Regional Flying-fox Management Plan

GLADSTONE REGIONAL COUNCIL

Document Approval							
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1. Executive summary

Gladstone Regional Council (GRC) has developed this Regional Flying-fox Management Plan (RFFMP) as a framework for managing the health, economic and amenity issues associated with flying-fox roosts in urban areas. Our approach to flying-fox management balances these community issues with conservation of flying-foxes and their valuable ecological role.

Flying-fox roosts throughout the Gladstone Region are typically occupied seasonally by black flying-foxes, with large influxes of little red flying-foxes and small numbers of grey-headed flying-foxes also observed from time to time. GRC currently undertakes management actions at three flying-fox roosts that occur across parts of Council-controlled land; Canoe Point in Tannum Sands, Leixlip Creek in Calliope and Miriam Vale.

Council is taking an integrated approach to flying-fox roost management, applying a number of management actions to effectively mitigate the impacts of flying-fox roosts on the community. This RFFMP provides general management actions for all flying-fox roosts in the Gladstone Region, as well as roost-specific actions for each of the current roost sites occurring on Council-controlled land. The Plan also provides a process for assessing and responding to reports of newly emerging flying-fox roosts, allowing for early intervention where appropriate.

2. Acronyms

ABLV	Australian Bat Lyssavirus
BFF	Black flying-fox (*Pteropus alecto*)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Code of practice
DES	Department of Environment and Science (Queensland)
DMP	Damage Mitigation Permit
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EVNT	Endangered, Vulnerable or Near Threatened
FF	Flying-fox
FFRMP	Flying-fox Roost Management Permit
GHFF	Grey headed flying-fox (*P. poliocephalus*)
GRC	Gladstone Regional Council
HeV	Hendra virus
IUCN	International Union for Conservation of Nature and Resources
LGA	Local government area
LRFF	Little red flying-fox (*P. scapulatus*)
MNES	Matters of National Environmental Significance
NC Act	*Nature Conservation Act 1992* (Queensland)
NFFMP	National Flying-fox Monitoring Program
NSW	New South Wales
QLD	Queensland
RFFMP	Regional Flying-fox Management Plan
SoMI	Statement of Management Intent
UFFMA	Urban Flying-fox Management Area
VM Act	*Vegetation Management Act 1999* (Queensland)

3. Background

Flying-foxes are winged mammals that feed on the nectar, pollen and fruit from over 100 species of native plants and a variety of introduced plants found in orchards and urban areas. These social animals roost in communal camps during the day which serve as resting places and are important for social interaction, mating and rearing of young. Camps can be occupied permanently, seasonally or temporarily, and the number of occupants can vary significantly throughout the year.

Habitat loss and the resulting lack of food and shelter has pushed flying-foxes to roost and forage in urban areas more frequently (Tait et al., 2014). As a result, human-flying-fox interaction has increased and contributed to the misconception that flying-foxes are growing in number. Conflict between flying-foxes and humans mainly occurs when a roost is located in the vicinity of residential areas. People living near flying-fox camps may be affected by noise, odour and droppings. Other concerns also include fear of disease, roost vegetation damage, rainwater tank contamination and secondary amenity and economic impacts (Kung et al., 2015).

The highly dynamic nature of flying-foxes and their continuous migration throughout their range makes managing flying-fox roosts difficult and unpredictable. Often the community's desired outcome is to see the roost relocated, however it is highly likely that dispersal efforts will be unsuccessful or move the roost to a location of equal or greater conflict (Roberts et al., 2013).

3.1 Purpose

The purpose of this Regional Flying-fox Management Plan (RFFMP) is to provide a framework for the management of flying-fox roosts throughout the Gladstone Region in a way that balances community health, wellbeing, economic and amenity values with the ecological value and conservation of flying-foxes.

3.2 Scope

This RFFMP provides Council's approach in managing existing and future flying-fox roosts occurring on or partly on Council-controlled land within urban flying-fox roost management areas (UFFMAs) throughout the Gladstone local government area (Appendix 1).

Roosts occurring on private property or State-controlled land may be managed by the relevant landholder in compliance with legislative requirements and with authorisation by the Department of Environment and Science (DES).

3.3 Objectives

The key objectives of this RFFMP are:

- To mitigate risks to public health, wellbeing and amenity presented by flying-fox roosts in urban areas;
- To comply with legislative requirements, animal welfare and conservation objectives for flying-foxes; and
- To increase community understanding and awareness of flying-foxes and the importance of their ecological role in conservation.

3.4 Legislative framework

All three flying-fox species known to occur in the Gladstone Region are protected under Queensland legislation (*Nature Conservation Act 1992*; NC Act). The Grey-headed flying-fox is also listed as vulnerable under Commonwealth legislation (*Environment Protection and Biodiversity Conservation Act 1999;* EPBC Act), affording it additional protection.

3.4.1 Nature Conservation Act 1992 (Qld)

Like all native fauna and flora, flying-foxes are protected under the *Nature Conservation Act 1992* (NC Act). The NC Act is administered by DES who is responsible for the conservation of flying-foxes in Queensland.

Section 88C of the NC Act prohibits unauthorised disturbance of a flying-fox roost. The 'Interim policy for determining when a flying-fox congregation is regarded as a flying-fox roost under section 88C of the *Nature Conservation Act 1992'* (DES, 2021) provides guidance on when a place is considered a flying-fox roost considering the variable nature of flying-fox biology and behaviour.

Local governments are granted an 'as-of-right' authority (i.e. not an obligation) to manage flying-fox roosts in UFFMAs in accordance with the Code of Practice (COP): Ecologically sustainable management of flying-fox roosts (DES, 2020a). Specifically, the Code outlines how Council's may:

- Destroy a flying-fox roost;
- Drive away, or attempt to drive away, a flying-fox from a flying-fox roost; and
- Disturb a flying-fox in a flying-fox roost.

Management actions undertaken by local governments outside of a UFFMA or that do not comply with the COP require a Flying-fox Roost Management Permit (FFRMP) issued by DES. Similarly, any other landowner wishing to undertake management of a flying-fox roost must also independently apply for a FFRMP.

The COP: Low impact activities affecting flying-fox roosts (DES, 2020b) sets out how any person, including private landowners, may undertake low impact activities at any flying-fox roost. Under this code, low impact activities are mulching, mowing or weeding under or near roost trees, and/or minor trimming of roost trees, where the activities are not directed at destroying, driving away, or attempting to drive away or disturbing a flying-fox in a flying-fox roost.

Neither COP provides exemptions to other legislation that may apply to flying-fox management activities, such as the Queensland *Vegetation Management Act 1999* (VM Act), *Fisheries Act 1994*, the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and various planning provisions. They also do not provide exemptions for all vegetation under the NC Act.

3.4.2 *Vegetation Management Act 1999* (Qld)

The clearing of native vegetation in Queensland is regulated by the *Vegetation Management Act 1999* (VM Act), the *Planning Act 2017* and associated policies and codes. The type of clearing allowed and how it is regulated depends on the vegetation type, land tenure, location, extent and purpose of the clearing.

VM Act exemptions allow native vegetation to be cleared for a range of routine property management activities without the need for a development approval or notification. A number of VM Act exemptions may apply to clearing vegetation that is flying-fox roosting or foraging habitat, however, specific advice should be obtained from Department of Resources.

3.4.3 *Environment Protection and Conservation Biodiversity Act 1999* (C'wlth)

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

The grey-headed flying-fox (*Pteropus poliocephalus*; GHFF) is listed as a vulnerable species under the EPBC Act, meaning it is an MNES. DAWE has developed the Referral guideline for management actions in GHFF camps (DAWE 2015) (the Guideline) to guide whether referral is required for actions pertaining to GHFF.

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

- Contained ≥10,000 GHFF in more than one year in the last 10 years; or
- Been occupied by more than 2500 GHFF permanently or seasonally every year for the last 10 years.

While GHFF are known to occur within flying-fox roosts in the Gladstone Region, these roosts do not currently meet criteria to be considered nationally important and therefore management actions are unlikely to require referral.

3.4.4 International agreements

All flying-fox species are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), as species that may become threatened with extinction unless international trade is not closely controlled.

The GHFF is listed as Vulnerable on the International Union for Conservation of Nature and Resources (IUCN) Red List because of continuing population decline, estimated at a decline of more than 30% over the last three generations (Lunney et. al. 2008).

3.5 Statement of Management Intent

GRC has adopted a Statement of Management Intent (SoMI) for flying-fox management, which defines Council's position and intentions in managing flying-fox roosts throughout the Gladstone Region. Specifically, Council intends to:

- Coordinate the management of flying fox roosts on Council owned or State land placed under the control of Council pursuant to the *Land Act 1994* (i.e. Council-controlled land) within and outside UFFMAs;
- Where a flying-fox roost occurs on a combination of Council-controlled and either State land(s) or private land(s):
    - Undertake appropriate in-situ management actions (i.e. actions that retain the roost in its established location) on parts of the roost that occur on Council-controlled land.
    - Where dispersal or other actions affecting the entire roost are considered, Council will engage with the relevant landholder/s to negotiate implementation of roost management actions.
- Have no involvement in the active management of flying-fox roosts occurring solely on State land and/or private land.

As per Council's SoMI, roosts occurring solely on private property or State land are the responsibility of the relevant landowner.

3.6 Flying-foxes of the Gladstone Region

The Gladstone Region is home to three species of flying-fox namely the Black flying-fox (*Pteropus alecto*), Little red flying-fox (*P. scapulatus*) and Grey-headed flying-fox (*P. poliocephalus*). Roosts are typically occupied seasonally by Black flying-foxes from mid-spring through to autumn, with influxes of Little red flying-foxes and small numbers of grey-headed flying-foxes also observed from time to time.

3.6.1 Species ecology

3.6.1.1 Ecological role

Flying-foxes make a unique contribution to ecosystem health through their ability to move seeds and pollen over long distances (Southerton et al. 2004). It is estimated that a single flying-fox can disperse up to 60,000 seeds in one night (ELW&P 2015). Some plants, particularly *Corymbia* spp., have adaptations suggesting they rely more heavily on nocturnal visitors such as bats for pollination than daytime pollinators (Southerton et al. 2004).

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

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

3.6.1.2 Flying-foxes in urban areas

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

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

Flying-foxes roosting and foraging in urban areas more frequently can give the impression that their populations are increasing; however, the GHFF is in decline across its range. At the time of listing, the species was considered eligible for listing as vulnerable as counts of flying-foxes over the previous decade suggested that the national population may have declined by up to 30%. The main threat to GHFF in QLD is clearing or modification of native vegetation.

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

3.6.1.3 Roost characteristics

All flying-foxes are nocturnal, roosting during the day in communal camps. These camps may range in number from a few to hundreds of thousands, with individual animals frequently moving between camps within their range. Typically, the abundance of resources within a 20–50 km radius of a camp site will be a key determinant of the size of a camp (SEQ Catchments 2012).

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

- Closed canopy >5 m high;
- Dense vegetation with complex structure (upper, mid- and understorey layers);
- Within 500 m of permanent water source;
- Within 50 km of the coastline or at an elevation <65 m above sea level;
- Level topography (<5° incline); and
- Greater than one hectare to accommodate and sustain large numbers of flying-foxes.

3.6.1.4 Black flying-fox (*Pteropus alecto*)

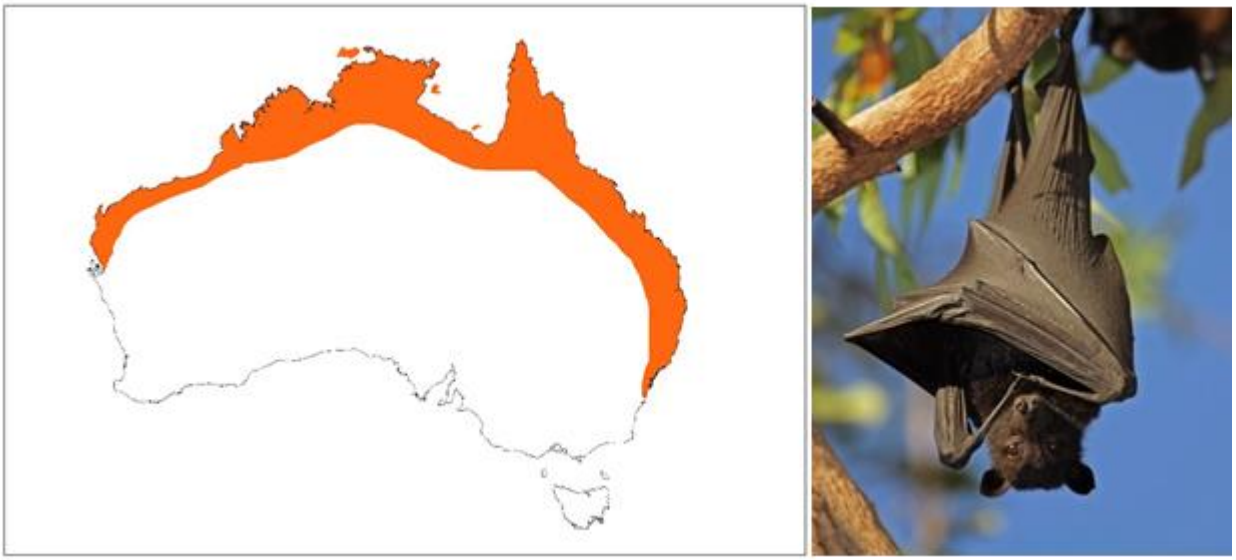

Figure 1 Black flying-fox indicative species distribution, adapted from OEH 2015a

The BFF (Figure 1) has traditionally occurred throughout coastal areas from Shark Bay in Western Australia, across Northern Australia, down through Queensland and into NSW (Churchill 2008; OEH 2015a). Since it was first described there has been a substantial southerly shift by the BFF (Webb & Tidemann 1995). This shift has consequently led to an increase in indirect competition with the threatened GHFF, which appears to be favouring the BFF (DoEE 2016a).

They forage on the fruit and blossoms of native and introduced plants (Churchill 2008; OEH 2015a), including orchard species at times. BFFs are largely nomadic animals with movement and local distribution influenced by

climatic variability and the flowering and fruiting patterns of their preferred food plants. Feeding commonly occurs within 20 km of the camp site (Markus & Hall 2004).

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

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

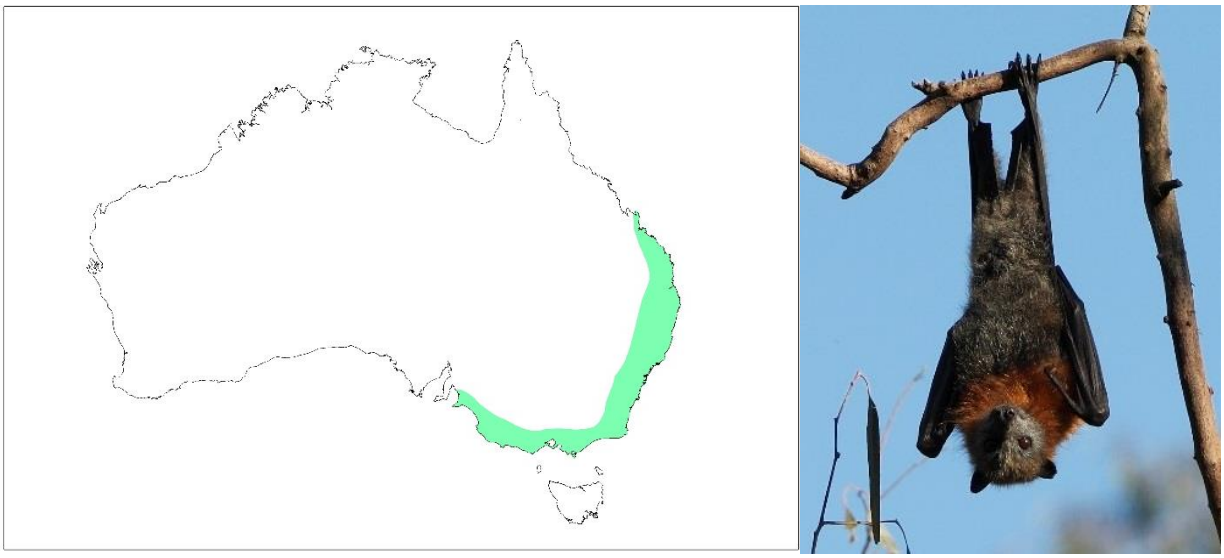

Figure 2 Grey-headed flying-fox indicative species distribution, adapted from OEH 2015a

The GHFF (Figure 2) is found throughout eastern Australia, generally within 200km of the coast, from Finch Hatton in Queensland to Melbourne, Victoria (OEH 2015d). It requires foraging resources and camp sites within rainforests, open forests, closed and open woodlands (including melaleuca swamps and banksia woodlands).

All the GHFF in Australia are regarded as one population that moves around freely within its entire national range (Webb & Tidemann 1996; DoEE 2015). GHFF may travel up to 100km in a single night with a foraging radius of up to 50km from their camp (McConkey et al. 2012). GHFF generally show a high level of fidelity to camp sites, returning year after year to the same site, and have been recorded returning to the same branch of a particular tree (SEQ Catchments 2012).

The GHFF population has a generally annual southerly movement in spring and summer, with their return to the coastal forests of north-east NSW and south-east Queensland in winter (Ratcliffe 1932; Eby 1991; Parry-Jones & Augee 1992; Roberts et al. 2012). They are widespread throughout their range during summer, but in winter and spring are uncommon in the south. In autumn they occupy primarily coastal lowland camps and are uncommon inland and on the south coast of NSW (DECCW 2009).

There is evidence the GHFF population declined by up to 30% between 1989 and 2000 (Birt 2000; Richards 2000 cited in OEH 2011a). There is a wide range of ongoing threats to the survival of the GHFF, including habitat loss and degradation, deliberate destruction associated with the commercial horticulture industry, conflict with humans, infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, power line electrocution, etc.) and competition and hybridisation with the BFF (DECCW 2009). For these reasons it is listed as vulnerable to extinction under federal legislation.

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

Figure 3 Little red flying-fox indicative species distribution, adapted from OEH 2015a

The little red flying-fox (LRFF) (Figure 3) is widely distributed throughout northern and eastern Australia, with populations occurring across northern Australia and down the east coast into Victoria.

The LRFF forages almost exclusively on nectar and pollen, feeding on over 204 species dominated by *Corymbia*, *Eucalyptus* and *Melaleuca* sp. (Bradford et al. 2022). The LRFF has the most nomadic distribution, strongly influenced by availability of food resources (predominantly the flowering of eucalypt species) (Churchill 2008), which means the duration of their stay in any one place is generally very short.

Habitat preferences of this species are quite diverse and range from semi-arid areas to tropical and temperate areas, and can include sclerophyll woodland, melaleuca swamplands, bamboo, mangroves and occasionally orchards (IUCN 2015). In some colonies, LRFF individuals can number many hundreds of thousands and they are unique among *Pteropus* species in their habit of clustering in dense bunches on a single branch. As a result, the weight of roosting individuals can break large branches and cause significant structural damage to roost trees, in addition to elevating soil nutrient levels through faecal material (SEQ Catchments 2012).

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

3.6.1.7 Reproduction

Black and grey-headed flying-foxes

Males initiate contact with females in January with peak conception occurring around March to April/May; mating season represents the period of peak camp occupancy (Markus 2002). Young (usually a single pup) are born six months later from September to November (Churchill 2008).

Young are highly dependent on their mother for food and thermoregulation and are suckled and carried by the mother until approximately four weeks of age (Markus & Blackshaw 2002). At this time, they are left at the camp during the night in a crèche until they begin foraging with their mother in January and February (Churchill 2008)

and are usually weaned by six months of age around March. Sexual maturity is reached at two years of age with a life expectancy up to 20 years in the wild (Pierson & Rainey 1992).

As such, the critical reproductive period for GHFF and BFF is generally from August (when females are in final trimester) to the end of peak conception around April. Dependent pups are usually present from September to March (Figure 4).

Little red flying-fox

The LRFF breeds approximately six months out of phase with the other flying-foxes. Peak conception occurs around October to November, with young born between March and June (McGuckin & Blackshaw 1991; Churchill 2008) (Figure 4). Young are carried by their mother for approximately one month then left at the camp while she forages (Churchill 2008). Suckling occurs for several months while young are learning how to forage. LRFF generally birth and rear young in temperate areas.

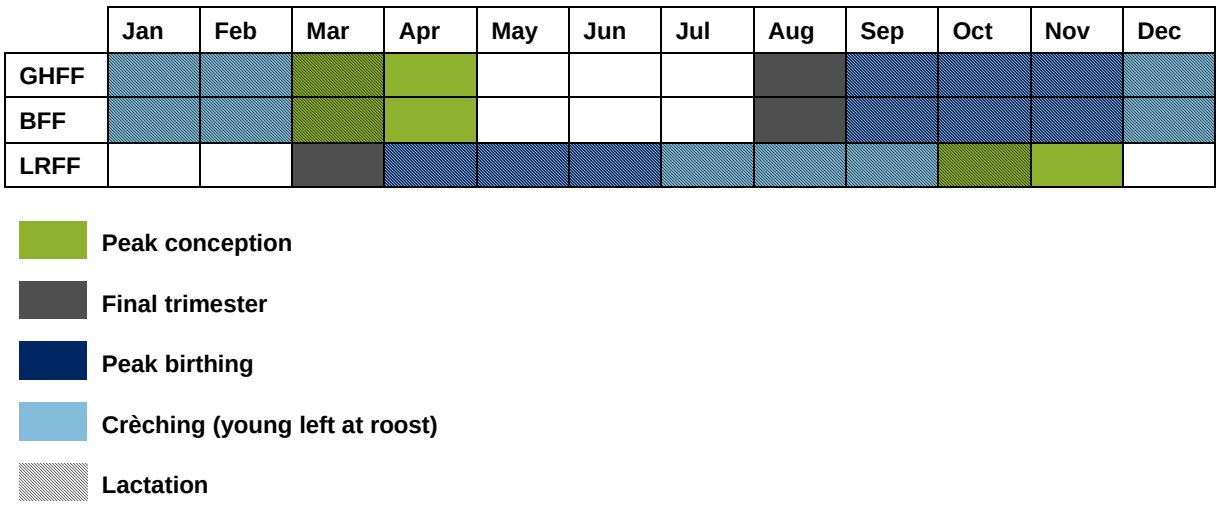

Figure 4 Indicative flying-fox reproductive cycle.

3.6.2 Known flying-fox roosts

The locations and description of current and historical flying-fox roosts in the Gladstone Region are described in Table 1 below. Roost locations can be viewed on the National Flying-fox Monitoring Viewer website. Flying-fox movements are highly dynamic and unpredictable and as such, roost size and locations are subject to change over time. The locations and observations of roosts occurring on Council-controlled land are published on the GRC website are regularly updated based on monitoring results.

Table 1: Flying-fox roosts of the Gladstone Region

Category of flying-fox congregation (as per Interim Policy)	Location	Description	Tenure	Within UFFMA?	Addressed in this RRFFMP?	Notes/Known history
Permanent roost	Canoe Point, Tannum Sands	FF seasonally occupy native vegetation at St Francis Catholic Primary School and adjoining Council-controlled reserves containing Turtle Way bikeway	Combination – Council-controlled + private property	Yes	Yes	FF shifted to this location following dispersal from Tarcoola Drive, Boyne Island in early 2000's. Council commenced monitoring of the Canoe Point roost in 2013.
Permanent roost	Leixlip Creek, Calliope	FF seasonally occupy riparian vegetation within Leixlip Creek intersecting Stowe Road.	Combination – Council-controlled + State controlled + private property	Yes	Yes	Initial complaints of FF roost in Leixlip Creek received in 2010. Council commenced monitoring the roost in October 2013. Council undertook minor weed control and removal in 2014.
Permanent roost	Miriam Vale	FF seasonally occupy private property at 14 Chapman Street, adjoining Council-controlled road reserve and Tranquillity Walk section of Blomfield Street parkland	Combination – Council-controlled + private property	Yes	Yes	FFs have occupied various areas of Miriam Vale township since 2013, including private properties on Roe Street, Chapman Street and Council-controlled parks on Blomfield Street. Dispersals completed 2017, 2018 and 2021 to remove FF from fig trees in Alf Larson Lions Park.
Permanent roost	Blain Drive, Gladstone	FF in mangrove community at Bulgwoyn Park	Council-controlled land	Yes	Yes	Records of flying-fox occupation since early 2000's but were absent from at least 2016. Approx. 50,000 FF returned to site from 9 June 2022 and remain present.

Permanent roost	Boyne River	FF seasonally occupy mangroves near mouth of Boyne River	Non-Council – State controlled land	Yes	No	FF have occupied various areas within mangroves along the Boyne River, including adjacent to Sandpiper Park and Curlew Park (LRFF in August 2021).
Permanent roost	Bororen Memorial Parkland	Roost established in trees within the dog agility area, fig and other trees within the parkland	Council controlled land	Yes	No	Roost of ~1500 BFF & GHFF established from September to November 2019, likely due to drought and starvation event at the time. Flying-foxes have not since returned.
Permanent roost	Thomson Street, Agnes Water	Vegetation between Thomson Street and Captain Cook Drive	Combination – Council-controlled + private property	Yes	No	A large roost of LRFF established in the area for approximately 8 weeks in January 2021. Flying-foxes have not since returned.
Permanent roost	Gladstone Marina	FF typically occupying mangroves within Auckland Inlet, spilling over into marina parklands	Non-Council – GPC controlled land	Yes	No	Massive influx of LRFF in April 2021 impacted on parklands. Managed by GPC under a Flying-fox Management Plan.
Permanent roost	Calliope River	FF occupying mangroves of Calliope River	Non-Council – State controlled land	No	No	There have been a number of flying-fox strikes and engulfment's and evening flying-outs can affect flight times.
Permanent roost	Round Hill Creek	FF in mangroves near mouth of Round Hill Creek	Non-Council – State controlled land	No	No	Foraging may impact residents of Agnes Water and Seventeen Seventy.
Historical site	Tarcoola Drive, Boyne Island	FF in mangroves along Boyne River adjacent to Tarcoola Drive	Non-Council – State controlled land	Yes	No	Roost established November 2000, several dispersals by residents under damage mitigation permits from 2001-2002 resulting in relocation of roost to Canoe Point, Tannum Sands.

3.7 Stakeholders

There are a range of stakeholders relevant to the management of flying-foxes in the Gladstone Region who may be directly or indirectly affected by flying-foxes or interested in their management. Key stakeholders and their interest or reported impacts from flying-foxes are identified in Table 2 below.

Table 2 Stakeholders to flying-fox management in the Gladstone Region

Stakeholder	Interest/reported impacts
Department of Environment & Science	DES is the State Government department that provide and enforce the regulatory framework for flying-fox roost management. The department's primary role is to ensure the protection of flying-fox welfare by administering the *Nature Conservation Act 1992* and associated codes of practice.
Queensland Health	Queensland Health research and provide information to the community about disease risk associated with flying-foxes.
Gladstone Regional Council	Council holds an as-of-right authority (i.e. not an obligation) by the State Government to manage flying-fox roosts within UFFMAs. Council also has a responsibility to manage the risks to community associated with roosts occurring on Council-controlled land.
Gladsone Airport Corporation	Flights departing/arriving at the airport can be impacted during evening fly outs. Engulfment of animals risks damage to aircraft.
Gladstone Ports Corporation	GPC is the land owner for the Gladstone Marina roost. Roost is managed under a Flying-fox Roost Management Plan.
Department of Resources	DoR is the land owner for several roosts in the Gladstone Region including the Boyne River, Calliope River, Round Hill Creek and part of Leixlip Creek.
Impacted residents	Residents living near or occupied by roosts have identified primarily negative impacts associated with noise, odour, faecal drop caused by roosting and foraging flying-foxes. Impacted residents often seek management action from Council or may perform their own (potentially unauthorised) management action.
Wildlife carers	Local wildlife carers receive and rehabilitate injured or orphaned flying-foxes within the Gladstone region. Carers have an interest in protecting flying-fox welfare.
Business owners	Various business owners have identified both positive and negative impacts of flying-fox roosts in areas nearby to flying-fox roosts. Some business owners have reported impacts to customers and are concerned about loss of trade.
General community	The general community is largely unaffected by flying-foxes and may feel positively or negatively towards their existence. Community may be affected when a roost impacts their ability to use or enjoy a public space.

3.7.1 Customer Service Requests relating to flying-fox management

Gladstone Regional Council receives Customer Service Requests (CSRs) for a wide range of issues, including relating to flying-foxes and flying-fox roost management. As part of developing this RFFMP, Council reviewed all CSRs relating to flying-foxes received in the last 5 years (2017-2022). CSRs were assessed on the following parameters:

- Related behaviour - Foraging or roosting (if roosting, related roost location);
- Issues/concerns raised - including disease/health, droppings, noise, odour, management approach/lack of management, economic impact, vegetation damage, crop damage and flying-fox welfare; and
- Type of stakeholder - business owner, wildlife carer, impacted resident or general community.

In total, Council has received 73 CSRs relating to flying-foxes since January 2017. The majority of requests related to roosting behaviour (65 CSRs) as opposed to foraging (8 CSRs). The highest conflict sites were Miriam Vale (21 CSRs) and Leixlip Creek (20 CSRs), with 21 requests also received for other locations during times of high roost numbers (e.g. Gladstone Marina) or establishment of roosts in new locations (e.g. Bororen, Thomson Street).

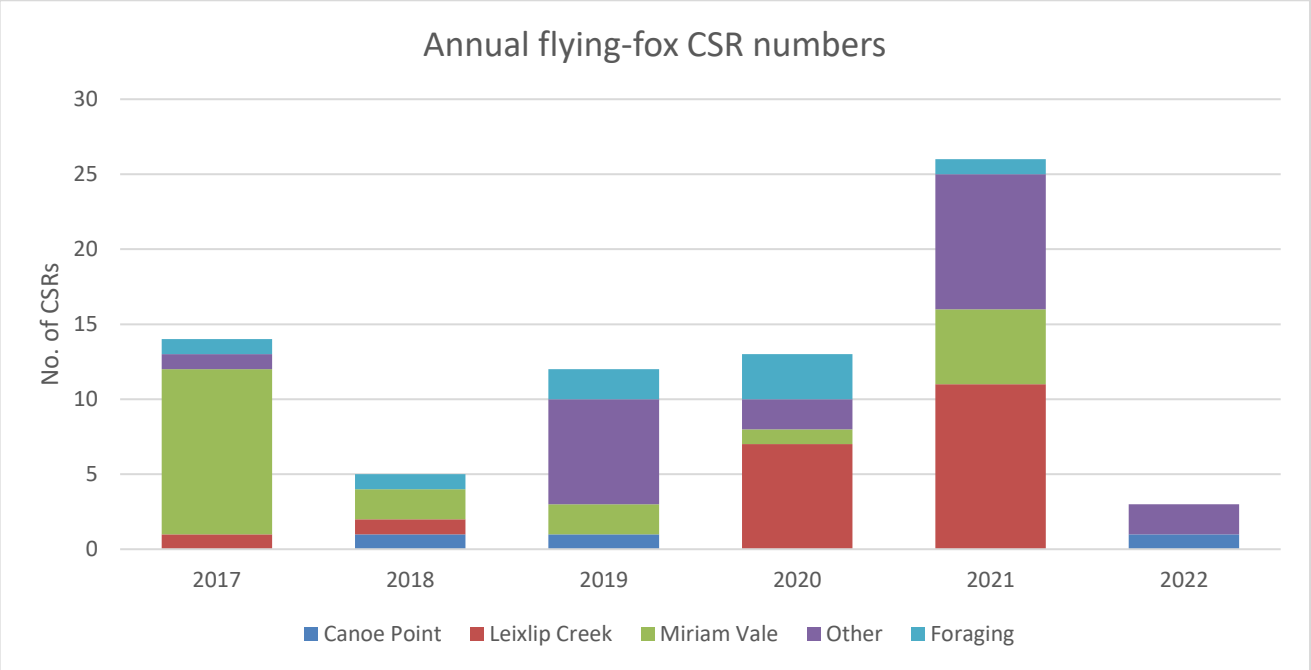

Figure 4: Annual number of flying-fox CSRs received for foraging and roosting by location

The key issues raised related to management approach/lack of management (44% of CSRs), perceived disease/health risks (42% of CSRs), droppings (30% of CSRs) and odour (26% of CSR). Other issues of vegetation damage, noise and economic impacts (from loss of business or property value) were also cited regularly. A small number of CSRs were neutral or mentioned no issue (4 CSRs), or raised concern about flying-fox welfare (1 CSR).

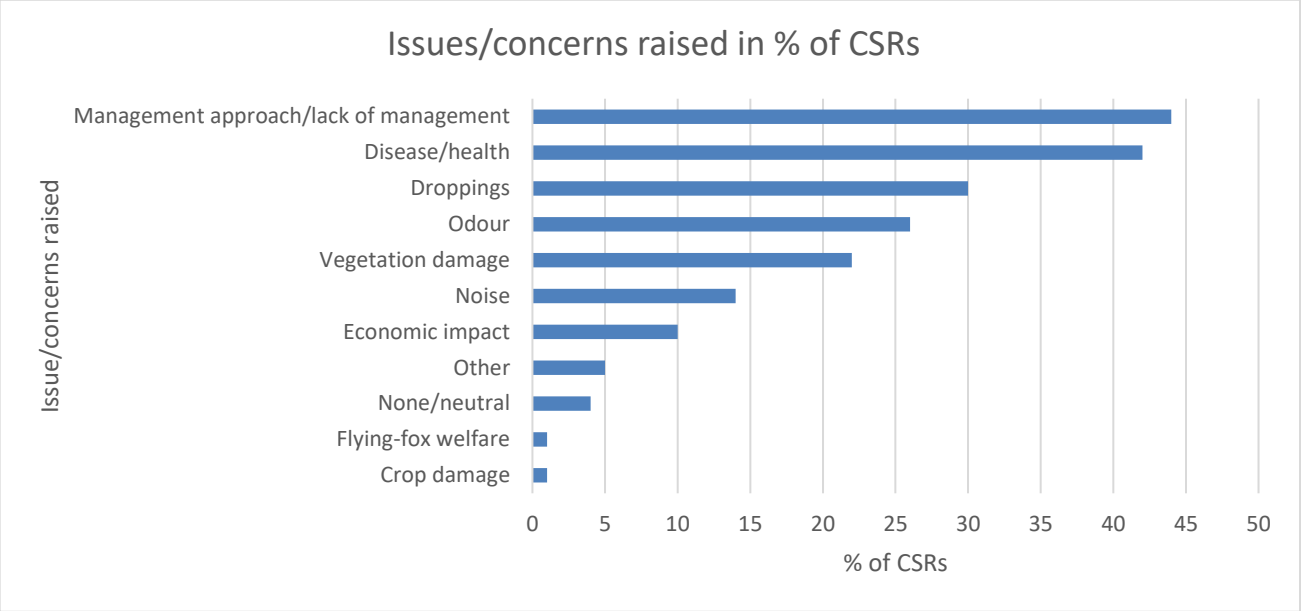

Figure 5: Issues/concerns raised in flying-fox CSRs

The majority of CSRs were received from residents impacted by flying-fox roosts; residents with flying-foxes roosting on their property (11 CSRs), roosting less than 100m from their property (13 CSRs) or roosting nearby but greater than 100m from their property (17 CSRs). 4 CSRs were received from business owners impacted by a flying fox roost on or nearby their property, and 2 CSRs were received from wildlife carers involved in flying-fox rehabilitation. The remaining CSRs (27) were received from the general community.

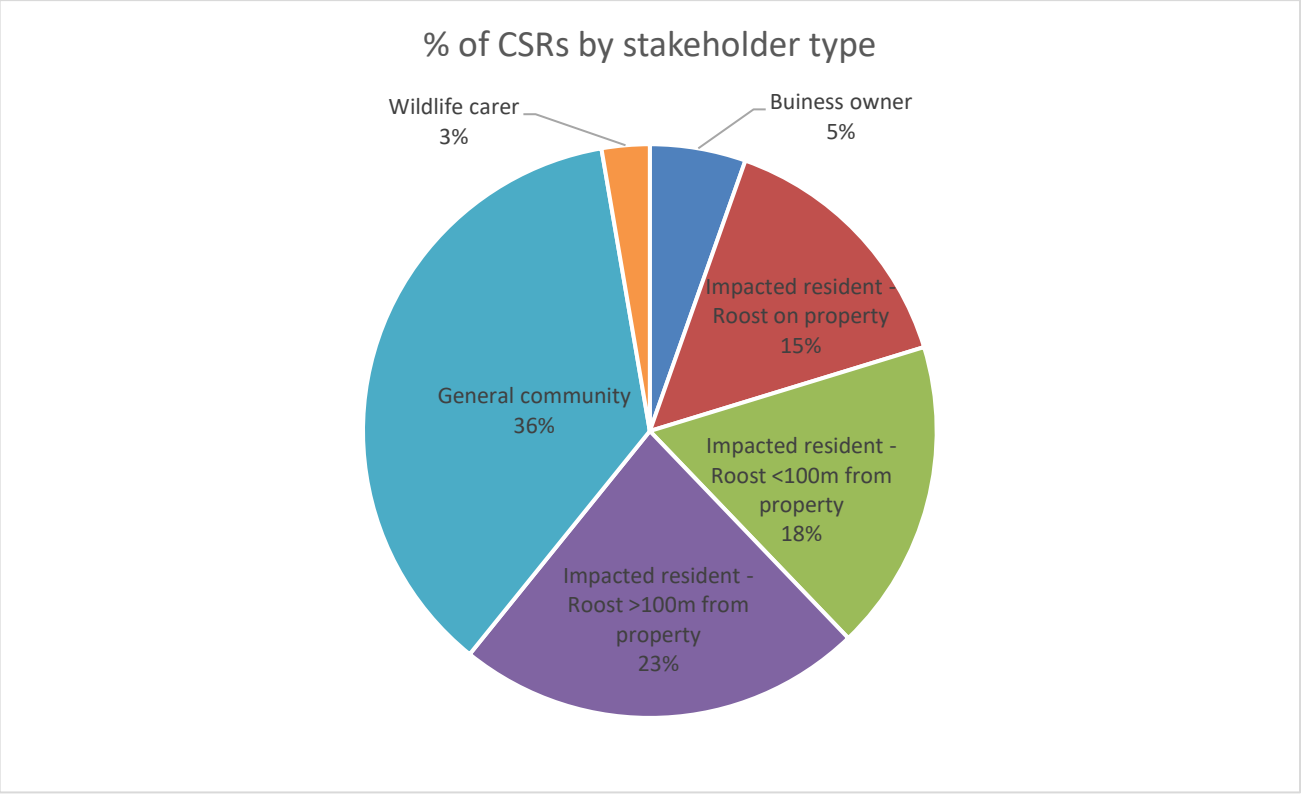

Figure 6: Stakeholder type raising flying-fox CSRs

4. Management approach

To achieve an effective balance between protecting community wellbeing and flying-fox welfare, GRC has adopted a risk-based approach to guide the management of roosts occurring on Council-controlled land in the Gladstone Region.

The Flying-fox Roost Management Guideline (DES, 2020c) identifies a range of management options and their application to varying degrees of human-flying-fox conflict. Table 3 below provides criteria for assessing the level of human-flying-fox conflict. The Guideline explains that each roost site should be risk assessed on a case-by-case basis and that effective management typically requires integration of multiple management strategies.

The below sections detail general management strategies that Council will apply to flying-fox management across the region, as well as roost-specific management actions addressing key risks at existing roost sites that involve Council-controlled land. Newly established roost sites will be managed in accordance with section 4.3.

Table 3: Levels of human-flying-fox conflict

Conflict level	Description
Low conflict	• Outside of UFFMA
Moderate conflict	• Within UFFMA; and • Greater than 100m from homes/businesses

High conflict	• Within UFFMA; and
	• Less than 100m from homes/businesses; or
	• High use public area;
	  ○ District Recreation Park
	  ○ District Sport Park
	  ○ Regional Recreation Park
	  ○ Botanic Gardens

4.1 General management actions

Table 4 below details the actions Council will take that support flying-fox management throughout the Gladstone Region. These actions focus on building understanding and awareness of flying-foxes and roost dynamics; and building community capacity to self-manage impacts.

Table 4 General management actions

Management action	Applicable to	Action(s)	Triggers	Action status
Education and awareness	Whole community · Residents · Business · Clubs · School · Tourists	Provide educational material to the community and residents impacted by flying-fox roosts. Resources to include information about living with flying-foxes, flying-fox ecology and behaviour, public health issues and diseases, tank water management and management of non-native foraging trees. Educational material to be regularly updated and provided through various communication channels to appropriately capture the range of demographics impacted by flying-foxes. Such channels will include the Council website and social media, print publications (e.g. Council Connect, brochures and factsheets), interpretive signage and mail outs.	Material reviewed annually	Existing
	Residents with flying-fox roosting on private property	Provide information to explain the management options available to residents who have flying-fox on private property. Information to explain Council's Statement of Management Intent, Code of Practice: Low impact activities affecting flying-fox roosts and that residents can apply directly to DES for their own flying-fox roost management permits.	When flying-fox are roosting on private property	Existing
	Council internal staff	Maintain and ensure staff awareness of internal procedures and guidance documents for flying-fox management activities, including training where required, on aspects such as responding to customer enquiries, injured or orphaned flying-fox handling and roost management activities.	Documents reviewed annually	Existing
Participation in research and knowledge sharing	Council	Provide information and support to the National Flying-fox Monitoring Program (NFFMP) and research studies investigating flying-fox roost management. Participate in the annual National Flying-fox Forum to facilitate knowledge sharing between Council, DES, flying-fox researchers and carers.	Submit data for NFFMP monitoring quarterly Support other research as required	Existing

Management action	Applicable to	Action(s)	Triggers	Action status
Flying-fox roost monitoring	Roosts occurring on or partially on Council-controlled land	Undertake monthly monitoring of flying-fox roosts in accordance with the CSIRO National Monitoring Methodology (Westcott et al. 2011) to understand population dynamics within the region, identify potential sources of human-flying-fox conflict and monitor the success of management strategies. Results of monitoring will be published on the GRC website and shared DES on a quarterly basis for incorporation in the National Flying-fox Monitoring Program.	Monthly	Existing
Flying-fox collections	Injured, ill or orphaned flying-foxes on Council-controlled land	Support wildlife carers by responding to reports of injured, ill or orphaned flying-foxes on Council-controlled land by collecting and transporting animals if/when they are unavailable. Maintain appropriately trained and vaccinated staff to perform this function. This reduces the risk of public interaction with flying-foxes and supports welfare outcomes.	When wildlife carers are unavailable	Existing
	Dead flying-foxes on Council-controlled land	Collect and appropriately dispose of dead flying-foxes from Council-controlled land.	As required	
Flying-fox Customer Service Requests (CSRs)	All flying-fox related enquiries from stakeholders	Respond to flying-fox related CSRs as per Figue 7 below. Issue additional communications as required when CSRs increase in response to seasonal changes or an event (e.g. new flying-fox roost, starvation event).	When CSRs recieved	Existing
Land-use planning	Existing and historical flying-fox roosts	Consider adding current and historic roost extents and make publicly available via GRC online mapping. Consider incorporation in biodiversity overlay in future planning scheme amendments.	During next Planning Scheme amendment	New action
Heat stress or starvation event response	Council, DES and local wildlife care organisations	In collaboration with DES and local wildlife care organisations, develop process for monitoring and responding to heat stress and starvation	ASAP	New action

Management action	Applicable to	Action(s)	Triggers	Action status
		events resulting in mass dying or collection of flying-foxes for rehabilitation.		
Manage non-native foraging trees	Council land	Plan for and where possible manage potential non-native foraging trees (e.g. Cocos Palms) on Council-managed land. Where possible, remove trees and replace with suitable native species. Ensure non-native foraging trees are excluded from species lists associated with the Planning Scheme and Capricorn Municipal Development Guidelines.	ASAP	New action
Responsible use of barbed-wire fencing	Council-controlled facilities	Investigate options for retrofitting barbed-wire fences at Council facilities nearby to flying-fox roosts or feed trees with wildlife-friendly alternatives to prevent entanglements of flying-foxes and other wildlife. Ensure wildlife-friendly fencing is standard for new Council projects.	ASAP	New action

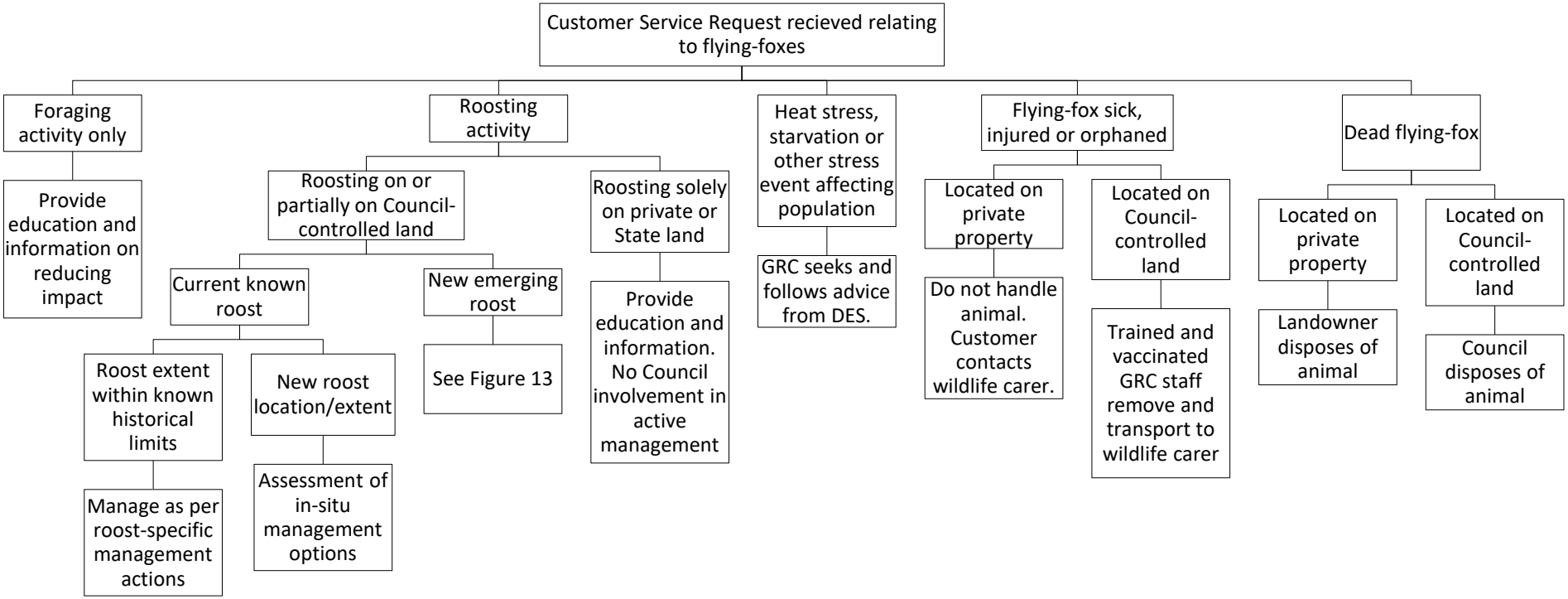

Figure 7: Process for responding to Customer Service Requests relating to flying-foxes

4.2 Roost-specific management actions

4.2.1 Canoe Point, Tannum Sands

Flying-foxes relocated to Canoe Point, Tannum Sands in 2006 following an authorised dispersal from the Tarcoola Drive area of Boyne Island. The roost currently seasonally occupies native vegetation primarily on St Francis Catholic Primary School land, as well as the Turtle Way bikeway on Council-controlled reserve. The roost has been known to spill-over into other parts of Canoe Point Botanic Reserve. A map of the typical roost extent is provided in Appendix 2.

The Canoe Point roost represents a moderate level of human-flying-fox conflict. The roost is located within the UUFMA and greater than 100m from residents and businesses. Community complaints related to the Canoe Point roost primarily relate to use of the Turtle Way bikeway. Users of the bikeway have raised concern about walking underneath and being in close proximity to flying-foxes, citing fear of droppings and disease. Council has responded by performing tree removal and pruning of vegetation overhanging the path and installing interpretive signage as an onsite education opportunity.

St Francis Catholic Primary School also report noise impacts from the roost can be disruptive to lessons. This typically worsens when the roost is occupied by large numbers of little red flying-fox, expanding the roost in close proximity to classrooms.

The roost also directly adjoins Kalori Training & Conference Centre, owned by Boyne Smelter Limited. While the roost has not been known to occupy trees at the venue, evening fly-outs may impact upon private events at this location.

Council intends to undertake appropriate in-situ management actions (i.e. actions that retain the roost in its established location) on parts of the roost that occur on Council-controlled land to miminise impacts to bikeway users. Roost-specific management actions are detailed in Table 6 below. Neighbouring landholders may apply to DES to obtain a Flying-fox Roost Management Permit to manage flying-fox roosts on their land.

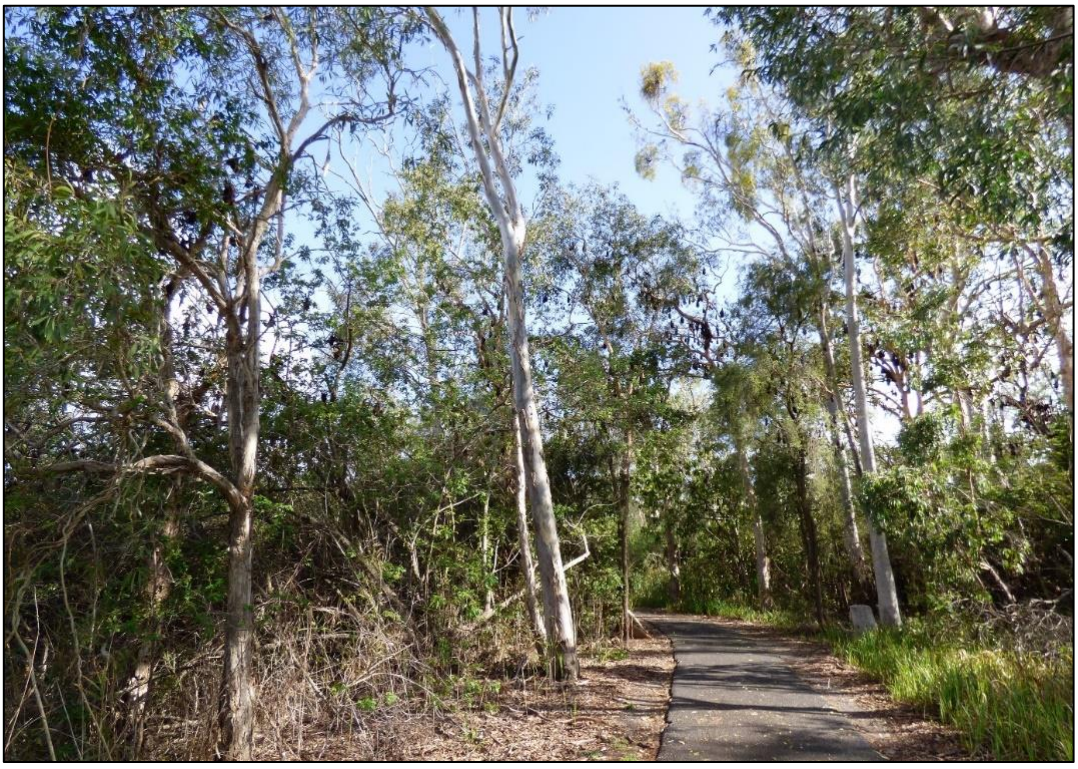

Figure 8: Flying-fox roosting in trees above Turtle Way bikeway at Canoe Point, Tannum Sands

Table 6: Roost-specific management actions – Canoe Point, Tannum Sands

Roost description:	FF seasonally occupies native vegetation at St Francis Catholic Primary School and adjoining Council-controlled reserves containing Turtle Way bikeway	Conflict level:	Moderate
Management action	Action(s)	Triggers	Action status
Maintain vegetation-free buffer for Turtle Way bikeway	Maintain vegetation-free buffer alongside and in airspace above Turtle Way bikeway to alleviate concerns from users.	When vegetation impedes bikeway, maintain 1m buffer	Existing
Maintain interpretive signage at Turtle Way bikeway	Maintain permanent interpretive signage as an onsite education and awareness opportunity. Ensure signage remains clean and free of graffiti.	Inspect signage monthly, replace as required	Existing
Temporary signage	Install temporary signage while flying-foxes are roosting above and in close proximity to pathways to alert pedestrians and cyclists and minimise disturbance of flying-foxes.	When flying-fox are roosting near Turtle Way or Botanic Walk	Existing
Temporary track closures	If roost impacts on safety of path users (e.g. risk of falling branches or tree failure), instate temporary track closures. Generally occurs during large influxes of little red flying-foxes and roost expands beyond typical extent.	When flying-fox roost risks safety of user of Turtle Way or Botanic Walk	Existing
Support educational events and visits	Support educational events (e.g. Australasian Bat Night), guided school and community visits as onsite learning opportunities. Site is easily accessible and in close proximity to Kalori Training & Conference Centre.	As required	New

4.2.2 Leixlip Creek, Calliope

Council commenced monitoring of flying-foxes within riparian vegetation within Leixlip Creek in 2013. The roost primarily occurs on state-controlled land within the waterway, in the area directly adjoining the Calliope Caravan Park, west of Stowe Road. During times of high flying-fox numbers, the roost expands to the eastern side of Stowe Road, onto Council-controlled land and road reserve. In 2021, the roost also migrated further east along Leixlip Creek into Calliope Golf Club. A map of the typical roost extent is provided in Appendix 3.

The roost represents a high level of human-flying-fox conflict, being located within the UFFMA and within 100m of residents and businesses. Occupants of the Calliope Caravan Park have reported significant impacts from noise and droppings, particularly when the roost is occupied by large numbers of little red flying-foxes. Flying-foxes are known to roost within trees on the Caravan Park land, directly overhanging permanent residents. Calliope Golf Club have also expressed concern about flying-foxes roosting within their property, citing that patrons are fearful of going near roosting areas. In 2021, Council referred alleged unauthorised roost disturbance for investigation by DES.

As per Council's SoMI, Council intends to undertake appropriate in-situ management actions (i.e. actions that retain the roost in its established location) on parts of the roost that occur on Council-controlled land. Council is not currently considering or would be supportive of dispersal of the roost from this location due to risk of uncontrolled outcomes, including the roost splintering to multiple locations of equal or greater impact to the community. Roost-specific management actions are detailed in Table 7 below.

Figure 9: Flying-fox roost within riparian vegetation at Leixlip Creek, Calliope (view from Stowe Road south towards Calliope Caravan Park).

Table 7: Roost-specific management actions – Leixlip Creek, Calliope

Roost description:	FF roost seasonally occupies riparian vegetation within Leixlip Creek intersecting Stowe Road.	Conflict level:	High
Management action	Action(s)	Triggers	Action status
Manage weeds on GRC-controlled land	Control biosecurity matter occurring on Council-controlled land near the Leixlip Creek roost.	As required	Existing
Mitigate flying-fox collisions on Stowe Road	Maintain permanent wildlife signage to alert road users to presence of flying-fox and mitigate risk of collisions during fly in and fly out. Issue communications (e.g. on social media) when flying-fox numbers are high reminding drivers to exercise caution.	When flying-fox numbers are high (>20,000)	Existing
Targeted support for impacted residents	Seek state government funding to administer financial assistance to neighbouring residents in managing the impacts of flying-fox roosts. Assistance would be subject to funding availability and be based on set eligibility criteria. Some items or services that may be considered include high-pressure washers, solar panel cleaning, awnings or covers for cars and outdoor areas.	Once off, if funding secured	New action

4.2.3 Miriam Vale

Flying-foxes have seasonally occupied various areas of Miriam Vale township since 2013, including private properties on Roe Street, Chapman Street and Council-controlled parks on Blomfield Street. The roost currently occupies private property at no. 14 Chapman Street, adjoining Council-controlled road reserve and the Tranquillity Walk section of Blomfield Street parkland. A map of the typical roost extent is provided in Appendix 4.

The roost represents a high level of localised of impact to private properties on Chapman Street, and impacts on the wider community by preventing use of the parkland and associated infrastructure. Complaints from neighbouring residents primarily related to faecal drop and associated impacts on rainwater tanks and solar panels, as well as fear of disease. There is also risk of direct contact with flying-foxes within parkland on Blomfield Street. During the 2016/17 flying-fox season around 20 orphaned flying-fox young were removed from the playground area and equipment and taken into care by wildlife rehabilitators.

This RFFMP supersedes the Miriam Vale Flying-fox Management Plan originally developed in 2017 following extensive consultation with the Miriam Vale community. The Plan established a rapid response dispersal service to prevent roost establishment within Alf Larson Lions Park, which represented the greatest level of conflict with the community. The Tranquillity Walk area was identified as the preferred receival site and a location where flying-fox should be retained where they can be managed by Council.

Council intends to retain the flying-fox roost on areas of Council-controlled land at Tranquillity Walk and Chapman Street, while managing impacts to neighbouring residents and the Miriam Vale community. Roost-specific management actions are detailed in Table 8 below.

Figure 10: Black flying-fox in the Chapman Street area (viewed from Bates Street)

Table 8: Roost specific management actions – Miriam Vale

Roost description:	FF seasonally occupy private property at 14 Chapman Street, adjoining Council-controlled road reserve and Tranquillity Walk section of Blomfield Street parkland	Conflict level:	High
Management action	Action detail	Timing	Action status
Rapid response dispersal from Alf Larson Lions Park	Maintain a rapid response service for early dispersal of flying-fox from Alf Larson Lions Park. Once initial roost establishment is reported to Council, a small team of specialist consultants will mobilise to site (within 24 hours) to discourage the early stages of roosting and direct flying-fox to the preferred location of Tranquillity Walk, Blomfield Street. Maintain permanent on-site signage nearby to known roost trees at Alf Larson Park advising of Council contact details to report presence of flying-foxes.	When flying-fox begin roosting in Alf Larson Lions Park	Existing
Adjust parks maintenance and operational activities	Avoid or carefully manage any parks maintenance or Council operational activities to minimise disturbance to flying-fox roosts. Activities to be performed in accordance with Code of Practice: Low impact activities affecting flying-fox roosts.	When flying-fox are present	Existing
Temporary exclusion of roost sites	Install temporary exclusion measures (fencing/barriers) and advisory signage to prevent human-flying-fox interactions and minimise disturbance of flying-fox. Ensure safe alternative pedestrian access is provided. Where appropriate, fencing to incorporate mesh banners to screen site and reduce odour issues.	When flying-fox are present at Tranquillity Walk	Existing
Maintain interpretive signage at Tranquillity Walk	Maintain permanent interpretive signage as an onsite education and awareness opportunity. Ensure signage remains clean and free of graffiti.	Inspect signage monthly, replace as required	Existing
Clean up flying-fox roost sites upon seasonal departure	When flying-fox depart roosts, respond in a timely manner to clean up and restore vegetation damage, weed/grass growth and faecal drop to alleviate visual amenity impacts.	When flying-fox depart roosts	Existing
Restore and enhance preferred roost sites	Consider opportunities to restore roosting habitat at Tranquillity Walk to increase roost capacity and encourage flying-foxes to remain on Council-controlled land where conflict can be managed.	When flying-fox depart roosts	New action

Relocation of impacted infrastructure	Investigate potential to relocate exercise equipment at Tranquillity Walk to allow community access when area is occupied by roost and fenced off. Consider opportunities to restore flying-fox roosting habitat in this location to encourage flying-foxes to remain on Council-controlled land.	For delivery 2023/24 financial year	New action (carried from MVFFMP)
Targeted support of impacted residents	Seek state government funding to administer financial assistance to neighbouring residents in managing the impacts of flying-fox roosts. Assistance would be subject to funding availability and be based on set eligibility criteria. Some items or services that may be considered include high-pressure washers, solar panel cleaning, awnings or covers for cars and outdoor areas.	Once off, If funding secured	New action

4.2.4 Blain Drive, Gladstone

Flying-foxes occupied the mangrove forest on Council-controlled land at Bulgwoyn Park at Blain Drive, Gladstone since at least the early 2000's The name 'Bulgwoyn' means flying-fox in Gooreng Gooreng language and is recognised as a totem for local indigenous people. A rotunda with interpretive signage exists to the south of the roost that provides vantage for public viewing of the roost and fly-outs.

The roost remained vacant since at least 2016 is considered a historic site under the 'Interim policy for determining when a flying-fox congregation is regarded as a flying-fox roost under section 88C of the *Nature Conservation Act 1992'* (DES, 2021). A large number of flying-foxes (>50,000) returned to the site during June 2022 and have remained present through two consecutive periods of 30 days, meaning the temporal criteria has been met for the site to be considered a permanent roost. A map of the current extent is provided in Appendix 5.

Importantly, the site has also contained a significant number of vulnerable grey-headed flying-foxes and may in future, be considered a nationally-important grey-headed flying-fox camp under the federal EPBC Act. The 'Referral guideline for management actions in gre-headed and spectacled flying-fox camps' defines a nationally-imporatant roost as those that have contained ≥10,000 grey-headed flying-foxes in more than one year in the last 10 years, or have been occupied by more than 2,500 grey-headed flying-foxes permanently or seasonally every year for the last 10 years.

The Blain Drive roost represents a moderate level of human-flying-fox conflict. The roost is located within the UFFMA and greater than 100m from residents and businesses. Initial complaints have been limited, relating to flying-foxes foraging on backyard trees.

Council considers that the current location of the roost provides for minimal direct impact on nearby residents as there is sufficient distance and buffer provided by surrounding parkland. Concern may be raised by park users around contact with dead, injured or orphaned flying-fox found on the ground, particularly at the off-leash dog agility area at Webb Park.

Council intends to continue to monitor the roost at Blain Drive and respond to customer enquiries as per general management actions. Council will consider appropriate in-situ management actions (i.e. actions that retain the roost in it's established location) if the roost location changes or expands beyond it's current extent. There are currently no roost specific management actions for this roost.

Figure 11: Flying-fox roost within mangrove forest at Bulgwoyn Park, Blain Drive, Gladstone

4.3 Management of newly emerging flying-fox congregations

Flying-fox movements are highly dynamic and factors influencing selection of roost sites is poorly understood (Roberts, 2005). While some species of flying-fox develop strong affinities with their roost sites, as environmental pressures change, new roosts may emerge in historical or previously unused locations. Flying-foxes are increasingly roosting in urban areas likely due to loss of native roosting and foraging habitat, and the year-round food and water sources often available in urban areas. More than 90% of new roosts in NSW have formed close to existing residential areas and, as of 2017 it was estimated that approximately half of flying-fox roosts across Australia were situated close to human settlements (Timmiss et al. 2021).

Recognising that roosts in urban areas can be a source of human-flying-fox conflict, it is important to have a process for responding to newly emerging flying-fox roosts in a way that balances community values with flying-fox conservation and welfare. Being able to quickly assess and respond to new flying-fox roosts allows for early intervention if required, which increases likelihood of successful outcomes as flying-foxes have not yet developed a strong affinity for the site. Implementing management action during the early stage of roost establishment also means impacting only a small number of flying-fox, and minimises level and length of impact on the community.

Upon receiving notification of a new emerging flying-fox roost, Council officers will attend to assess the location, size and species composition of the roost. Council will then determine whether to implement management actions according to the decision tree in Figure 13 below. If it is determined that action is required, Council will consider and implement appropriate management options as detailed in Table 10.

Figure 12: A large influx of little red flying-foxes in a previously unoccupied area of Agnes Water, 2021

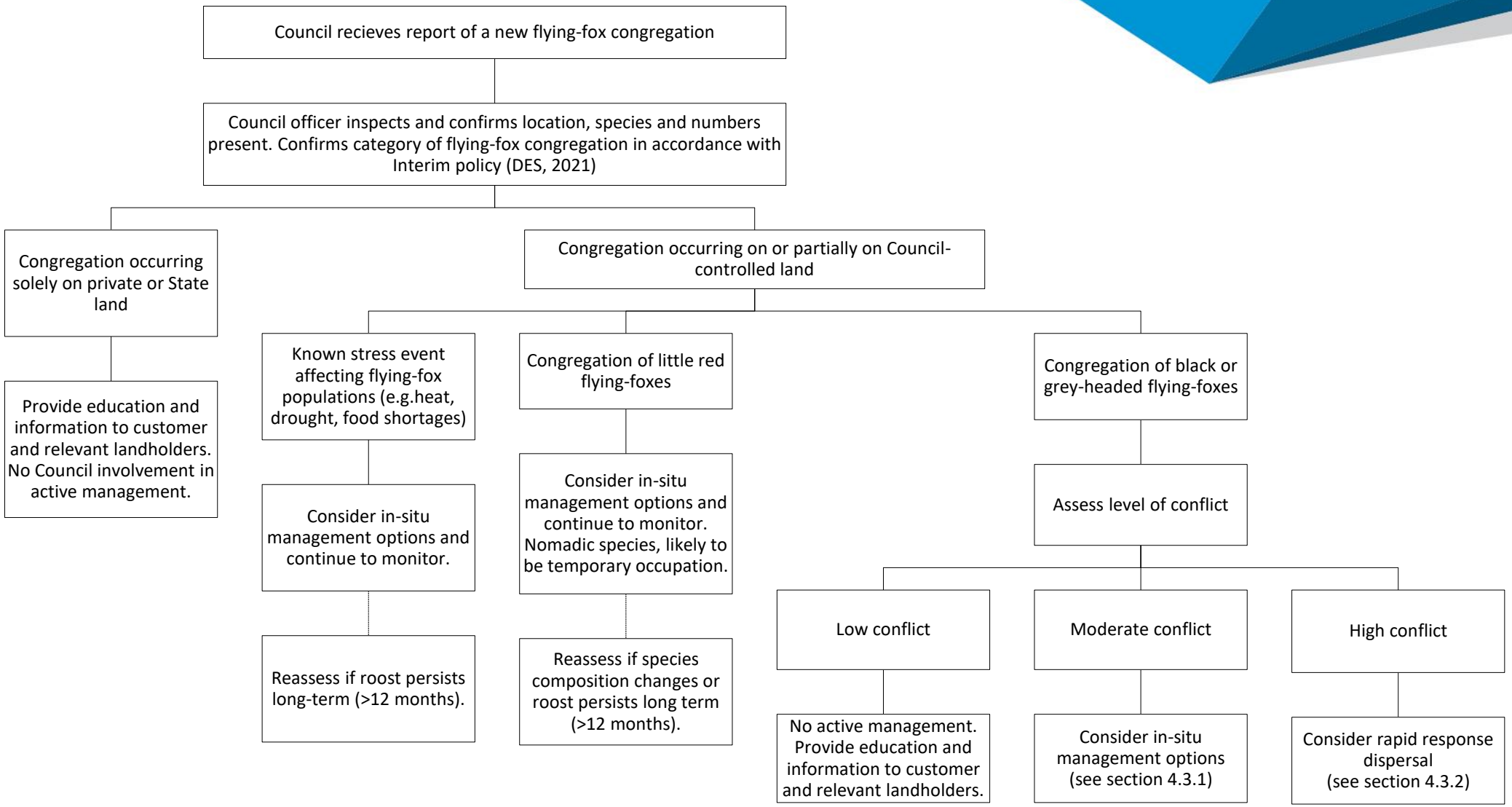

Figure 13: Assessment and response to newly emerging flying-fox congregations

4.3.1 In-situ management options

In-situ management of roosts occurring on Council-controlled land may assist to reduce human-flying-fox interactions by separating or increasing the distance between the roost and neighbouring properties. Importantly, these management options focus on managing roosts in their established location and are not intended to disperse or relocate the flying-foxes entirely.

Application of in-situ management options must be carefully considered on a case-by-case basis to ensure they are suitable for the situation and are likely to successfully alleviate conflict. Some options such as vegetation-free buffers and nudging must be managed to ensure they don't risk inadvertent dispersal or shifting the conflict towards other neighbouring properties.

In-situ management options and their suitability are detailed in Table 10 below.

Figure 14: In-situ management of Miriam Vale flying-fox roost through use of temporary fencing buffer

Table 10: In-situ roost management options

Management option	Option detail and rationale	Suitability
Relocation or retrofitting of public infrastructure and activities	Sources of human-flying-fox conflict associated with noise, odour, faecal drop and visual amenity may be alleviated through modification of public infrastructure and activities in areas nearby to roosts. This may include retrofitting Council buildings to reduce noise and odour impacts to staff and customers and relocating park infrastructure or public activities (e.g. pedestrian access) from areas impacted by flying-fox roosts. In taking such action, consideration should be given to options and alternatives that are most feasible, cost-effective and likely to reduce conflict.	When flying-fox roost is impacting public infrastructure or activities and relocation is feasible
Management/restoration of flying-fox roost site	The occupation of Council-managed areas by flying-fox roosts can result in a number of visual amenity impacts, including faecal drop on park infrastructure and footpaths, limb breakage and defoliation of roost trees and overgrowth of weeds and grasses beneath the roost. While Council is able to undertake minor maintenance while the roost is occupied in accordance with *Code of Practice: Low impact activities affecting flying-fox roosts* (DES 2013), large-scale clean-up and restoration of roost areas may be required following departure of flying-foxes.	When flying-fox roosts impact visual amenity of public area
Buffers without vegetation removal	Buffers created through the installation of permanent/semi-permanent structures (e.g. fencing/barriers) can reduce the potential for human-flying-fox conflict by making areas of the roost inaccessible or increasing the distance between flying-fox and the public. This action assists with preventing human-flying-fox interactions and associated health and safety risks, and minimising disturbance of flying-fox.	When public access to roost must be restricted to manage health and safety risks and/or disturbance
Buffers through vegetation modification	Vegetation pruning or removal aims to alter the area of the buffer habitat sufficiently so it is no longer suitable for roosting. The amount required to be removed varies between sites and roosts, ranging from some minor weed removal to removal of most of the canopy vegetation. Vegetation removal must be done using a staged approach, with the aim of removing as little native vegetation as possible to alleviate impacts. In some instances the removal of any native vegetation will not be appropriate, or may risk shifting conflict to a neighbouring residence.	The usefulness of a buffer to mitigate odour and noise impacts generally declines if the camp is within 50 meters of human habitation (SEQ Catchments 2012), however any buffer will assist and should be as wide as the site allows.

	Removing vegetation may increase visibility into the camp and noise issues for neighbouring residents which may only increase conflict. The importance of under and mid storey vegetation in mitigating the impacts of heat stress events on flying-fox welfare must also be considered.	Must consider that actions do not risk shifting conflict to other neighbouring residences.
Nudging	Nudging involves using noise and other low intensity disturbance methods to encourage flying-foxes to move from high conflict areas towards to other trees within the same area of roost habitat. Such action is not intended to disperse or relocate flying-foxes to a different roost site. If implemented, nudging activities must not be undertaken in the early morning, to reduce risk to of inadvertent dispersal of flying-foxes from the entire roost. Activities should rather be conducted during the daytime to encourage flying-foxes to move a small distance (i.e. 10m) to nearby trees. Daytime disturbance such as this is not permitted under the *Code of Practice: Ecologically sustainable management of flying-fox roosts* and will require a Flying-fox Roost Management Permit issued by DES.	Suitability must be assessed on a case-by-case basis with consideration given to the availability of nearby roosting habitat and likelihood of success in alleviating conflict (i.e. that nudging does not risk shifting conflict to other neighbouring residences).

4.3.2 Rapid response dispersal

Dispersal of a flying-fox congregations or roosts aims to encourage flying-foxes to move to another location, through either disturbance or habitat modification. Importantly, there are significant costs and a range of potential risks that are greatly increased with dispersal action, including that the roost may splinter or shift to an area of greater conflict. Early intervention at a newly establishing roost is often a key factor in successfully driving away flying-foxes by active disturbance as flying-foxes are yet to develop a high affinity for the roost site (DES, 2020).

In Miriam Vale, rapid response dispersal is a key management action for flying-foxes returning to Alf Larson Lions Park. This management option is considered necessary to mitigate the significant human health and safety risks presented by injured or orphaned flying-fox interacting with children in the park and playground equipment.

For newly emerging flying-fox congregations in other locations, dispersal of flying-foxes will only be considered by Council as a management option for sites presenting a high conflict level with the community and where certain criteria are met to manage associated risks to an acceptable level. These include:

- Congregation/roost consists primarily of black or grey-headed flying-foxes, species that are known to develop high affinities with roost sites. Dispersal will not be considered for large influxes of little red flying-foxes as they are a highly nomadic species and their presence is reliant on seasonal availability of flowering eucalypts and melaleucas (DES, 2021).
- Congregation/roost consists of less than 10,000 flying-foxes. Dispersals become increasingly more expensive and difficult to manage as the roost size increases. Council will not consider dispersal of large roosts due to the significant cost and risk of uncontrolled outcomes.
- Not within critical breeding periods. In accordance with the COP, it must be considered that management actions are avoided when females are in the late stages of pregnancy or when there are dependant young that cannot sustain independent flight (generally August-December). Dispersal activities within these periods places an increased risk on flying-fox welfare.
- Not within periods of population stress, e.g. climatic extremes, weather events or food shortages. The COP similarly requires consideration that management actions are avoided during periods of population stress to avoid impacts to flying-fox welfare.
- Suitable receival sites are available. As dispersal activities most commonly result in the formation of replacement camps nearby (within 1km) (Roberts et al., 2021), it is important that acceptable receival sites are identified to effectively reduce the level of conflict with the community.

4.3.2.1 Dispersal methods

Flying-fox dispersal can be broadly categorised as either ‘passive’ or ‘active’ dispersal. Passive dispersal involves removing vegetation in a staged manner to gradually make the habitat unattractive, causing flying-fox to disperse of their own accord over time with little stress. Generally, a significant proportion of vegetation needs to be removed in order to achieve dispersal of flying-foxes and prevent roost re-establishment. This method has a considerable impact upon visual amenity values of a site and is not considered appropriate where these or other values (e.g. heritage, environmental) must be protected.

Active dispersal involves disturbing flying-foxes using noise and visual disturbance techniques as they attempt to return to roost from nightly foraging; typically between 0300 and 0700 hours. Flying-foxes commonly abandon a roost after a period of consecutive daily dispersals, moving to nearby camps or may create a new or several new camps nearby (<1km) (Roberts et al., 2021). Despite this, flying-foxes have a very high level of fidelity to their roosts and will often return to previous sites for many years, requiring on-going dispersal action.

4.3.2.2 Suitable receival sites

Prior to undertaking any dispersal action, suitable receival sites must first be identified to inform the dispersal process and avoid shifting the roost to a location of equal or greater conflict. Criteria for selection of a receival site are detailed in Table 11 below.

Table 11: Criteria for identification of receival sites from flying-fox roost dispersal

Criteria for identification of receival sites	Justification
Council-controlled land	Roosts on Council-controlled land allows Council to coordinate management and avoids burdening private landholders.
Current or historical roosting habitat	Demonstrates area is suitable roosting habitat and flying-fox have an affinity with the site.
>100m from residents or businesses	To reduce conflict level from high to moderate.
Within 1km	Dispersed roosts typically relocate a short distance (<1km) from the original site (Roberts et al., 2021).
Suitable vegetation characteristics	Vegetation characteristic align with the following (SEQ Catchments 2012): • Closed canopy >5 m high; • Dense vegetation with complex structure (upper, mid- and understorey layers); • Within 500 m of permanent water source; • Within 50 km of the coastline or at an elevation <65 m above sea level; • Level topography (<5° incline); and • Greater than one hectare to accommodate and sustain large numbers of flying-foxes.

4.3.2.3 Dispersal process

Council will maintain a preferred supplier arrangement with a suitably qualified consultant to provide rapid response dispersal of flying-fox roosts from Alf Larson Park and newly emerging high conflict sites throughout the region. Members of the public are encouraged to report flying-fox returning to Alf Larson Park, or in other locations where they have not been observed previously, through to Council for investigation.

Following a determination that rapid response dispersal is required, Council will contact the specialist environmental consultants engaged to provide the service and request immediate mobilisation to site. If the site is considered a roost under the Interim Policy (DES, 2020), Council will arrange notification of the impending management actions to DES and neighbouring local governments as required by the *Code of Practice: Ecologically sustainable management of flying-fox roosts* (DES 2013). Where possible, Council will also endeavour to notify potentially impacted residents and/or communities.

The consultants will utilise non-lethal deterrence methods which may include light, noise and pyrotechnics, to discourage the early stages of roosting. Dispersal action will be undertaken by consultants in a controlled and coordinated way so that flying-foxes are actively directed to identified receival site/s. All dispersal activities will be undertaken in accordance with the *Code of Practice: Ecologically sustainable management of flying-fox roosts* (DES 2013).

If, as a result of dispersal action initiated by Council, flying-foxes begin to move towards or settle within areas that are not a preferred receival site, attempts will be made to relocate the roost to these preferred areas for a period of 6 consecutive days. If, after this timeframe, flying-foxes remain within the original location or an area that is not a preferred receival site, Council will cease further dispersal attempts and will manage roosts in accordance with the provisions of the SoMI and suitable in-situ management actions contained in this FFMP.

Figure 15: Flying-fox dispersal performed in Miriam Vale in 2017

5. Evaluation and review

This RFFMP will be reviewed on 3 yearly basis. Particular consideration will be given to any changes in local flying-fox roost locations and issues, regulatory framework or roost management research and technologies, with information amended or incorporated in the plan as required.

Any significant amendments will be undertaken in accordance with Council's Community Engagement Policy and communicated to stakeholders.

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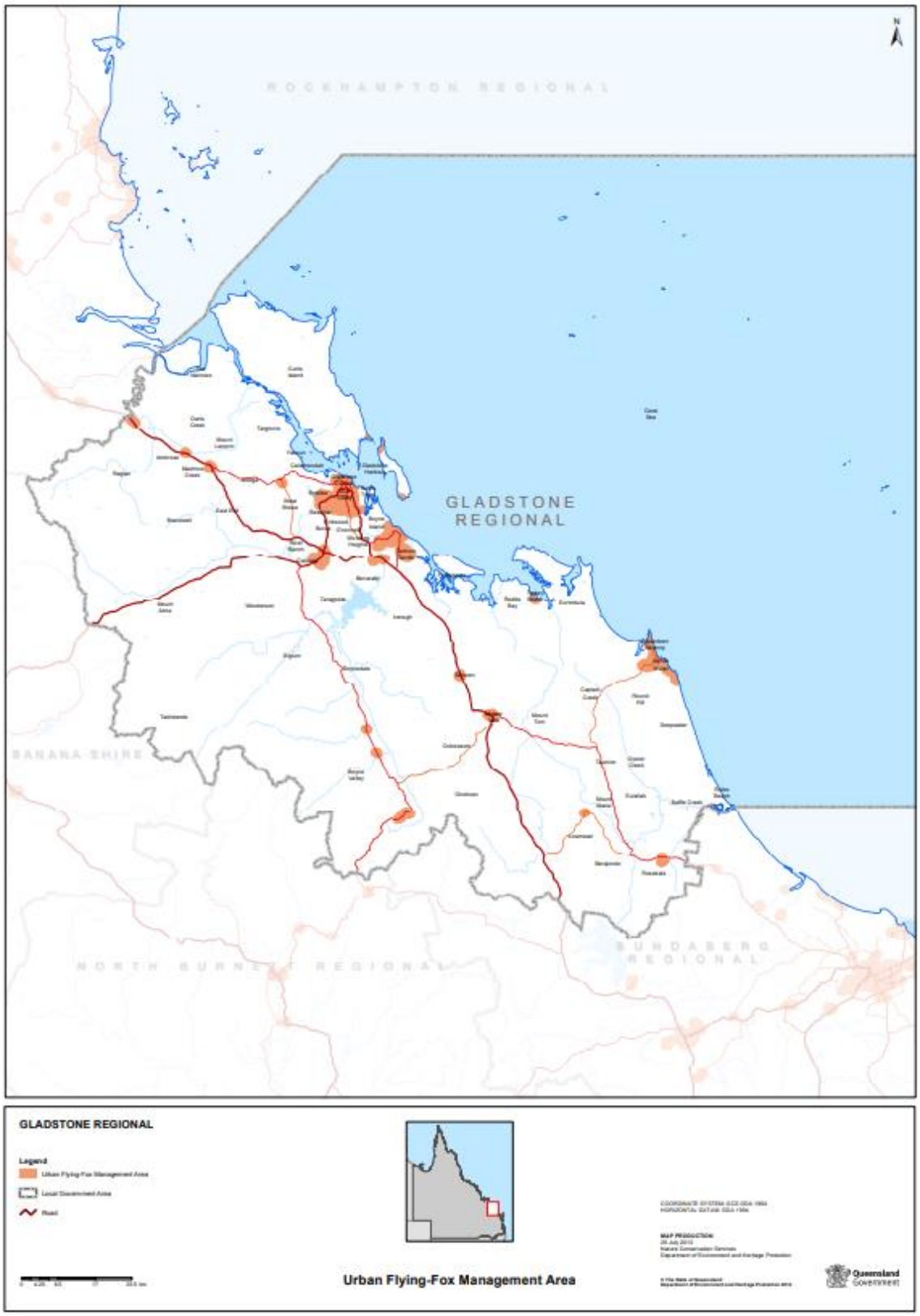
7. Appendices

Appendix 1 – Urban Flying-fox Management Areas in the Gladstone Region



Appendix 2 –Canoe Point, Tannum Sands – Typical roost extent in red outline

GLADSTONE REGIONAL COUNCIL

Canoe Point, Tannum Sands - Typical roost extent in red outline

62.50 0 31.25 62.50 Meters

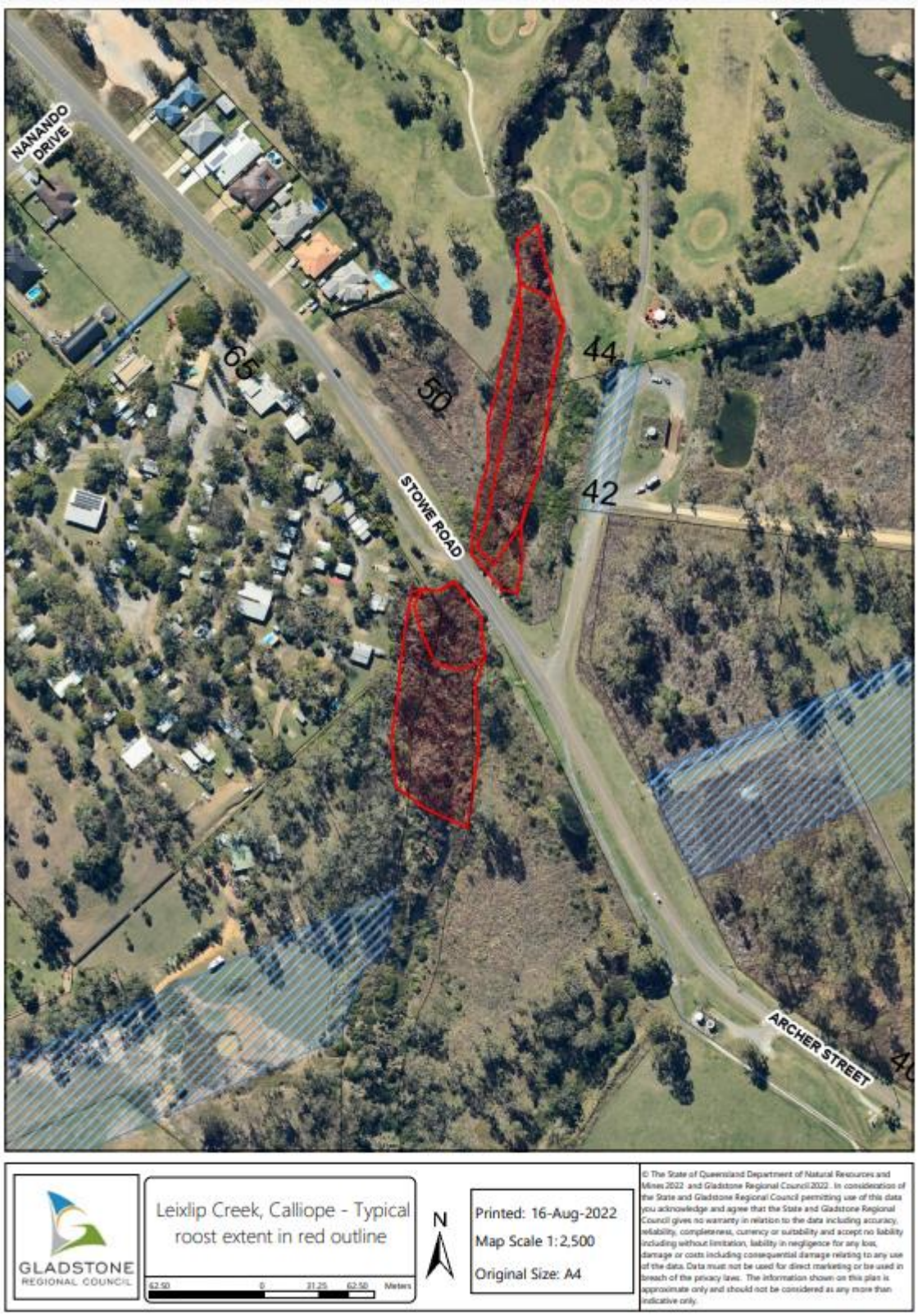
N

Printed: 16-Aug-2022

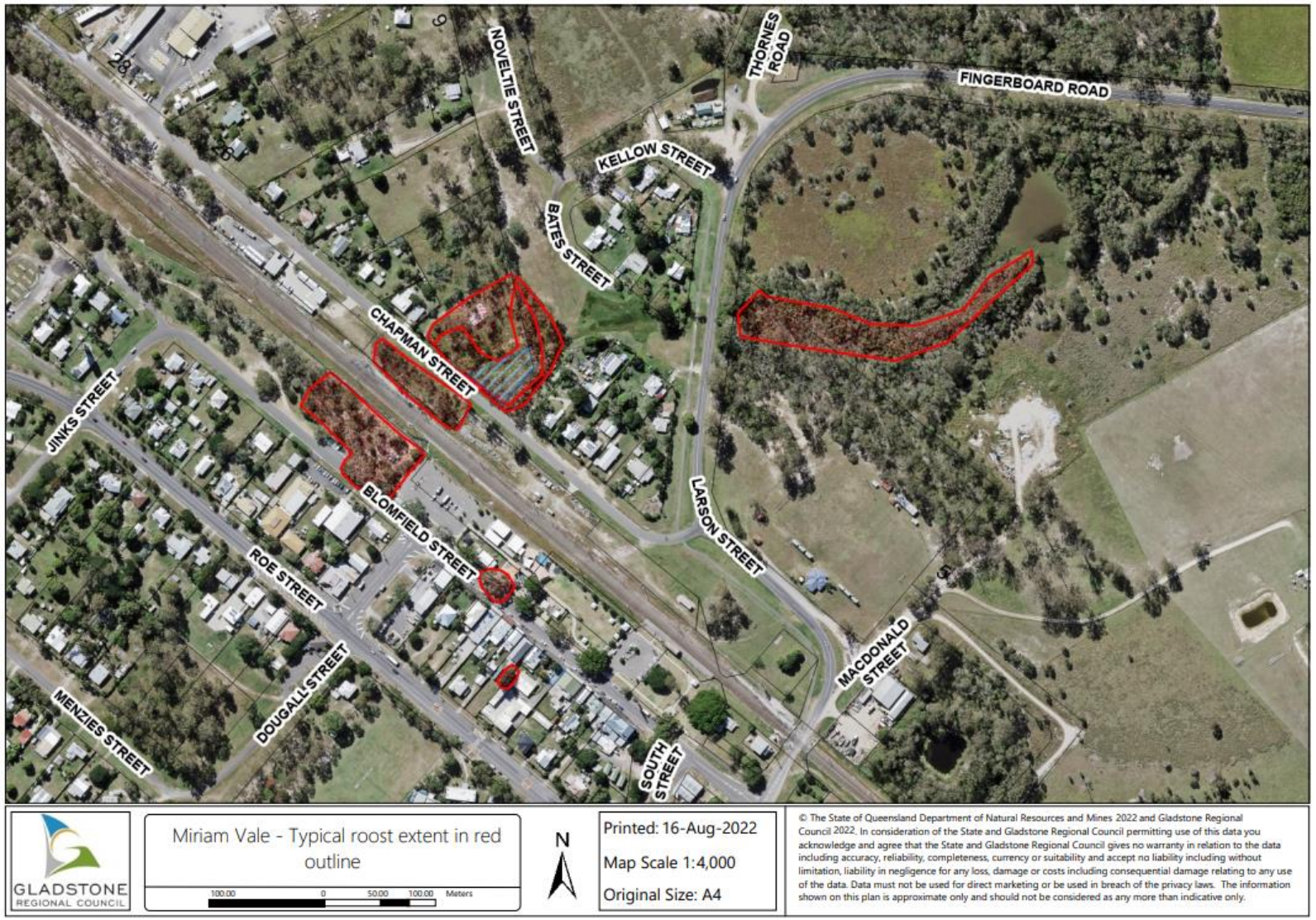
Map Scale 1:2,500

Original Size: A4

Appendix 3 - Leixlip Creek, Calliope – Typical roost extent in red outline



Appendix 4 –Miriam Vale – Typical roost extent in red outline



Appendix 5 – Blain Drive, Gladstone – Typical roost extent in red outline

Our Region. Our Future.

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