drive localised foraging, council is unlikely to support reactive vegetation management actions.

Where impacts associated with foraged fruit and droppings are identified on council-controlled lands, council will consider adapting operational footpath cleaning and street sweeping programs to ensure safety is maintained.

6.6.2 Starvation events

During regional starvation events a greater number of deceased Flying-foxes are expected to be located across public and private lands, often in proximity to opportunistic feed trees (e.g. figs, silky oaks and fruit trees). Council will seek to engage with the community, staff, and any additional impacted parties to provide educational materials during starvation events. Council will seek to remove deceased Flying-foxes on council-controlled lands in a proactive manner and in response to requests to specific requests by the community.

Where requests from the community are made regarding sick and injured flying-foxes council will refer the community to appropriate wildlife care entities.

6.6.3 Heat stress events

6.6.3.1 Approach by council

Future heat mortality events are a major concern regarding the management of Flying-foxes, particularly for Flying-fox roosts located on council owned or managed land with public access or use. Maximum daily temperature forecasts in excess of 37°C are a sign that additional roost-based management actions may be required. Heat-stressed or deceased Flying-foxes coming to ground are a source of significant community concern.

In the past, lack of public education concerning these events has led to a number of people being unnecessarily bitten, scratched and exposed to potential infection. Council will seek to provide leadership during Flying-fox heat stress events to facilitate humane care of Flying-foxes in distress by experienced wildlife carers, and to ensure that public amenity is maintained during these periods.

While Flying-foxes are suffering from heat stress, human disturbance may push them beyond their limits and greatly increase the chances of mortality. Persons attempting to undertake animal welfare actions during these events should take note of the State guideline Managing Heat Stress in Flying-fox Colonies. The guideline describes the protocols and practices which may be employed including the use of misting or spraying. Case studies highlighted in the guideline indicate the success of properly executed animal welfare actions during historical heat events.

Animal welfare activities undertaken during heat events must be careful to ensure that any actions aimed at minimising Flying-fox suffering do not inadvertently cause them any additional stress. For example, if spraying or misting leads to Flying-foxes leaving the roost, or showing signs of greater heat stress, the action could not only worsen the situation for the animals, but also constitute a breach of the *Nature Conservation Act 1992*.

It is critical that live Flying-foxes should only be handled by appropriately vaccinated persons who have undergone training in bat handling. Additional procedures for dealing with injured or orphaned Flying-foxes on council land have previously been put in place and this process will continue where a need is identified.

Noting the potential significant overlap between high-risk bushfire events and Flying-fox heat stress events council is unable to guarantee the supply of water transport and spray units. In the first instance council's immediate priority is to respond to imminent threats to life and property posed by bushfire events.

Council is to prepare a regional heat stress response procedure as an identified short-term action.

6.6.3.2 Public preparation for heat related mortality events

Where an extreme heat event is anticipated council will provide advice to the public via the website, social media and print materials (where available). This will alert the public to the possibility of large numbers of heat-stressed or deceased Flying-foxes coming to ground or falling from trees. Advice will also be provided on recommended handling and clean up procedures where required.

Where roosts are located on council owned or managed land efforts will be put in place to minimise contact between heat affected Flying-foxes and the public. Subject to the nature of the heat event this may entail measures such as additional park signage, area access restrictions or park closures.

Clear, basic messaging to the community to not touch or handle Flying-foxes and to contact your local wildlife carer where Flying-foxes are sick or injured is to be emphasised through available print and digital media. Temporary physical signage may also be installed in proximity to known roosts.

6.6.3.3 Liaison with wildlife carers

During heat stress events council will liaise with wildlife carers to facilitate access to impacted roosts for immediate treatment and care of impacted Flying-foxes. Where a roost is located on private land council will seek permission from the landowner for council staff and wildlife carers to access the property and provide support.

Council will provide water resources to assist with care where available, noting that heat stress events may coincide with high-risk bushfire weather.

6.6.3.4 Waste disposal

During heat stress events council will seek to isolate deceased or heat-impacted Flying-foxes from publicly accessible areas to minimise potential for community interaction with stressed Flying-foxes.

Following completion of a heat stress event council will seek to undertake removal of deceased Flying-foxes. Subject to the severity of the heat stress event, council will seek to assist impacted landowners and landowners with Flying-fox roosts on their properties, however priority for immediate clean-up will be council managed lands.

Where landowners provide consent to access for management of heat stress events council will seek to assist within clean-up of deceased Flying-foxes.

6.6.3.5 Record keeping and information sharing

Accurate record keeping is important if the full impact of extreme heat events on Flying-fox populations is to be better understood. Post heat event, council will collect and count deceased Flying-foxes on council owned or managed land.

7 PROACTIVE MANAGEMENT OF FLYING-FOX ROOSTS

7.1 EDUCATION, ENGAGEMENT AND SOCIAL MEDIA

The following community education strategies present opportunities to achieve enhanced community environmental awareness, particularly in relation to Flying-foxes, their role in the community and how humans can co-exist with them:

- Proactive newsletter or roost status letter updates to nearby residents during periods of high occupancy, discussing local flowering species or breeding patterns
- Engagement with local schools and the broader community to provide informative, targeted education on Flying-foxes. This could be through print resources (e.g. No me, No tree stickers) or integrating with relevant classes such as environment, geography and biology
- Broad active engagement including community seminars, workshops and stalls at local markets and events
- Education events to highlight the importance of reducing risk of disease through the “no touch, no risk” policy
- Education events targeted at families such as Flying-fox fly out viewing
- Installation of fixed binoculars at suitable roosts to allow the community to watch Flying-foxes roosting.
- Information workshops for conservation landowners across the region to build knowledge among landowners on Flying-fox habitats and foraging resources (e.g. engagement with Land for Wildlife community).
- Media engagement during large influxes, reinforcing messaging on the temporal nature of large congregations and the ecological reasons for visiting the region (large amounts of foraging resources)
    - This could be facilitated through print, radio and television interviews or short videos on various platforms.

7.1.1 Breakdown of innovative methods used by other councils in Flying-fox management and education

Locally, Sunshine Coast Council and City of Moreton Bay both deliver comprehensive community education programs in association with their Flying-fox roost conflict management strategies. Innovative methods of engagement which are notable across these regions include:

- Educational workshops with impacted residents, environmental groups and interested members of the public about Flying-fox ecology, rehabilitation and care.
    - These workshops can include the attendance of one or several live Flying-foxes to enable close viewing
- Batpod podcast: a ‘choose your own adventure’ series in the life of a conservation officer for children ages 10–15 about living near Flying-foxes
- Attendance by ‘Frankie’ the Flying-fox at markets and community pop-up events
- Batmap – an interactive online viewer which shows regional monitoring and distribution data for Flying-fox roosts across the region.

Council will investigate opportunities to develop and deliver innovative environmental education initiatives, including in relation to Flying-fox community education.

7.2 CONFLICT MANAGEMENT – PRE-EMPTIVE BUFFERING AND TRIMMING AROUND A ROOST

Council may proactively identify and conduct vegetation management opportunities within and in proximity to an existing Flying-fox roost. Works may include the establishment of buffer areas between sensitive receptors, residences, commercial facilities, equestrian related uses and public facilities. Council may identify opportunities to complete these works in association with operational works programs or opportunistically in association with Queensland Government Flying-fox roost management grant programs.

Where council identifies areas with the potential to conduct pre-emptive vegetation works to minimise human-wildlife conflict in association with Flying-foxes, council will consider a range of factors including but not limited to the presence of species habitat values, State regulated vegetation, internal council and external stakeholder views, revegetation and maintenance requirements.

Where council identifies potential to complete these works, council will seek to balance considerations of greatest need and likely effectiveness in reducing community conflict levels.

7.3 EMBELLISHMENT OR PROTECTION OF ALTERNATIVE, LOW CONFLICT ROOSTING HABITAT AND FORAGING HABITAT

Council supports the establishment or expansion of alternate roosting sites to encourage Flying-foxes to roost in areas that will not affect residents. Council will investigate opportunities to integrate roost rehabilitation, embellishment and establishment actions at suitable locations in a strategic and balanced manner. Council will also seek to consider and protect Flying-fox foraging habitat.

While subject to previous research no single factor has been determined to conclusively draw Flying-foxes to roost locations. Establishment of new roost sites accordingly is a challenging and potentially frustrating exercise for land managers. Where council seeks to establish or improve potential roost locations this will be conducted in a manner which allows for a suite of potential biodiversity outcomes. Additionally, council will seek to protect existing preferred and low-conflict roosts, and enhance and expand roost locations which are considered to be viable in the long-term. Council will continue to use latest research in analysing best locations for alternative low conflict roosting habitat and foraging areas.

In association with the preparation of this FFRMP document a standalone GIS analysis of potential Flying-fox roost habitat areas has been completed. As part of the completed analysis potential low conflict areas on Council owned or managed lands have been identified. This analysis is provided in the document 'GIS analysis of alternate roost and foraging habitat areas'.

Council will continue to review the findings and refine the analysis recommendations and will engage with internal and external stakeholders to deliver of roost habitat embellishment works within identified potential low conflict areas.

7.4 PROACTIVE MANAGEMENT ACTION TIMELINE

The below management action timeline identifies proactive management actions across three categories:

- Recurring actions: actions which proceed operationally at routine intervals
- Short-term actions: actions which have been identified for completion within 1-2 years
- Medium to long-term actions: actions which have been identified for completion within 1-5 years

7.4.1 Recurring actions

Quarterly monitoring:

- Council is to undertake monitoring of identified and accessible Flying-fox roosts at a minimum frequency of quarterly, with potential increases during summer influx periods
- Council is to review a roosts status as a nationally significant Grey headed flying-fox roost where greater than 2500 Grey headed flying-foxes are recorded during a monitoring event.

Additional project monitoring:

- Where works are proposed within 75m of a Flying-fox roost, council is to complete a pre-works monitoring event, including an assessment for the presence of Grey headed flying-fox.

Heat event preparation:

- Council is to undertake an annual review and update of its Flying-fox heat stress management plan
- Council is to undertaken annual stocktake of equipment to be utilised during a heat stress event and engagement with operations team leads who would be called upon during an event.

Mailbox drop:

- Council is to undertake a seasonal mailbox drop to high-risk roosts

Coordinating with appropriate land managers for management of weeds and Flying-fox appropriate vegetation structure:

- Pilny reserve, Camira
- Woodend roost, Woodend
- Lorikeet St Reserve, Bundamba

Table 4: Identified recurring actions

TIMING	ACTION	RESPONSIBILITY
February	Quarterly monitoring	Natural Environment Branch
May	Quarterly monitoring	Natural Environment Branch
August	Quarterly monitoring	Natural Environment Branch
September	Heat event preparation	Natural Environment Branch
October	Mail box drop	Natural Environment Branch
November	Quarterly monitoring	Natural Environment Branch

7.4.2 Short-term actions

Table 5: Identified short-term pro-active flying-fox management program actions

Action	Category	Location	Timing	Priority	Responsibility
S1. Investigate opportunities to provide additional covered areas and walkways at both Nerima Gardens and the Ipswich Nature Centre	Conflict management	Queens Park Nature Centre and Nerima Gardens	Year 1	Medium	Capital Delivery Branch
S2. If S1 is deemed feasible, provide additional covered areas and walkways at Nerima Gardens and/or the Ipswich Nature Centre (subject to budget)	Conflict management	Queens Park Nature Centre and Nerima Gardens	Years 2-4	Medium	Capital Delivery Branch
S3. Prepare a site-specific roost management plan for Nerima Gardens, including working with the Nerima Gardens co-design workshop team to achieve suitable outcomes for other stakeholders, and park amenity	Conflict management	Nerima Gardens	Years 1-3	Medium	Natural Environment Branch
S4. Following completion of S3, implement the site-specific roost management plan for Nerima Gardens	Conflict management	Nerima Gardens	Following completion of S3	Medium	Operational units/ Natural Environment Branch
S5. Implement updated permanent Flying-fox education and 'no touch' signage at Nerima Gardens and/or the Ipswich Nature Centre	Education	Queens Park Nature Centre and Nerima Gardens	Year 1	High	Capital Delivery Branch/ Natural Environment Branch
S6. Formalise quarterly monitoring program including understanding of resourcing required	Systems and processes	Regional	Year 1	High	Natural Environment Branch
S7. Implement dedicated Flying-fox specific customer request codes to allow for accurate recording and filing of questions and complaints	Systems and processes	n/a	Year 1	Medium	Natural Environment Branch
S8. Establish regional Flying-fox management communications register	Systems and processes	n/a	Year 1	High	Natural Environment Branch
S9. Investigate a coordinated approach to Hendra virus vaccination and awareness with Biosecurity Queensland	Systems and processes	n/a	Year 2-4	Medium	Natural Environment Branch
S10. Include consideration of environmental values of Flying-fox low conflict habitat and foraging habitat in environmental acquisition process update	Systems and processes	n/a	Year 2-4	Medium	Natural Environment Branch

S11. Develop heat stress response procedure and associated internal documents	Systems and processes	n/a	Year 1	High	Natural Environment Branch
S12. Investigate internal and joint funding arrangements within council and with the State Government for a dedicated urban wildlife conflict officer, specialising in community Flying-fox education and conflict management	Systems and processes	n/a	Year 1	High	Natural Environment Branch
S13. Investigate internal or joint funding arrangements within council and with the State Government for provision of enhanced Flying-fox roost monitoring and survey tools (including but not limited to electronic data collection and management software)	Systems and processes	n/a	Year 1	Medium	Natural Environment Branch
S14. Investigate and identify opportunities to collaborate with State and local government(s) to improve Flying-fox knowledge through research	Research	n/a	Year 2-4	Low	Natural Environment Branch
S15. Assessment of all associated parks master plans with internal and community consultation, followed by repeal of master plans and creation of roost habitat embellishment plan where approved and appropriate. Considerations must be made where this document will make amendments to the planning scheme to consider Flying-fox roosts, and create Flying-fox roosts ▪ Goodna Creek at Smith St, Redbank ▪ Tivoli sporting complex, Tivoli ▪ Sapling Pocket Reserve, Sapling Pocket ▪ Pan Pacific Peace Gardens ▪ Purga Nature Reserve ▪ Any additional roost habitat embellishment sites identified	Alternate roost habitat establishment	n/a	Year 1-2	High	Natural Environment Branch
S16. Develop a management plan for ibis species (*Plegadis falcinellus*, and *Threskiornis* spp.). This management plan is to increase understanding of how ibis in the region roost, preferred habitat and population variability. By increasing understanding of ibis, the interactions between ibis and Flying-foxes and the influence each species has on the other can be determined for future management actions.	Research	n/a	Year 2 – 4	Medium	Natural Environment Branch
S17. Investigate and promote grant opportunities for local wildlife carers to facilitate ongoing support for local community groups and individuals.	Education	n/a	Year 1-4	Medium	Natural Environment Branch

7.4.3 Medium to long-term actions

Table 6: Identified medium and long-term proactive flying-fox management program actions

Action	Category	Location	Timing	Priority	Responsibility
ML1. Investigate opportunities for proactive roost vegetation management activities to create managed buffers between sensitive receptors, commercial uses and residences and Flying-fox roosts	Conflict management	Regional	Year 1-4	Medium	Natural Environment Branch
ML2. If ML1 is deemed viable, implement a managed buffer establishment and maintenance program	Conflict management	Regional	Following completion of ML2	Medium	Natural Environment Branch
ML3. Investigate opportunities for installation of canopy sprinklers at high conflict roosts across the region	Conflict management	Regional	Years 1-4	Medium	Natural Environment Branch
ML4. If ML3 is deemed viable, implement a canopy sprinkler installation and maintenance program	Conflict management	Regional	Following completion of ML3	Medium	Natural Environment Branch
ML5. Investigate opportunities for roost habitat embellishment works at identified roost habitat embellishment sites	Alternate roost habitat establishment	Regional	Following completion of S13	Medium	Natural Environment Branch
ML6. If ML5 is deemed viable, prepare roost habitat embellishment plans for identified potential alternate roost habitat embellishment locations	Alternate roost habitat establishment	Regional	Following completion of ML5	Medium	Natural Environment Branch
ML7. If ML6 is deemed viable, undertake actions to deliver roost habitat embellishment works at identified potential alternate roost habitat embellishment locations	Alternate roost habitat establishment	Regional	Following completion of ML6	Medium	Natural Environment Branch
ML8. Investigate opportunities for increased heat stress resilience technologies/strategies to be incorporated into roosts with high risks of heat stress impacts, including but not limited to temperature and humidity sensors, water taps/tanks, sprinklers and embellished heat stress refuge areas	Heat stress resilience	Regional	Year 2-4	Medium	Natural Environment Branch
ML9. If ML8 is deemed viable, implement heat stress resilience technologies/strategies in roosts with high risks of heat stress impacts	Heat stress resilience	Regional	Year 2-5	Medium	Natural Environment Branch

ML10. Investigate opportunities for environmental education programs to incorporate Flying-fox related educational outcomes aimed at increasing community capacity to co-exist with Flying-foxes.	Education	Regional	Year 2-5	Low	Natural Environment Branch
ML11. If ML10 is deemed viable, implement environmental education programs incorporating Flying-fox related educational outcomes	Education	Regional	Year 2-4	Low	Natural Environment Branch
ML12. The completion of further local refinement of foraging habitat mapping, including the identification of important seasonal food trees and vegetation communities across the Local Government Area, and potential opportunities for expansion of these areas (where suitable).	Research	Regional	Year 2-5	Low	Natural Environment Branch
ML13. The implementation of the findings of ML12, including the establishment of important foraging resources, where deemed viable.	Conservation threat management	Regional	Year 3-5	Low	Natural Environment Branch
ML14. The investigation and implementation of opportunities to include Flying-fox roosts as matters of local environmental significance under the Ipswich City Council local planning instrument (Planning Scheme), and reduce human-wildlife conflict by excluding new development within a buffer distance from roosts. Particularly in relation to the occurrence of Black flying-foxes and Little red flying-foxes.	Strategic Planning/Conflict management	Regional	Year 1-5	High	Natural Environment branch
ML15. Following the completion of ML12, the investigation and implementation of opportunities to include foraging habitats for Black flying-foxes and Little red flying-foxes as matters of local environmental significance under the Ipswich City Council local planning instrument (Planning Scheme), and incorporation of Performance Outcomes which ensure development which impacts important flying-fox foraging habitat areas is assessed	Strategic Planning	Regional	Year 1-5	High	Natural Environment branch

7.4.4 Key recommendations

In preparing this regional FFRMP recommendations have been developed to assist in prioritising short-medium and long-term management actions. Council may undertake delivery of the identified actions where resources are available and will seek to facilitate cost sharing arrangements with the State, research partners and industry where possible to deliver the recommendations of the FFRMP.

Council will remain flexible in delivery of the identified recommendations as circumstances change and will seek to achieve a balance between management of impacts to the community and conservation of flying-foxes.

7.4.4.1 Short to medium-term recommendations

Short to medium-term actions are actions identified as priority works for completion or scheduling within 1-3 years of endorsing this plan and include:

1. That council ensures adequate resourcing to facilitate the completion of recurring works identified in Table 4 and ongoing management of internal and external engagement on flying-fox management related matters.

2. That council maintain a high standard of written and verbal communication with impacted residents and community members and assess concerns regarding impacts of Flying-foxes and Flying-fox roosts in accordance with Sections 6.4 and 6.5 of this regional FFRMP.

3. That council deliver identified short-term actions (Section 7.4.2) in accordance with budget and resourcing allowances.

4. That council maintain an understanding of available State and Commonwealth grant funding opportunities to deliver identified priorities.

5. That council develop and implement a regional heat stress response procedure.

7.4.4.2 Medium to long-term recommendations

Medium to long-term recommendations are actions identified to be undertaken over an extended period of time (1-5, or greater years) to provide long-term management outcomes. Where possible, identified long-term actions will be sought to be delivered in a manner aligning with regionwide conservation and operational programs. Medium to long-term recommendations have been identified as:

1. The review of this plan at a maximum of five (5) years from implementation by council.

2. That council deliver identified medium to long-term actions (Section 7.4.3) in accordance with budget and resourcing allowances.

3. That council engage with research programs delivered by State or Commonwealth governments and industry partners where opportunities are available.

4. That council maintain an up to date supporting document ‘Flying-fox roosts of the Ipswich region’.

8 EVALUATION, REPORTING AND REVIEW

Managing Flying-foxes and their impacts on the community is an extremely complex and resource intensive field of wildlife management. Many of the more common actions historically used to manage Flying-foxes have low documented success rates and frequently lead to increased community conflict and subsequent management actions.

The overall success of this management plan will be evaluated against the goals and objectives established in Section 1.1. The level of community concern for impacts from Flying-foxes in Ipswich and community understanding of Flying-fox ecology are key evaluation criteria.

Based on community sentiment, including the findings of community engagement undertaken as part of the review of this FFRMP, it is recognised that while a portion of the community is negatively impacted by Flying-fox roosts, an additional portion of the community is indifferent to Flying-foxes or are strongly supportive of enhanced conservation outcomes of flying-fox populations.

Where council undertakes roost management actions, a Flying-fox roost management notification is to be made to DETSI a minimum of two business days prior to works. Following completion of roost management actions, a Flying-fox roost management evaluation form is to be completed, kept on file, and provided to DETSI within three months of the management actions being completed.

All management action evaluation reporting will be maintained in a database to allow council to review prior management approaches at the time of plan review.

8.1.1 Review of roost management actions

Following completion of management actions council will review the success of the management action against the specific goals and intent of the action. Primarily, Flying-fox management actions will be assessed for their success in achieving one or more of the following outcomes:

- The effective management of long-term Flying-fox roost and Flying-fox population viability
- Improved roost and foraging vegetation community health and resilience
- A reduction in conflict between Flying-fox roosts and sensitive receptors, commercial uses, residences or public use places
- An increase in public amenity and usability of public lands
- A decrease in disease risk associated with exposure of people or horses to Flying-foxes
- The contribution of the action in maintaining species viability within the region.

8.1.2 Costs

The costs associated with planning, implementing and monitoring Flying-fox management actions can be substantial. In general, costs increase relative to the level of intervention. That is, minimal intervention actions such as education are relatively low cost in comparison with significant vegetation modification or dispersal actions which may have substantial ongoing costs.

Review of management actions undertaken will include consideration of financial costs and other resources incurred by council. Any management actions and their associated costs (e.g. financial and staffing requirements) will be recorded in detail to maintain an ongoing record for review. Following review, findings will be utilised to guide resources available to council to perform Flying-fox roost management actions in accordance with the region's FFRMP.

8.1.3 Review period

Council shall undertake regular review of regional Flying-fox management programs at least once every five years. In completing this evaluation and review council is to review and update the following components:

- Relevant ecological, behavioural and social information provided within this plan

    - A review of significant research outcomes in relation to Flying-fox behaviour, ecology and management practices is recommended to be undertaken
- Roost location information, and updates to roost extent mapping
    - Where additional roosts are identified, these are to be incorporated into this plan to ensure a whole-of-region approach to management is maintained
- A review of the management framework for Flying-fox roosts throughout the region. The review should ensure the following outcomes are being achieved:
    - Flying-fox management is undertaken in a considered, well-planned, long-term approach
    - Management intents are clearly identified for roosts across the region
    - Management of roosts maintains a broad level of community and council support
    - Management frameworks provide for maintenance and improvement of public safety, amenity and critical infrastructure
    - Actions undertaken by council support the effective long-term conservation of Flying-foxes at a statewide level
    - That the plan be consistent with guidance from the Department of Environment, Tourism, Science and Innovation Flying-fox Roost Management Guideline, and complies with relevant codes of practice.

9 FURTHER INFORMATION AND RESOURCES

Roost Management – codes of practice and guidelines

Department of Environment and Science 2020, *Code of Practice Ecologically sustainable management of flying-fox roosts Nature Conservation Act 1992*, Queensland Department of Environment and Science, Brisbane.

Department of Environment and Science 2020[1], *Code of Practice Ecologically sustainable management of flying-fox roosts Nature Conservation Act 1992*, Queensland Department of Environment and Science, Brisbane.

Department of Environment and Science 2020[2], *Flying-fox Roost Management Guideline, Wildlife and Threatened Species Operations*, Department of Environment and Science, Brisbane.

Department of Environment and Science, Queensland Parks and Wildlife Service and Partnerships 2021, Interim policy for determining when a flying-fox congregation is regarded as flying-fox roost under section 88C of the Nature Conservation Act 1992, Department of Environment and Science, Brisbane.

Education

Department of Environment and Science Frequently Asked Questions (FAQs), https://www.qld.gov.au/environment/plants-animals/animals/living-with/bats/flying-foxes/about-flying-foxes/questions-and-answers

Southern Queensland Flying-fox Education Kit 2022, Burnett Mary Regional Group, https://www.allaboutbats.org.au/education/flying-foxes/

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Heat Stress

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Appendices

APPENDIX A: COUNCIL'S STATEMENT OF MANAGEMENT INTENT

City of Ipswich	**STATEMENT OF MANAGEMENT INTENT - FLYING-FOX ROOST MANAGEMENT IN IPSWICH CITY**	Version: 2 Document No: A3853164

1.1 Objective:
To protect the health, wellbeing and livelihoods of the residents of Ipswich City while recognising the important ecological role performed by flying-fox populations.

Human Rights Commitment

Ipswich City Council (Council) has considered the human rights protected under the *Human Rights Act 2019 (Qld)* (the Act) when adopting and/or amending this policy. When applying this policy, Council will act and make decisions in a way that is compatible with human rights and give proper consideration to a human right relevant to the decision in accordance with the Act.

1.2 Regulatory Authority:

Under the State *Nature Conservation Act 1992*, and associated regulations, Councils have a voluntary as-of-right authority allowing them, if they so choose, to implement additional management actions for flying-fox roosts in a defined urban area. Councils also have an option to create a management plan to extend their authority beyond defined urban areas. The as-of-right management actions are limited to non-lethal methods, and may only be undertaken in accordance with the statutory *Code of Practice – ecologically sustainable management of flying-fox roosts*.

In administering the as-of-right authority Councils must still abide with a range of other legislation and policy. Key among these are protections afforded to the Grey-headed flying-fox under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* which is not affected or diminished in any way by the State changes.

1.3 Policy Scope:

This document establishes a policy framework for management of existing and new flying-fox roosts located within the city. The State provisions define areas within Council's planning scheme having a residential or commercial purpose, including a buffer of one (1) kilometre, as the Urban Flying Fox Management Area (UFFMA)*. Council's policy will apply to roosts located both within and outside of the UFFMA through the adopted city-wide flying-fox roost management plan.

Council will manage flying-fox roosts located on Council owned or managed land. In addition, where a roost occupies both Council land and adjacent private property, Council will work with the respective land owner/s to develop management solutions, consistent with this policy, and the adopted flying-fox roost management plan. A hierarchical approach to flying-fox roost management will be employed favouring education and minimal intervention strategies developed on a case-by-case basis.

Council will support private property owners to manage flying-fox roosts on their land. The flying-fox roost management plan underpins the provision of a range of services for private land owners including:

- Provision of education materials
- Provision of technical support
- Provision of research data and support
- Referral to expert information sources

In exceptional circumstances Council may assist a private property owner to develop and implement a roost specific management action. These situations will be identified through risk assessment processes applied on a case by case basis as detailed in the adopted flying-fox roost management plan.

A number of flying-fox matters are outside the scope of this policy including any management of roosts or flying-foxes matters in association with:

- State owned or managed land
- Commonwealth owned or managed land

Management of flying-foxes in these locations should be discussed with the respective land owner or manager. Further, this policy clarifies Council's role in relation to a number of additional matters of flying-fox management and human health.

1.4 Policy Statement:
The following key policy statements will guide Council's management of flying-fox roosts and associated management issues and actions which is further articulated in the adopted flying-fox roost management plan:

- Human health and wellbeing will be given primary consideration over the health and wellbeing of flying foxes where significant conflict is found to exist between the two;
- Flying foxes perform an essential ecological role, pollinating and dispersing the seeds of native plants and maintaining forest health;
- Due to the highly mobile and dynamic nature of flying-fox roosts any management actions will be considered and developed on a case-by-case basis;
- Council will follow a hierarchical approach to flying-fox roost management favouring education and minimal intervention;
- A risk-based assessment process will be used to determine the requirement for any roost specific management actions;
- Management actions including dispersals and vegetation modification will only be considered after less intrusive actions have been tried and found to be unsuccessful. Dispersals have a low documented success rate in Australia with significant potential to exacerbate the existing situation.

1.5 Roles and responsibilities

In addition to Council a number of agencies and organisations play an important role in the management of flying foxes.

Flying-fox biology and management

Further information on flying foxes, their biology and management options for roosts located on private property are available from the Department of Environment, Tourism, Science and Innovation.

Health and Safety

For up-to-date information on flying-fox related human health matters residents are advised to contact the Queensland Health hotline.

Flying-fox rescue

Residents are advised never to touch or attempt to aid a sick or injured flying-fox. For assistance with sick or injured flying foxes contact Bat Conservation and Rescue Queensland. Residents are advised to visit Council's website for information on disposal of dead flying-foxes.

1.6 Definitions:

Urban Flying Fox Management Area (UFFMA) – those land parcels defined within a local government planning scheme as having a residential or commercial purpose with the addition of a one (1) kilometre buffer.

Management actions – non lethal actions intended to stop flying-foxes from making use of a site or part of a site.

Policy Author: Planning Officer (Biodiversity)

Date of Council Resolution: 22 April 2014

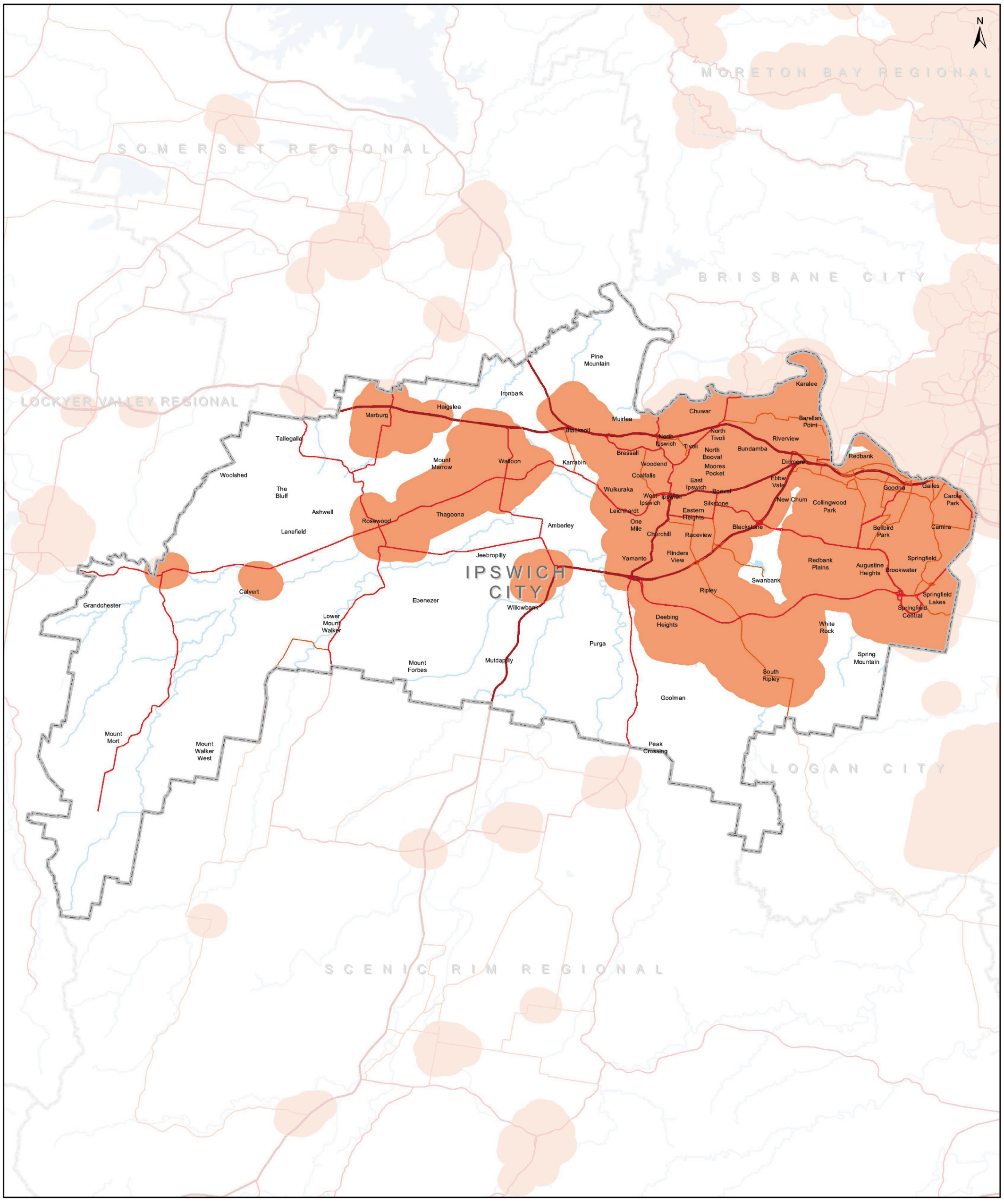
Date of Review: 28 October 2016

Committee Reference and Date: Policy and Administration Board No. 2014(03) of 1 April 2014 – City Management and Finance Committee No. 2014(04) of 15 April 2014

No. of Resolution: 2

Date to be Reviewed: 28 October 2018

APPENDIX B: URBAN FLYING-FOX MANAGEMENT AREA (UFFMA) FOR IPSWICH CITY COUNCIL

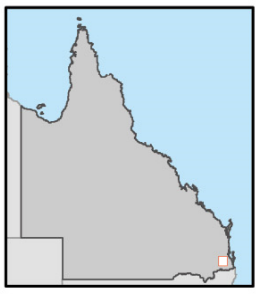


IPSWICH CITY

Legend

- Urban Flying-Fox Management Area
- Local Government Area
- Road

0 1.25 2.5 5 7.5 km



Urban Flying-Fox Management Area

COORDINATE SYSTEM: GCS GDA 1994
HORIZONTAL DATUM: GDA 1994

MAP PRODUCTION
29 July 2013
Nature Conservation Services
Department of Environment and Heritage Protection

Queensland Government

APPENDIX C: COMMUNITY CONSULTATION IN PREPARATION OF FLYING-FOX MANAGEMENT PLAN

C.1 METHODS

Ipswich City Council undertook the following community engagement actions:

- Review of historical customer requests received by council in relation to Flying-fox management between 2013 and 2023; and
- An online survey regarding council management of Flying-fox roosts throughout the region. This survey was open to all residents of the region, via the 'Shape Your Ipswich', an online community engagement platform. The survey was also promoted through mailouts to residents near roost locations.

C.2 REVIEW OF HISTORIC CUSTOMER REQUESTS

Review of historical customer requests was undertaken from a period of 2013 to 2022 to inform consideration of the community's engagement with council in relation to Flying-foxes and their management across the region.

A review of these requests identified limited data capture resolution in association with historic requests.

C.3 Community survey (2023)

In preparation of the FFRMP the community were invited to provide feedback to Ipswich City Council regarding their views of Flying-fox camp management and Flying-fox impacts throughout the region. The survey was available online from 21 April 2023 to 25 May 2023. The survey was available for all residents to access via the 'Shape Your Ipswich', an online community engagement platform where local residents can have their say on council projects, initiatives, new ideas, etc.

Of the respondents, the following suburbs were categorised based on total engagement from the 47 total responses:

- Camira had 17% of total responses;
- Ipswich and Eastern Heights each had 15% of total responses;
- Bundamba had 11% of total responses;
- Raceview and Redbank Plains each had 6% of total responses;
- Newtown, Yamanto, and Booval each had 4% of total responses; and
- North Ipswich, Collingwood Park, East Ipswich, Springfield, Sadliers Crossing, Silkstone, Woodend, and Augustine Heights all had 2% of total responses.

Of the 47 total responses, 18 provided roosting data and 29 answered the provided survey. From those who completed the survey; a total of 82.76% lived near a Flying-fox roost, 13.79% worked near a Flying-fox roost, and 1 respondent (3.45%) was a wildlife veterinarian who frequently worked with Flying-foxes.

Residents living near a roost provided details regarding the proximity of their residence and the roost location. 12.5% of respondents reported roosts on private property, 29.17% lived next to a roost, 16.67% lived within 100m of a roost, and 33.33% lived between 100 to 500 metres from a roost. All respondents reported living near a roost from longer than 1 year, with 66.67% living near a roost for over 5 years.

The survey predominantly included 'radio button' answers, with options for further comments provided. Questions included the following broad topic groups:

- The locality of the respondent, and their proximity to a Flying-fox roost
- How long they had lived near a Flying-fox roost
- How often, what time of day, and what time of year they notice or are impacted by Flying-foxes
- How they personally feel towards Flying-foxes and why

- What impacts residents had experienced from Flying-foxes
- What actions they believe will help manage the impacts
- Details on whether they had ever contacted an authority about Flying-foxes
- What actions they would support council undertaking in respect to management of Flying-fox roosts

Overall, 75.86% of respondents believed that Flying-foxes are an important native animal, playing a vital role of a pollinator of native plants, 13.79% were neutral, and 10.34% believe that flying-foxes are not important to the environment. 48.27% of respondents believed that the presence of Flying-foxes prevent them from participating in regular activities, and negatively impact their lifestyle.

Over half of the respondents stated that they were impacted by the noise, odour, droppings, and impacts to private property. Of the respondents, only 10.34% were not impacted in anyway by Flying-foxes.

Respondents answered what would help manage impacts in the Ipswich region, with the following responses ranked on respondent preferences:

1. Habitat enhancements in suitable roost locations away from urban areas (87.50%)
2. Regular monitoring of roosts to identify status, movements and issues (58.33%)
3. Routine maintenance of roost vegetation (e.g. mowing, trimming) (33.33%)
4. Education materials (29.17%)
5. Other (e.g. remove all Cocos palm, dispersal of roosts in urban areas) (29.17%)
6. Management options for my property (e.g. car covers, washing line covers) (25.00%)
7. Canopies on public pathways under roosts (20.83%)
8. Technical advice from a government expert (12.50%)
9. Technical advice from a non-government expert (8.33%)

Key comments regarding how council should manage flying-foxes included:

- Council maintaining a level of communication with adjacent impacted residents (i.e. education)
- Council maintaining an up-to-date register of Flying-fox roost locations and information, ensuring transparency for future prospective landowners
- The installation of covered walkways and areas in public areas where Flying-foxes roost
- Protection of habitats
- Provision of alternate habitat areas with suitable foraging, water and microclimate features

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