DRAFT

Byron Shire

Flying-fox Camp

Management Plan 2017-2022

July 2017

Byron Shire Council

Flying-fox Camp Management Plan 2017

Byron Shire

Camp Management Plan

June 2017

Byron Shire Council

Certification

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Contents

Acknowledgements **iii**

Acronyms and abbreviations **viii**

1. Overview **9**

1.1 Introduction 9

1.2 Objectives 9

2. Context **11**

2.1 Cultural environment 11

2.2 Camp locations 11

2.3 Flying-fox Monitoring Activities 17

2.4 History of the camps 17

2.5 Land tenure 19

2.5.1 Beech Drive camp 19

2.5.2 Butler Street camp 19

2.5.3 Middleton Street camp 19

2.5.4 Mullumbimby camp 20

2.5.5 Paddy's Creek camp 20

2.6 Reported issues related to the camps 20

2.6.1 Beech Drive camp 22

2.6.2 Butler Street camp 22

2.6.3 Middleton Street camp 22

2.6.4 Mullumbimby camp 22

2.6.5 Paddy's Creek camp 22

2.7 Management response to date 23

2.7.1 Beech Drive camp 23

2.7.2 Butler Street camp 23

2.7.3 Middleton Street camp 23

2.7.4 Mullumbimby camp 24

2.7.5 Paddy's Creek Camp 25

3. Community engagement **27**

3.1 Stakeholders 27

3.2 Engagement methods 27

3.3 Community feedback – management options 28

4. Legislation and policy **31**

4.1 Local government 31

4.2 State 31

4.2.1 Flying-fox Camp Management Policy 2015 31

4.2.2 *Threatened Species Conservation Act 1995* 31
4.2.3 *Biodiversity Conservation Act 2016* 32
4.2.4 *National Parks and Wildlife Act 1974* 32
4.2.5 *Prevention of Cruelty to Animals Act 1979* 32
4.2.6 *Environmental Planning and Assessment Act 1979* 32
4.2.7 *Crown Lands Act 1989* 33
4.2.8 *Protection of the Environment Operations Act 1997* 33
4.2.9 *Local Government Act 1993* 33
4.2.10 *Roads Act 1993* 33
4.3 Commonwealth 33
4.3.1 *Environment Protection and Biodiversity Conservation Act 1999* 33
4.3.2 DoEE Draft Recovery Plan for the Grey-headed Flying-fox 35
5. Other ecological values of the site 36
5.1 Beech Drive camp 36
5.2 Butler Street camp 36
5.3 Middleton Street camp 37
5.4 Mullumbimby camp 37
5.5 Paddy's Creek camp 37
6. Human and animal health 38
6.1 Disease and flying-fox management 38
7. Site-specific analysis of camp management options 39
8. Planned management approach 44
8.1 Consideration of active dispersal 44
8.2 Proposed management actions for each flying-fox camp 45
8.2.1 Beech Drive camp 48
8.2.2 Butler Street camp 49
8.2.3 Middleton Street camp 50
8.2.4 Mullumbimby camp 52
8.2.5 Paddy's Creek camp 54
8.3 Decision making process 61
8.4 Stop work triggers 62
9. Assessment of impacts to flying-foxes 63
9.1 Standard measures to avoid impacts 65
9.1.1 All management activities 65
9.1.2 All Level 2 and 3 actions 67
9.1.3 Vegetation trimming/ removal 68
9.1.4 Canopy vegetation trimming/ removal 68

9.1.5 Bush regeneration 69
9.2 Assessment of impacts to other threatened species or communities 69
10. Plan administration 70
10.1 Funding and approvals 70
10.2 Evaluation and review 70
10.3 Monitoring of the camp 70
10.4 Reporting 71
10.5 Management structure and responsibilities 71
10.6 Adaptive management 72
10.7 Funding commitment 73
11. References 74
Appendix A Camp history 79
A1 Beech Drive camp 79
A2 Butler Street camp 79
A3 Middleton Street camp 80
A4 Mullumbimby camp 81
A5 Paddy's Creek camp 81
Appendix B Stakeholders 83
Appendix C Desktop ecological assessment 84
Appendix D Flying-fox ecology and behaviour 85
D1 Ecological role 85
D2 Flying-foxes in urban areas 85
D3 Under threat 86
D4 Camp characteristics 86
D5 Species profiles 87
D5.1 Black Flying-fox (*Pteropus alecto*) 87
D5.2 Grey-headed Flying-fox (*Pteropus poliocephalus*) 88
D6 Reproduction 89
D7 Foraging 90
D8 Diet 90
Appendix E Additional human and animal health information 92
E1 Australian bat lyssavirus 92
E2 Hendra virus 92
E3 Menangle virus 93
E4 General health considerations 93
Appendix F Flying-fox rescue protocol 94
Appendix G Section 91 licence application form 98

Acronyms and abbreviations

ABLV	Australian bat lyssavirus
BFF	Black Flying-fox (*Pteropus alecto*)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DoEE	Commonwealth Department of the Environment and Energy
DPI	Department of Primary Industries (NSW)
EEC	endangered ecological community
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FF	Flying-foxes
GHFF	Grey-headed Flying-fox (*Pteropus poliocephalus*)
the Guideline	Referral guideline for management actions in Grey-headed and Spectacled Flying-fox camps 2015 (Commonwealth)
HEV	high environmental value
HeV	Hendra virus
LEP	Local Environmental Plan
LGA	local government area
MNES	matters of national environmental significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OEH	Office of Environment and Heritage (NSW)
the Plan	Camp Management Plan
PoM	Plan of Management
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
the Policy	Flying-fox Camp Management Policy 2015 (NSW)
SIS	species impact statement
TEC	threatened ecological community
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
VMP	Vegetation Management Plan

1. Overview

1.1 Introduction

This Flying-fox Camp Management Plan (the Plan) has been prepared for Byron Shire Council ('Council') to guide future management of five separate flying-fox camps (refer to **Illustration 1.1**) within Byron Shire Council Local Government Area (LGA). The five camps are referred to herein as:

- Beech Drive Camp
- Butler Street Camp
- Middleton Street Camp
- Mullumbimby Camp
- Paddy's Creek Camp.

This Plan is consistent with the NSW Office of Environment and Heritage (OEH) Camp Management Plan Template and Policy to facilitate licensing of camp management actions over the next five years.

1.2 Objectives

The objectives of this Plan are to:

1. minimise impacts to the community, while conserving flying-foxes and their habitat
2. provide a reasonable level of amenity for the surrounding community
3. manage public health and safety risks
4. clearly define roles and responsibilities
5. enable land managers and other stakeholders to use a range of suitable management responses to sustainably manage flying-foxes
6. effectively communicate with stakeholders during planning and implementation of management activities
7. enable long-term conservation of flying-foxes in suitable habitat within the shire
8. ensure management is sympathetic to flying-fox behaviours and requirements
9. improve community understanding and appreciation of flying-foxes, including their critical ecological role
10. ensure flying-fox welfare is a priority during all works
11. ensure camp management is consistent with broader conservation management strategies that may be developed to protect threatened species/ communities
12. ensure camp management does not contribute to loss of biodiversity or increase threats to threatened species/ communities
13. clearly outline proposed camp management actions for each camp
14. ensure management activities are consistent with the NSW Flying-fox Camp Management Policy (OEH 2015b)
15. facilitate licence approval (where required) for actions at each camp
16. implement an adaptive management approach to camp management based on evidence collected.

Information shown is for illustrative purposes only

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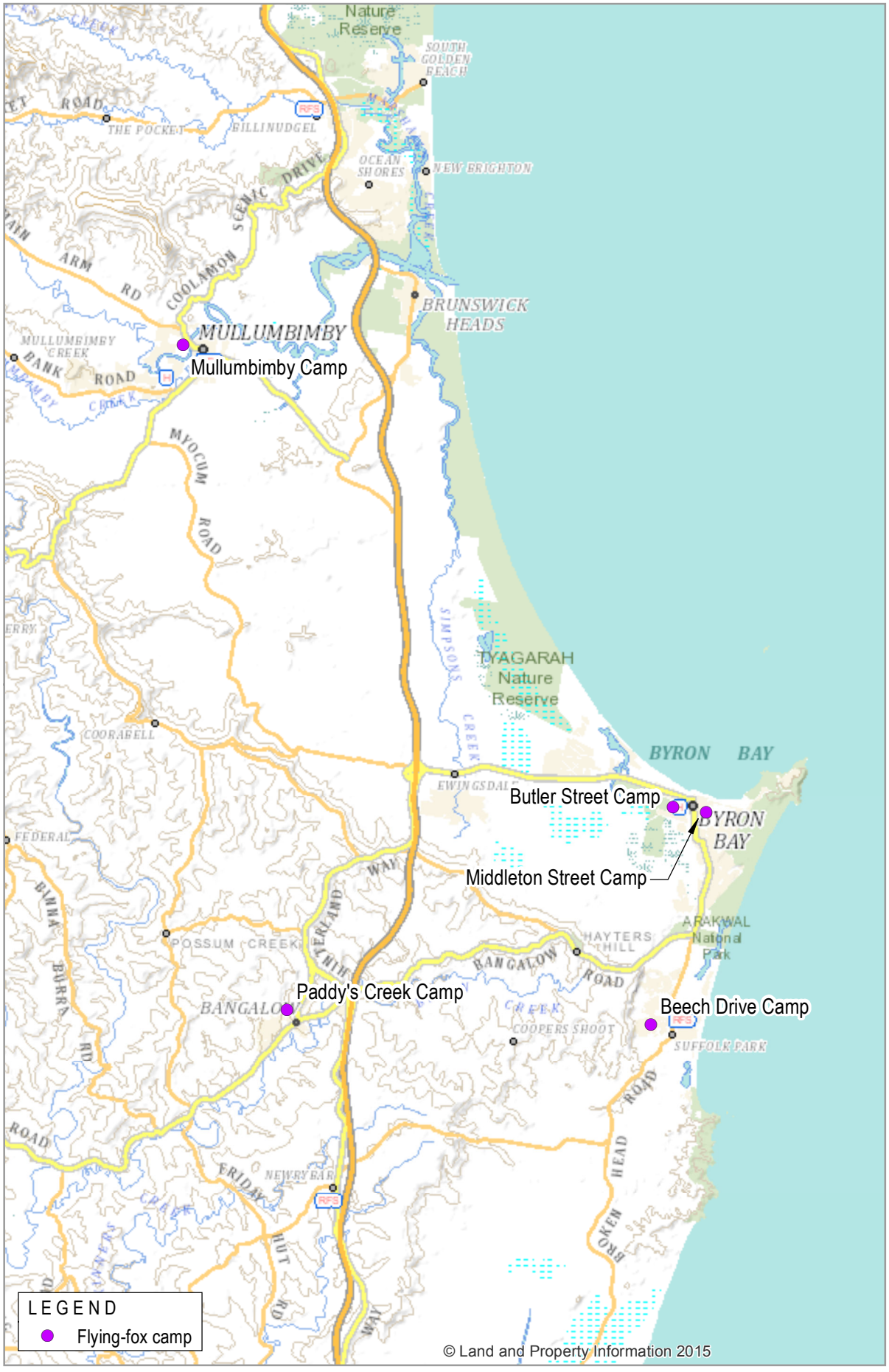

0 2.5 km

North

Byron Shire Subject Flying-fox Camp Locations

2. Context

2.1 Cultural environment

To be advised by the Arakwal MoU Advisory Committee and relevant Local Aboriginal Land Councils.

2.2 Camp locations

The subject flying-fox camps are located within urban environments throughout Byron Shire. A description of the five flying-fox camp locations and extents are provided in **Table 2.1** and **Illustrations 2.1-2.5**.

Table 2.1 Camp Locations

	Beech Drive	Butler Street	Middleton Street	Mullumbimby	Paddy's Creek
Town	Suffolk Park	Byron Bay	Byron Bay	Mullumbimby	Bangalow
Location description	Between Bottlebrush Crescent and Beech Drive	South of Byron Street, west of Butler Street, north of Burns Street and east of Cumbebin Swamp Nature Reserve	West of Tennyson Street, north of Marvell Street, south of Lawson Street and east of Middleton Street	South of Palm Avenue, within Rotary Rainforest Park, and on freehold land south and east of Garden Avenue	East of Palm Tree Crescent, west of Colins Street, north of Raftons Road
Associated waterway	Unnamed first and second order stream	Cumbebin Swamp, drains to Belongil	Drainage line	Chinbible Creek, Yogabera Creek, and Yalgany Gully between the ends of Riverside Drive and Garden Avenue and along the Brunswick River	Paddy's Creek; a tributary of Byron Creek
Lot DP	Lot 126 DP 815022	Lot 230 DP 755695, Lot 1 DP 758207, Lot 391 DP 728539 and Lot 392 DP 728539	Lot 457 DP 1087879	Rotary Park is Lot 451 DP 728526	Lot 74 DP 793398 and Lot 38 DP 262183
Max. recorded camp extent (as at Feb 2017)	0.27 ha	1.5 ha	0.72 ha	2.5 ha	1.2 ha
Contiguous habitat remaining	0.6 ha	93.5 ha*	0.4 ha	5 ha	0.6 ha

* This figure includes 91 ha of contiguous habitat available to the west, within Cumbebin Swamp Nature Reserve.

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0 40

North

Beech Drive
Flying-fox Camp Location and Maximum Footprint

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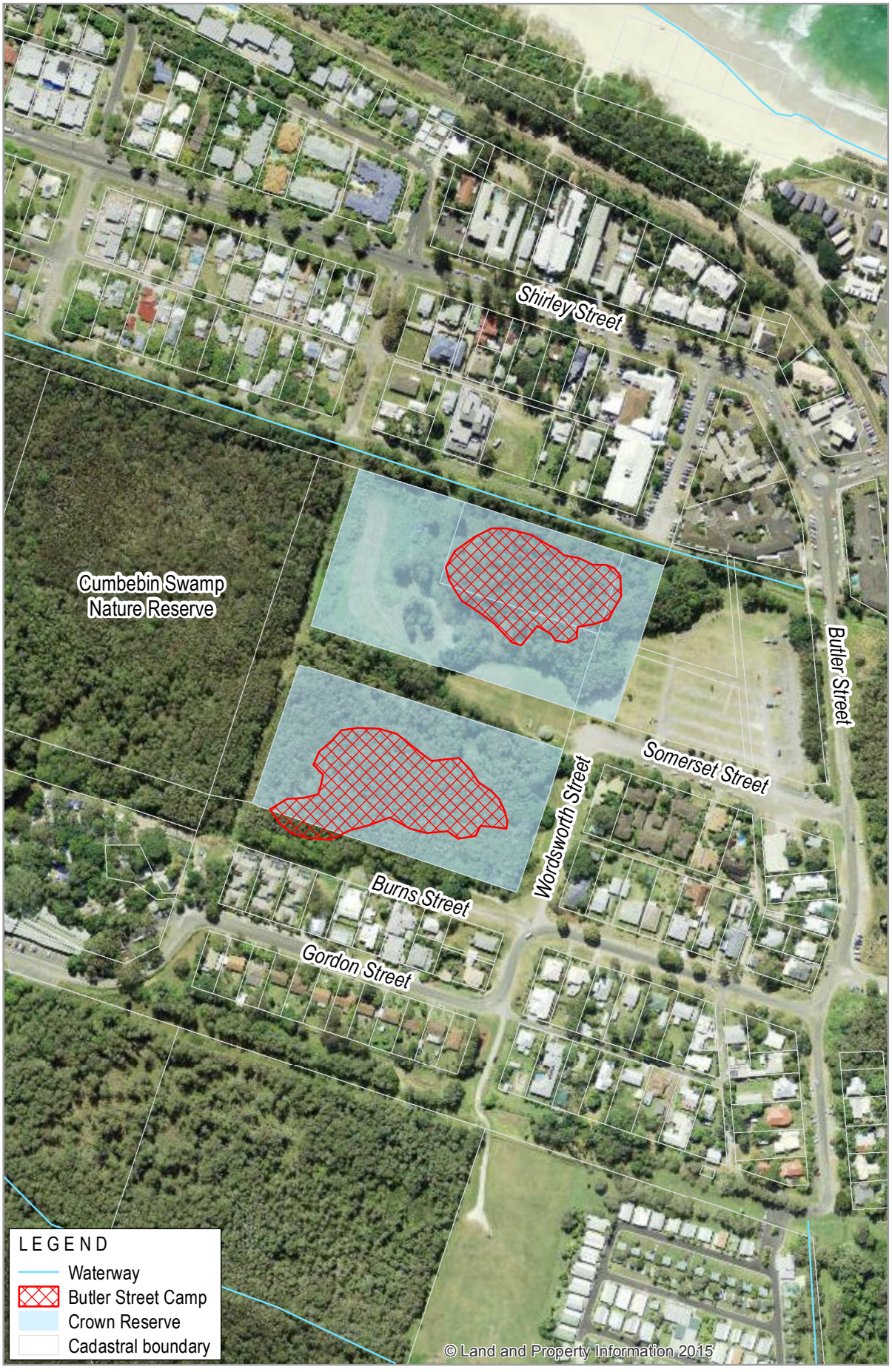
Source of base data: SIX Maps and Byron Shire Council



Butler Street
Flying-fox Camp Location and Maximum Footprint

0 80

North

GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1007

Illustration 2.2

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Middleton Street
Flying-fox Camp Location and Maximum Footprint

0 40

North

GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1009

Illustration 2.3

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Mullumbimby
Flying-fox Camp Location and Maximum Footprint

0 100

North

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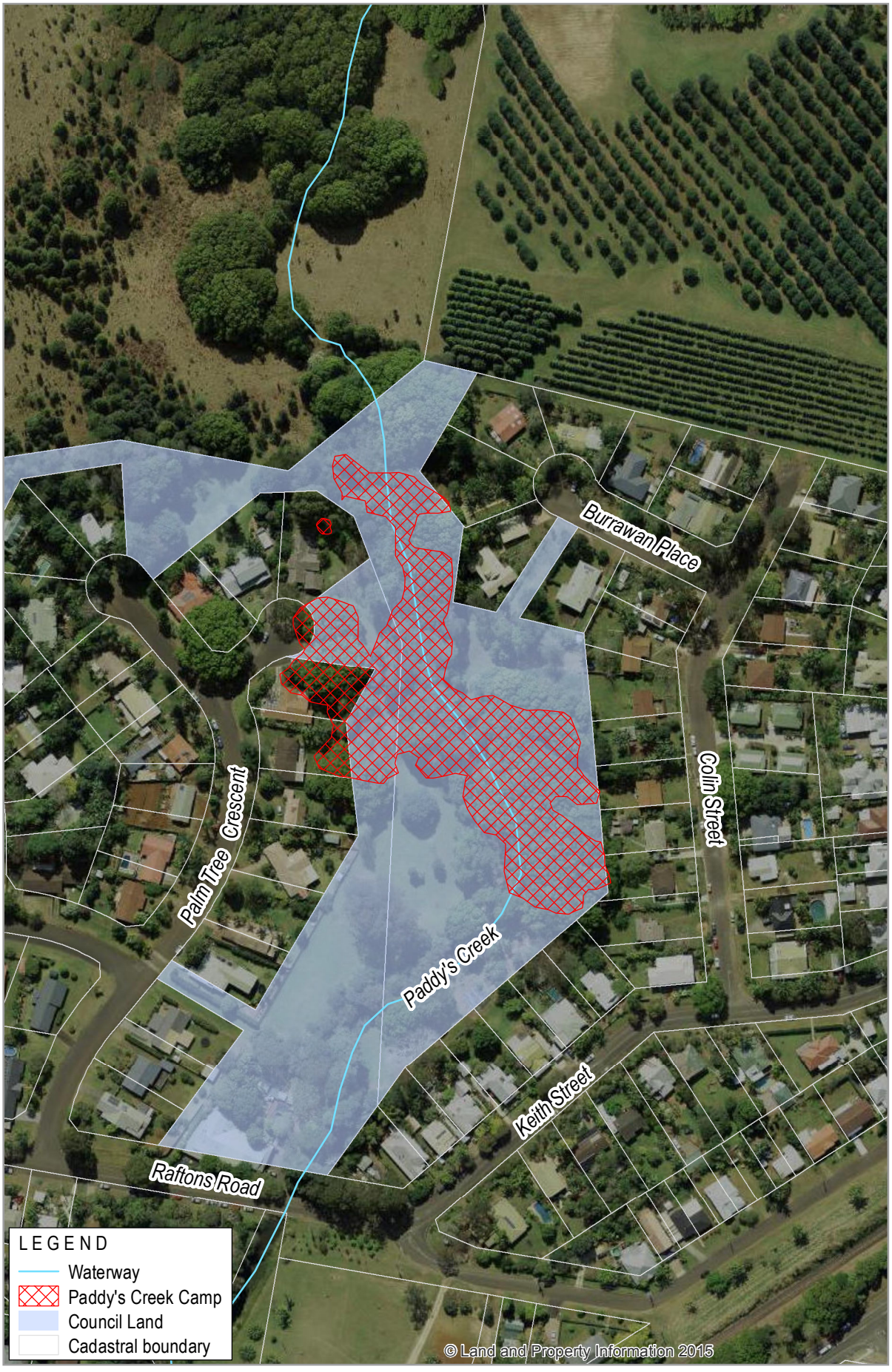


Paddy's Creek
Flying-fox Camp Location and Maximum Footprint

0 50

North

GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1011

Illustration 2.5

2.3 Flying-fox Monitoring Activities

In February 2013, Byron Shire Council commenced flying-fox monitoring at the Beech Drive, Butler Street, Paddy's Creek and Mullumbimby camps, and at Middleton in early 2016 in line with the National Flying-fox Monitoring Program point count survey method (Westcott & McKeown 2013) to obtain a record on the total number of flying-foxes. The monitoring is undertaken on a quarterly basis (February, May, August and November). The data is managed by the CSIRO and publicly available from the Australian Government Department of Environment and Energy (DoEE). Prior to this, monthly monitoring was undertaken by Council.

Council acknowledges the ongoing access difficulties at many of the sites during monitoring with:

- much of the Butler Street camp being permanently under water (although a boardwalk within Lot 230 DP 755695 offers advantageous observation points)
- Middleton Street camp being frequently subject to storm water inundation
- Restricted access to the eastern bank of Paddy's Creek, particularly behind residential private properties on Colins Street
- varied levels of access to private land at Mullumbimby upon which to conduct surveys.

Council continues to seek private landholder approval to access much of the Mullumbimby camp resulting in methodological challenges and possible errors associated with the counts. Due to potential errors associated with the counts, the focus is not on absolute numbers, but rather the long-term trends in numbers and associated impacts on community.

2.4 History of the camps

A summary of camp history including maximum numbers, species present and nature of occupation is provided in **Table 2.2** for each camp. The subject camps were first documented in council records between 2008 and 2012, although earlier records of the Butler Street camp and Paddy's Creek camp have been reported.

The camps support both the Grey-headed Flying-fox and Black Flying-fox, with maximum recorded numbers varying between 900 and 10,359 animals. There are no known records of Little Red flying-foxes (*Pteropus scapulatus*) roosting at any of the camps. Further details regarding flying-fox numbers and fluctuations at each camp are provided at **Appendix A**.

Table 2.2 Camp history

History	Beech Drive	Butler Street	Middleton Street	Mullumbimby	Paddy's Creek
Camp first recorded	May 2010	July 2008[1]	September 2012	September 2010[2]	January 2010[3] (20-100 FF recorded)
Occupation (permanent, seasonal, occasional)	Occasional	Occasional	Occasional but permanent since Feb 2016	Permanent	Occasional
Maternity camp (Yes/ No)[4]	No	No	No	Yes	Yes
Species present	GHFF & BFF	GHFF & BFF	GHFF & BFF	GHFF & BFF	GHFF & BFF
Max. no. of flying-fox ever recorded	900	3,000	3,429	10,359	2,275
Date max. no. of flying-fox ever recorded	June 2010	May 2016	May 2017	May 2017	February 2015
Proportion of max. no.	83% GHFF, 17% BFF	100% GHFF	56% GHFF, 44% BFF	80% GHFF, 20% BFF	81% GHFF, 19% BFF
Max. no. of GHFF (date)	750 (June 2010)	3,000 (May 2016)	1,934 (May 2017)	8,279 (May 2017)	1,911 (Feb 2017)
Max. no. of BFF (date)	220 (Feb 2011)	550 (July 2011)	1,495 (May 2017)	2,445 (May 2013)	946 BFF (Feb 2013)
Comments	Flying-foxes are generally absent in winter except for 2011 (L. Ruyenberg, pers. comm., 18 April 2017).	Flying-foxes are generally absent in winter.	Between May 2016 and November 2016 only Grey-headed Flying-foxes were observed.	Numbers decrease and move to the eastern area of the camp along the Brunswick River in winter.	Flying-foxes are generally absent in winter.

GHFF: Grey-headed Flying-fox, BFF: Black Flying-fox

1 Allegedly however, the presence of flying-foxes in the area dates back at least 20 years (L Ruytenberg, pers. comm., 18 April 2017).

2 Camp establishment reportedly coincides with a national food shortage.

3 Anecdotal evidence suggests the flying-foxes first appeared at Paddy's Creek following the 2007 drought, and consequently a food shortage for flying-foxes that affected much of northern NSW.

4 Determination of camps as maternity sites is based on observations during Council monitoring.

2.5 Land tenure

2.5.1 Beech Drive camp

The camp is located entirely on Byron Shire Council owned land (refer to **Illustration 2.1**), and classified as community land. There are no adopted local area or regional strategic plans (such as conservation and development strategies or planning proposals) that relate to this land.

2.5.2 Butler Street camp

The camp is located entirely on the Department of Industry – Crown land (refer to **Illustration 2.2**), which is managed by Byron Shire Council. In 2002, a Plan of Management (PoM) for Butler Street Reserve, Byron Bay – Reserve 88993 for Public Recreation was prepared (Stratcorp Consulting, 2002). The PoM relates to several land parcels including Lot 1 DP 758207, Lot 389 DP 728537Lot 391 DP 728539 and Lot 392 DP 728539 and Lot 393 DP 728539. Only Lot 1 DP 758207, Lot 391 DP 728539 and Lot 392 DP 728539 have been occupied by the flying-fox camp. The PoM provides a framework for the management and development of public land however the document makes no reference to the management of flying-foxes despite anecdotal evidence of flying-foxes in the area dating back at least 20 years (L Ruytenberg, pers. comm., 18 April 2017).

Cumbebin Wetland Sanctuary, immediately north of Burns Street (Lot 230 DP 755695), is managed by the Byron Environment Centre on behalf of the Cumbebin Wetland Sanctuary Trust and Byron Shire Council.

2.5.3 Middleton Street camp

The camp is located entirely on the Department of Industry – Crown land (Lot 457 DP 1087879) including a 6 m wide public road corridor between Middleton Street and Tennyson Street but parallel to Marvel Street (refer to **Illustration 2.3**). Historically, the public road corridor was managed by adjoining residence however under Section 34A of the *Crown Lands Act 1989,* any previous agreements are null in void. Council acknowledges that the ongoing management of the public road corridor is in the interest of effective camp management.

There are no adopted local areas or regional strategic plans that relate to the land on which the camp is located, however the NSW Aboriginal Land Council holds Lot 457 DP 1087879 under an Aboriginal Land Claim. Until the claim is determined, there will be implications for which camp management options will be permissible on the subject Crown land.

The zoning of the land over the majority of the site is Deferred Matter (DM) under the Byron Local Environment Plan (LEP) 2014, and includes land zoned mixed use (B4) and public recreation (RE1). The DM areas in the Byron LEP 2014 remain subject to the Byron LEP 1988 provisions for the following zones affecting this site:

- 1(d) (Investigation)
- 2(a) (Residential)
- 7(b) (Coastal Habitat)
- 7(f2) (Urban Coastal Lands).

2.5.4 Mullumbimby camp

The camp is located on:

- Community land (Byron Shire Council managed).
- Byron Shire Council managed Crown land (Lot 451 DP 728526).
- Private freehold land (refer to **Illustration 2.4**).

The Department of Industry - Lands has undertaken a status investigation of those lands adjoining the non-tidal waterways described as Chinbible Creek and Yalgan Gully east of Pine Avenue, south of Main Arm Road and north of Garden Avenue. The investigation found land including part Crown Reserve 85663 for public recreation (Lot 451 DP 728526) has presumptive title to the middle thread of the waterway. This means, for example, that Council are responsible for weed control works along Yogabera Creek from the middle thread south to Rotary Rainforest Park (and including Rotary Rainforest Park as this is Council managed Crown land) and private land owners are responsible from the middle thread of the adjoining waterway to their properties.

The zoning of the land over the majority of the site is DM under the Byron LEP 2014, and includes land zoned low density residential (R2) and public recreation (RE1). The DM areas in the Byron LEP 2014 remain subject to the Byron LEP 1988 zoning provisions relating to 6(a) Open Space.

In 2015, Council prepared the Mullumbimby Flying-Fox Camp Management Actions that identifies actions to manage the Mullumbimby Flying-fox camp. The Mullumbimby Flying-fox Camp Actions will be incorporated into the current Plan thereby complying with the OEH policy.

2.5.5 Paddy's Creek camp

The camp is for the most part on Byron Shire Council owned land, specifically Lot 74 DP 793398 and Lot 38 DP 262183 and occasionally private freehold land between Palm Tree Crescent and Colins Street and along Paddy's Creek (refer to **Illustration 2.5**).

There are no adopted local areas or regional strategic plans (conservation and development strategies, planning proposals, etc.) that relate to the land on which the camp is located.

2.6 Reported issues related to the camps

A number of issues relating to each subject flying-fox camp have been reported to Council by the community. **Table 2.3** provides a collation of these issues compiled from community consultation undertaken in May 2017 as well as feedback and consultation directly with Council since 2015. Further discussion about community engagement efforts and outcomes can be found in **Section 3**.

Table 2.3 Reported issue relating to the camps

Issue	Beech	Butler	Middleton	Mullumbimby	Paddy's Creek
Noise[1]	✓	✓	✓	✓	✓
Faecal drop[2]	✓	✓	✓	✓	✓
Smell	✓	✓	✓	✓	✓
Disease[3]	✓		✓	✓	✓
Health and/ or wellbeing impacts[4]	✓		✓	✓	✓
Reduced general amenity[5]	✓	✓	✓	✓	✓
Flying-foxes overhanging facilities[6]			✓		✓
Impacts on businesses			✓		✓
Property devaluation			✓		✓
Diminished rental return			✓		✓
Damage to vegetation				✓	✓
Increased need for bush regeneration and associated costs				✓	✓
Impacts on other fauna species				✓	✓

1 **Noise**: as flying-foxes depart or return to the camp and/ or from the camp during the day however no acoustic testing has been conducted by Council. Also at night during the breeding season when flightless young are left at the camp.

2 **Faecal drop**: on outdoor areas, cars and washing lines, although the estimated time and cost associated with cleaning areas adjacent to the camp have not been quantified.

3 **Disease**: fear of; information about actual disease risk is provided in Section 7.

4 **Health and/ or wellbeing impacts**: for example, associated with lack of sleep, anxiety.

5 **Reduced general amenity**: for example, children's playground and footbridge at Paddy's Creek.

6 **Flying-foxes overhanging facilities**: for example, pathways, footbridge (at Paddy's Creek) and residential properties.

There are also people in the surrounding area who enjoy the camp and would prefer it is managed in situ. Reported positive feedback stems from people who:

- recognise the landscape-scale benefits flying-foxes provide through seed dispersal and pollination
- acknowledge the need to conserve flying-foxes as an important native species
- enjoy watching flying-foxes at the camp and/ or flying out or in
- appreciate the intrinsic value of the camp
- see the value of the camp as a tourism opportunity/ attraction
- appreciate the natural values of the camp and habitat
- feel the camp does not negatively impact on their lifestyle
- value the opportunity the camp provides for them and their family to get close to nature
- recognise the need for people and wildlife to live together.

2.6.1 Beech Drive camp

The majority of issues related to the camp are recorded between October and May, which coincides with the main period of flying-fox occupancy at the camp. The majority of issues recorded are related to the southern portion of the camp.

A total of 36 complaints have been received from 29 complainants between June 2010 and May 2017. This represents 10% of the total population living within 300 m of the camp. There has been no reported positive feedback from local residences near the camp.

2.6.2 Butler Street camp

The majority of issues related to the camp are recorded between October and May, which coincides with the main period of flying-fox occupancy at the camp.

A total of 21 complaints have been received from 12 complainants between May 2009 and May 2016. No complaints have been received by Council between June 2016 and May 2017. This represents 8% of the total population living within 300 m of the camp.

2.6.3 Middleton Street camp

All of the issues related to the camp coincide with the steady increase in flying-foxes and peak tourist time since February 2016. The majority of issues recorded are related to the entire area of the camp.

A total of 32 complaints have been received from 12 complainants in the past 12 months. This represents 6% of the total population within 300 m of the camp.

2.6.4 Mullumbimby camp

The majority of issues related to the camp are recorded around October to May that tends to coincide females give birth to young.

Council records show that the majority of issues recorded relate to the north and east of the camp.

Council has received 1,123 complaints from 1,036 complainants between December 2015 and May 2017. This represents 32% of the total population living in Mullumbimby, and includes complainants more than 300 m from the camp.

2.6.5 Paddy’s Creek camp

The majority of issues related to the camp are recorded between October and May and coincide with the arrival and departure of flying-foxes. The majority of issues recorded are related to the mobility of the camp within each season. At times, the issues are solely related to the north east area of the camp e.g. April 2014 at other times, the issues are solely related to the south area of the camp e.g. December 2016.

A total of 84 complaints have been received from 62 complainants between January 2014 and May 2017. This represents 47% of the total population living within 300 metres of the camp.

2.7 Management response to date

In July 2008 and 2010, Council staff attended the Managing Flying-fox Camps for Land Managers workshop hosted by OEH in Ballina. The workshops were aimed at increasing awareness of flying-foxes and camp management.

In September 2010, Council hosted a biodiversity seminar on flying-fox ecology and camp management presented by Dr Billie Roberts of Griffiths University. The seminar aimed to provide accurate information to the local community about flying-foxes and the complexity of managing camps.

In November 2010, Council developed internal guidelines for staff working in close proximity to flying-fox camps. The guidelines aimed to:

- minimise the impacts and disturbance to flying-foxes when working in close proximity to a camp
- ensure Council staff safety and health when working in close proximity to a camp.

In November 2016, Council developed a formal register/ protocol for tracking flying-fox enquiries and complaints.

Council staff has also continued to provide accurate information to the local community about flying-foxes in written form for each camp.

2.7.1 Beech Drive camp

In June 2010, Council staff undertook a site inspection with NSW National Parks & Wildlife officers to confirm species and total numbers. In the months preceding, Council staff responded to local community by providing information about flying-foxes. In September 2010, Council sought advice on management options from OEH that recommended a long term strategy to manipulate vegetation, which included the establishment of a buffer between the camp and local residence.

Since 2010, every 4-6 months, Council staff remove/ spot spray woody weeds and exotic grasses and annuals along the drainage line where flying-foxes have roosted.

In April 2011, Council received a petition from 29 local resident's requesting Council to prepare a flying-fox camp management plan. In June 2011, Council tabled the petition and resolved to prepare a report outlining the management issues relating to flying-foxes in urban areas. In response, Council acknowledge the issues and concerns of local community but due to limited resources, on ground actions have been restrictive.

In November 2016, interpretive signage was installed at the footpath located on the southern junction of Beech Drive and Bottlebrush Crescent.

2.7.2 Butler Street camp

Council maintain, by mowing the existing buffer in the form of a shared path and open drain which is located between residents on Byron Street and the camp. The southern portion of the camp is managed by Cumbebin Wetland Trust who periodically undertake weed control works.

2.7.3 Middleton Street camp

In November 2016, interpretive signage was installed on Middleton Street.

In January 2017, Council staff met informally with several local residents and businesses to discuss their concerns.

2.7.4 Mullumbimby camp

In January 2011, Byron Shire Council advised the local community in writing about flying-fox ecology and acknowledged that while the Mullumbimby camp had only recently established, the impacts of the camp on the local community were noted. Consequently, Council sought advice from OEH regarding camp management.

In 2014 and 2015, two meetings were held with Council staff and local residents' residing on Palm Avenue to discuss the reported issues related to the camp. Residents of Palm Avenue formed the Mullumbimby Bat Colony Resident Action Group (Action Group) with the aim of bringing attention to the NSW State government and Council the camp's negative affect on the community.

In May 2015, Council acknowledged the conflicts (e.g. noise and odour) that local residents were experiencing by living in close proximity to the camp. Associated land tenure combined with Council's legislative requirement to seek approval from OEH for camp management and exhibition of the then draft Flying-fox Camp Management Policy 2015 added varying layers of complexity to determine resource requirements and progress for the development of a flying-fox camp management plan. Notwithstanding, in June 2015 Council resolved to prepare the Mullumbimby Flying-fox Camp Management Action Plan (Action Plan) (GeoLINK 2016) and further resolved to allocate an additional $13,300 to implementation of the Action Plan.

In 2015 and 2016, Council staff implemented several key activities as identified in the Action Plan including removal of many Camphor Laurel and other woody weed seedlings and saplings from within Rotary Rainforest Park (south of Palm Avenue). As flying-foxes are known to roost in Camphor Laurel, which has the ability to adapt to disturbed environments, has prolific seed production and rapid growth rate as well as a lack of serious predators or diseases, the successful removal of hundreds of seedlings and sapling has reduced future roosting habitat. Such weed control however will require ongoing maintenance. Where permissible, Council staff have created dwelling buffers and manipulated vegetation but this has had negligible success at reducing the reported noise issues relating to the camp. Much of the land for possible creation of dwelling buffers and manipulation of vegetation are on private land.

Interpretive signage was installed at Rotary Rainforest Park and the Council website was updated to provide accurate information to the local community about flying-foxes. Monitoring of the effectiveness of interpretive signage in increasing knowledge and awareness has also been undertaken.

In October 2016, Council sought feedback on the Action Plan from OEH. Council requested their advice on how to transition the Action Plan to a flying-fox camp management plan so that OEH could endorse the Action Plan. OEH reviewed the Action Plan and in summary noted, although the Action Plan partially complied with the content and structure of a flying-fox camp management plan, it was limited in some of the essential detail. These limitations relate in part to the transition from an operational document to a structured management plan. In order to accord with the OEH Flying-fox Camp Management Policy 2015, guidelines and management plan template, more information is required. It was for this reason that the Mullumbimby camp was included in the current plan.

In March 2017, Council staff undertook informal reviews of 'Trip Advisor' to gauge visitor feedback in relation to flying-foxes relating to their stay in close proximity to the camp.

2.7.5 Paddy's Creek Camp

Between 2010 and 2012, Council treated all known weeds within the maximum extent of the camp primarily all ground layer and mid storey weeds but Camphor Laurel (*Cinnamomum camphora*) were considerably thinned where achievable. Some mature individual Camphor Laurel located on steep sections of the bank presented work safety challenges (Byron Shire Council 2012).

In November 2014, Council staff attended a meeting with local residents residing on Burrawan Place and Palm Tree Crescent to determine their concerns and the management of flying-foxes overhanging the play equipment and residential properties.

In September 2015 and in consultation with OEH, Council completed a review of environmental factors (REF) to create a buffer between Paddy's Creek and adjoining residence on Burrawan Place and Palm Tree Crescent during a period of camp absence. In addition, Council developed protocols for vegetation removal in and around flying-fox camps.

In total, seven Camphor Laurels were targeted and/ or several large limbs overhanging or in close proximity to the play equipment and residential properties were removed.

Due to limited available funding however, a staged approach was taken. The initial works removed Camphor Laurels overhanging the residence on Burrawan Place. Following this, Camphor Laurels overhanging the play equipment and residential properties at Palm Tree Crescent (refer to **Illustration 2.6**) were removed, at a total cost of $16,445.

In September 2016, residents adjacent to the camp on Burrawan Place and Palm Tree Crescent were individually notified one week prior to on-ground works commencing. The notification outlined the purpose of works and included information on what to do if an injured or orphaned flying-fox was observed.

In November 2016, interpretive signage was installed at the footbridge located on the eastern bank of Paddy's Creek.

In early 2017, Council staff continued to meet with several local residents to discuss their concerns and preference for Council to prepare a flying-fox camp management plan.

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 22/06/2017
Source of base data: SIX Maps and Byron Shire Council

Camphor Laurel selected for removal / trimming at Paddy's Creek (2015-2016)

0 50

North

3. Community engagement

3.1 Stakeholders

There are a range of stakeholders who are directly or indirectly affected by the flying-fox camps, or who are interested in its management. All stakeholders were attempted to be reached by Council when undertaking consultation. Stakeholders are listed within **Appendix B**.

3.2 Engagement methods

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

- understand the issues directly and indirectly affecting the community
- raise awareness within the community about flying-foxes
- correct misinformation and allay fears
- share information and invite feedback about management responses to date
- seek ideas and feedback about possible future management options
- develop management actions to address concerns.

The types of engagement that have been undertaken include:

- promotion of contact details of responsible officers (through social media, media releases, public meetings and Council's website)
- telephone conversations to record issues and complaints. Since November 2016, a record of each telephone conversation is kept and followed up until the matter is resolved
- informal face-to-face meetings, emails and telephone calls with some local residents/ business owners
- media (radio, print, social media)
- brochures and other educational material supplied by OEH & DPI regarding health and general flying-fox facts at community meetings
- website pages and links (http://www.byron.nsw.gov.au/flying-foxes) reviewed monthly and updated accordingly (if required)
- on-site signage: interpretive signage was installed in November 2016 at:
    - Beech Camp: the footpath located on the southern junction of Beech Drive and Bottlebrush Crescent.
    - Middleton Street: on Middleton Street.
    - Mullumbimby Camp: at Rotary Rainforest Park.
    - Paddy's Creek Camp: the footbridge located on the east bank of Paddy's Creek.
- community meetings; 1,078 letters were mailed to all owners, occupiers, schools and parents of children attending that school within 150 m of a camp as well as any complainants >150 m of a camp to attend a public meeting. Four public meetings were presented by Byron Shire Council staff, GeoLINK ecologists, representatives from OEH, NSW Health and NSW Department of Primary Industries:
    - Paddy's Creek Camp held at Bangalow Bowling Club on 2 May 2017 attended by 52 people.

  - Mullumbimby Camp held at Byron Shire Council chambers on 3 May 2017 attended by 34 people.
  - Butler and Middleton Camps held at the Cavanbah Centre on 10 May 2017 attended by 12 people.
  - Beech Camp held at Broken Head Hall on 11 May 2017 attended by one person.
- online survey: 'Flying-fox Engage', an on-line stakeholder engagement and decision-support tool, was used as a mechanism for stakeholders to learn about and rank their preferred camp management options. The results were then analysed which allows land managers to make informed decisions with consideration of stakeholder concerns and preferences. This online survey was open from 18 May until 5 June 2017 with the website www.flyingfoxengage.com/byron).
- attend meeting with Byron Shire Council Biodiversity & Sustainability Panel which consists of Councillors and specialist key stakeholders, with a particular interest in or expertise in the subject of the panel, which assist Council in decision making relating to a particular matter.

Methods of engaging with the community and other stakeholders during Plan implementation will be similar to those for Plan preparation and will include:

- promotion of contact details of responsible officers (through social media, media releases, public meetings and Council's website)
- telephone conversations to record issues and complaints. Since November 2016, a record of each telephone conversation is kept and followed up until the matter is resolved
- informal face-to-face meetings, emails and telephone calls with some local residents/ business owners
- media (radio, print, social media)
- website pages and links (http://www.byron.nsw.gov.au/flying-foxes) reviewed monthly and updated accordingly (if required)
- annual community meetings (if required).

3.3 Community feedback – management options

A summary of the feedback from *Flying-fox Engage* is as follows:

- A total of 128 valid submissions were received.
- Based on the cumulative preference totals of the top five re-ranked options by users, flying-fox information and awareness programs ranked highest as the most preferred management option followed by subsidising property modification to reduce flying-fox impacts.
- Culling flying-foxes while preferred by a few, was the least preferred management option with 83 respondents placing it as their last preference followed by 'do nothing'.
- Questions with the option for open answers provided extremely polarised views that reflected many people were concerned for the welfare of the flying-foxes and many people who wished that the flying-foxes were dispersed.
- The overall feedback from the community received via *Flying-fox Engage* favoured flying-fox camp management measures that:
- provided a long-term solution
- ensured the risk of transmission of flying-fox pathogens, viruses and disease remains low

- reduced the impact of noise and odour on nearby residents and businesses
- reduced the impact of flying-fox excrement.

Additional analysis was undertaken of the submissions provided by respondents identified as living within 150 m of a subject camp. The results are summarised in **Table 3.1**.

Table 3.1 Flying-fox Engage Summary of Camp Results

	Beech Drive	Butler Street	Middleton Street	Mullumbimby	Paddy's Creek
No. of respondents	5	5	13	21	25
Most preferred management option	Provision of flying-fox information and awareness programs	Subsidising property modification to reduce the impacts of flying-foxes	Provision of flying-fox information and awareness programs	Provision of flying-fox information and awareness programs	Provision of flying-fox information and awareness programs
2nd preferred management option	Removing vegetation to create a substantial buffer	Provision of flying-fox information and awareness programs	Subsidising property modification to reduce the impacts of flying-foxes	Subsidising property modification to reduce the impacts of flying-foxes	Passive dispersal of a flying-fox camp through selective vegetation removal
3rd preferred management option	Research to improve knowledge of flying-fox ecology.	Do nothing	Active dispersal of a flying-fox camp using disturbance	Culling flying-foxes	Early dispersal before a camp is established at a new location
4th preferred management option	-	-	-	Removing vegetation to create a substantial buffer	Active dispersal of a flying-fox camp using disturbance
5th preferred management option	-	-	-	Passive dispersal of a flying-fox camp through selective vegetation removal	Subsidising property modification to reduce the impacts of flying-foxes
Least preferred management option	Culling flying-foxes	Culling flying-foxes	Culling flying-foxes	Culling flying-foxes	Culling flying-foxes
2nd least preferred management option	Passive dispersal of a flying-fox camp through changing water management	Passive dispersal of a flying-fox camp through changing water management	Do nothing	Do nothing	Do nothing
3rd least preferred management option	Do nothing	Actively nudging the camp to a nearby location using disturbance	Passive dispersal of a flying-fox camp through changing water management	Passive dispersal of a flying-fox camp through changing water management	Actively nudging the camp to a nearby location using disturbance

4th least preferred management option	-	-	-	Actively nudging the camp to a nearby location using disturbance	Passive dispersal of a flying-fox camp through changing water management
5th least preferred management option	-	-	-	Subsidising services to reduce the impacts of flying-foxes	Provision of flying-fox information and awareness programs

4. Legislation and policy

4.1 Local government

Local government is required to prepare planning schemes (including Environmental Planning Instruments and Development Control Plans) consistent with provisions under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Local Environment Plans are environmental planning instruments that are legal documents and that relate to a local government area. A development control plan provides detailed planning and design guidelines to support the planning controls in a Local Environment Plan, but they are not legal documents.

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

4.2 State

4.2.1 Flying-fox Camp Management Policy 2015

The Flying-fox Camp Management Policy 2015 (the Policy) has been developed to empower land managers, primarily local councils, to work with their communities to manage flying-fox camps effectively. It provides the framework within which OEH will make regulatory decisions. In particular, the Policy strongly encourages local councils and other land managers to prepare Camp Management Plans for sites where the local community is affected.

4.2.2 *Threatened Species Conservation Act 1995*

The objects of the *Threatened Species Conservation Act 1995* (TSC Act) include to conserve biological diversity and protect the critical habitat of threatened species, populations and ecological communities. The grey-headed flying-fox is listed as threatened under the TSC Act (see also Why the Grey-headed Flying-fox is listed as a threatened species).

Section 91 of the TSC Act provides for the application of licences if the proposed action is likely to result in one or more of the following:

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

Section 94 of the Act provides factors (the seven-part test) to assess whether the proposed action is likely to have a significant effect on any threatened species or their habitats, population or ecological community (note, this is therefore not just applicable to flying-foxes). If OEH determines that a significant effect is likely, it may require a species impact statement (SIS) to be prepared and publicly exhibited. If OEH assesses a section 91 licence application and determines that a significant impact is unlikely, a section 95 certificate will be issued (Appendix A in the Policy provides a flow chart for this process).

Note: This Act is to be repealed on the commencement of the *Biodiversity Conservation Act 2016* on 25 August 2017.

4.2.3 *Biodiversity Conservation Act 2016*

Note: This Act has not yet commenced.

The purpose of this Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

4.2.4 *National Parks and Wildlife Act 1974*

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the conservation of nature, objects, places or features of cultural value and the management of land reserved under this Act. All native animals and many species of native plants are protected under the NPW Act. All native fauna, including flying-foxes, are specifically protected under section 98.

Under this Act, licences can be issued for actions such as harming or obtaining any protected fauna for specified purposes, picking protected plants or damaging habitat of a threatened species, population or ecological community. Note that the definition of 'harm' includes to *hunt, shoot, poison, net, snare, spear, pursue, capture, trap, injure or kill*. The definition of 'pick' includes to *gather, pluck, cut, pull up, destroy, poison, take, dig up, crush, trample, remove or injure the plant or any part of the plant*.

4.2.5 *Prevention of Cruelty to Animals Act 1979*

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

4.2.6 *Environmental Planning and Assessment Act 1979*

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

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

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

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

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

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

4.2.7 *Crown Lands Act 1989*

The principles of Crown land management include the observance of environmental protection principles and the conservation of its natural resources, including water, soil, flora, fauna and scenic quality. Any works on land that is held or reserved under the *Crown Lands Act 1989* (including vegetation management and dispersal activities) are an offence under the Act without prior authorisation obtained through the Department of Industries - Lands. Butler, Middleton and Mullumbimby camps are all located wholly or partially on Crown land.

4.2.8 *Protection of the Environment Operations Act 1997*

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

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

The POEO Act also regulates noise including 'offensive noise'. The Protection of the Environment Operations (Noise Control) Regulation 2008 (Part 4, Division 2) provides information on the types of noise that can be 'offensive' and for which the Environment Protection Authority (EPA) can issue fines. This may include noise generated as a part of dispersal activities.

4.2.9 *Local Government Act 1993*

The primary purpose of this Act is to provide the legal framework for an effective, efficient and environmentally responsible, open system of local government. Most relevant to flying-fox management is that it also provides encouragement for the effective participation of local communities in the affairs of local government and sets out guidance on the use and management of community land which may be applicable to land which requires management of flying-foxes. Beech Drive camp and Mullumbimby camp both occur wholly or partially on community land.

4.2.10 *Roads Act 1993*

Under s177 of the *Roads Act 1993*, Council may request to transfer the public road corridor (6 m wide) on the southern boundary of the Middleton Street camp, which is currently Crown land to Council for the purpose of flying-fox camp management activities on the subject road.

Under s138 of the *Roads Act 1993* consent to maintain the public road corridor for the purpose of flying-fox camp management activities on the subject road must to be obtained by Council.

4.3 Commonwealth

4.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

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

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

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

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

The Guideline defines a nationally important Grey-headed Flying-fox camp as one that has either:

- contained ≥10,000 Grey-headed Flying-fox in more than one year in the last 10 years, or
- been occupied by more than Grey-headed Flying-fox permanently or seasonally every year for the last 10 years.

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

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

Mitigation standards

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

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

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

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

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

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

4.3.2 DoEE Draft Recovery Plan for the Grey-headed Flying-fox

The Commonwealth government DoEE released the *Draft Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus for* public comment in early 2017. The plan identifies nine recovery objectives and 31 actions, with the overall aim '*to improve the national population trend; identify, manage and secure key foraging and roosting habitat; improve the community's capacity to coexist with flying-foxes; and increase awareness about flying-foxes, the threats they face and the important ecosystem services they provide as seed dispersers and pollinators*'. Actions specifically relevant to flying-fox camp management include:

- *Action 2.1: Continue to maintain a database of Grey-headed Flying-fox camps.*
- *Action 2.2: Undertake work on the database to include tenure and zoning of the land and land adjoining all camps.*
- *Action 2.3: Protect and enhance roosting habitat for Grey-headed Flying-foxes.*
- *Action 2.4: Develop and implement plans of management for all problematic Grey-headed Flying-fox camps.*
- *Action 4.1: Undertake community surveys to elicit community values and attitudes towards wildlife, specifically flying-foxes, and also to assess the effectiveness of public awareness-raising.*
- *Action 4.2: Develop and publish information for the community to build their capacity to coexist with Grey-headed Flying-foxes.*
- *Action 4.3: Publish case studies demonstrating how effective in situ management of flying-foxes can mitigate impacts on the local community, as well as the difficulties and costs associated with attempting dispersals.*
- *Action 4.4: Work with local governments and private landholders to identify existing flying-fox roosting habitat, implement mitigation measures in areas of conflict and investigate opportunities for creating or rehabilitating habitat away from people, and areas unsuitable for development due to potential conflict.*
- *Action 6.1: Ensure the public is aware of the referral guideline and that it is widely available for proponents who are proposing to manage a problematic flying-fox camp*.

5. Other ecological values of the site

A desktop assessment of ecological values of each flying-fox camp including threatened species, ecological communities, critical habitat, SEPP 14 Coastal Wetlands and SEPP 26 Littoral Rainforest is provided within **Appendix C**. Additional information regarding flying-fox ecology and behaviour is provided in **Appendix D**.

Areas of High Environmental Value (HEV) are based on the following criteria:
a. Areas protected for conservation
b. Native vegetation of high conservation value
c. Key habitat for threatened species and, populations
d. Wetlands, rivers, estuaries and coastal features of high value
e. Areas of geological significance.

5.1 Beech Drive camp

The land is mapped by Council as HEV vegetation. The vegetation is mapped by Council as Coastal Swamp Forest. The camp was ground-truthed during site assessment and is consistent with Council vegetation mapping.

This camp is made up of low dense mixed forest of eucalypts and paperbarks with minimal shrub cover and dense graminoid groundcover. The vegetation was observed to be in good condition with minimal weeds throughout the core of the site. The boggy ground is heavily clothed in leaf litter, interspersed with patches of sedges and ferns, temporary pools of water and bare ground. Canopy cover is dominated by Broad-Leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*).

The vegetation does not comprise an Endangered Ecological Community (EEC) listed under the TSC Act or the *Biodiversity Conservation Act 2016* (yet to be enacted) as it is located on a coastal sandplain. No Threatened Ecological Communities (TEC) listed under the EPBC Act occurs at the site.

5.2 Butler Street camp

The land is mapped by Council as HEV vegetation. The vegetation on both land parcels mostly consists of Coastal Swamp Forest made up of low dense mixed forest of eucalypts and paperbarks with minimal shrub cover and dense graminoid groundcover. The boggy ground is heavily clothed in leaf litter, interspersed with patches of sedges and ferns, temporary pools of water and bare ground. Canopy cover includes Swamp Mahogany (*Eucalyptus robusta*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Oak (*Casuarina glauca*). Edges comprise an uneven canopy with a weedy component of Camphor Laurel and Coral Tree (*Erythrina x sykesii)*.

The vegetation does not comprise an EEC listed under the TSC Act or the *Biodiversity Conservation Act 2016* (yet to be enacted) as it is located on a coastal sandplain. No TEC under the EPBC Act occur at the site.

5.3 Middleton Street camp

The land is mapped by Council as HEV vegetation. The vegetation mostly consists of Coastal Swamp Forest made up of low dense mixed forest of Swamp Oak (*Casuarina glauca*) and Broad-leaved Paperbark. Exotic species such as Coral Tree, Camphor Laurel and Cocos Palm (*Syagrus romanzoffiana*) are present within canopy gaps and provide habitat for Australian White Ibis. Common Reed (*Phragmites australis*) dominates the understorey.

The vegetation does not comprise an EEC listed under the TSC Act as it is located on a coastal sandplain. No TEC under the EPBC Act occur at the site.

5.4 Mullumbimby camp

The land is mapped by Byron Shire Council as HEV vegetation. The vegetation mostly consists of Casuarina and Camphor Laurel however, threatened flora such as Coolamon (*Syzygium moorei*) and Marblewood (*Acacia bakeri*) are also present (GeoLINK 2016). In addition, the riparian vegetation along Chinbible Creek constitutes Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC, listed under the TSC Act. No other EEC or TEC under the TSC Act or EPBC Act occur at the site.

5.5 Paddy's Creek camp

The land is mapped by Byron Shire Council as HEV vegetation. The canopy is dominated by Camphor Laurel and rainforest trees such as Bangalow Palm, Bleeding Heart (*Homalanthus populifolius)* and Black Bean (*Castanospermum australe)*. One threatened flora species, Coolamon (*Syzygium moorei*) was observed north of the Bangalow Community Child Care Centre. The core area of this community constitutes Lowland Rainforest in NSW North Coast and Sydney Basin Bioregions EEC, listed under the TSC Act. No other EEC or TEC under the TSC Act or EPBC Act occur at the site.

In 1989, local resident Edie Franks planted both banks Paddy's Creek with rainforest species. Originally, rainforest species were planted along the western bank within the riparian zone for approximately 300 m north of the footbridge and south to the Bangalow Community Child Care Centre. On the eastern bank, rainforest species were planted south of the footbridge for approximately 300 m. In 2012, a large proportion and diversity of weeds were recorded by Council including Small-leaved Privet, (*Ligustrum sinense*), Green Cestrum (*Cestrum parqui*), Mickey Mouse Plant (*Ochna serrulata)*, Giant Devil's Fig (*Solanum chrysotrichum*) and Cat's Claw (*Doxanthus unguis-cati*) (Bryon Shire Council 2012). Bangalow Land and Rivercare has undertaken additional vegetation maintenance around Paddy's Creek in recent years.

6. Human and animal health

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

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

6.1 Disease and flying-fox management

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

The effects of stress are linked to increased susceptibility and expression of disease in both humans (AIHW 2012) and animals (Henry & Stephens-Larson 1985; Aich *et al.* 2009), including reduced immunity to disease.

Therefore it can be assumed that management actions which may cause stress (e.g. dispersal), particularly over a prolonged period or at times where other stressors are increased (e.g. food shortages, habitat fragmentation, etc.), are likely to increase the susceptibility and prevalence of disease within the flying-fox population, and consequently the risk of transfer to humans.

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

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

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

7. Site-specific analysis of camp management options

The full range of options available for management of the five subject flying-fox camps were identified and reviewed throughout community consultation and Plan preparation. This suite of management options includes level 1, 2 and 3 (refer to **Table 7.1**) actions requiring short, medium and long term input. They attempt to address issues raised by community concerns and are used to inform Byron Shire Council's approach to the proposed management actions for each camp (refer to **Section 8**).

Table 7.1 Analysis of management options

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Level 1 actions				
Information and awareness programs	Perceived health risks Noise Smell Faecal drop	$	Low cost, promotes conservation of FFs, contributes to attitude change which may reduce general need for camp intervention, increasing awareness and providing options for landholders to reduce impacts can be an effective long-term solution, can be undertaken quickly, will not impact on ecological or amenity value of the site.	Information and advice itself will not mitigate all issues, and may be seen as not doing enough.
Property modification	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	$–$$	Property modification is one of the most effective ways to reduce amenity impacts of a camp without dispersal (and associated risks), relatively low cost, promotes conservation of FFs, can be undertaken quickly, will not impact on the site, may add value to the property.	May be cost-prohibitive for private landholders, unlikely to fully mitigate amenity issues in outdoor areas.
Fully-fund/ subsidise property modification	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	$–$$	Potential advantages as per property modification, but also overcomes issue of cost for private landholders.	Costs to the land manager will vary depending on the criteria set for the subsidy including proximity to site, term of subsidy, and level of subsidy. Potential for community conflict when developing the criteria, and may lead to expectations for similar subsidies for other issues.
Service subsidies including rate rebates	Noise Smell Faecal drop Health/wellbeing Property devaluation Lost rental return	$–$$	May encourage tolerance of living near a camp, promotes conservation of FFs, can be undertaken quickly, will not impact on the site, and would reduce the need for property modification.	May be costly across multiple properties and would incur ongoing costs, may set unrealistic community expectations for other community issues, effort required to determine who would receive subsidies.

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Routine camp management	Health/ wellbeing	$	Will allow property maintenance, likely to improve habitat, could improve public perception of the site, will ensure safety risks of a public site can be managed. Weed removal has the potential to reduce roost availability and reduce numbers of roosting FFs. To avoid this, weed removal should be staged and alternative roost habitat planted, otherwise activities may constitute a Level 3 action.	Will not generally mitigate amenity impacts for nearby landholders.
Alternative habitat creation	All	$$–$$$	If successful in attracting FFs away from high conflict areas, dedicated habitat in low conflict areas will mitigate all impacts, promotes FF conservation. Rehabilitation of degraded habitat that is likely to be suitable for FF use could be a more practical and faster approach than habitat creation.	Generally costly, long-term approach so cannot be undertaken quickly, previous attempts to attract FFs to a new site have not been known to succeed.
Provision of artificial roosting habitat	All	$–$$	If successful in attracting FFs away from high conflict areas, artificial roosting habitat in low conflict areas will assist in mitigating all impacts, generally low cost, can be undertaken quickly, and promotes FF conservation.	Would need to be combined with other measures (e.g. buffers/alternative habitat creation) to mitigate impacts, previous attempts have had limited success.
Protocols to manage incidents	Health/ wellbeing	$	Low cost, will reduce actual risk of negative human/pet–FF interactions, promotes conservation of FFs, can be undertaken quickly, will not impact the site.	Will not generally mitigate amenity impacts.
Research	All	$	Supporting research to improve understanding may contribute to more effectively mitigating all impacts, promotes FF conservation.	Generally cannot be undertaken quickly, management trials may require further cost input.
Appropriate land-use planning	All	$	Likely to reduce future conflict, promotes FF conservation. Identification of degraded sites that may be suitable for long-term rehabilitation for FFs could facilitate offset strategies should clearing be required under Level 2 actions.	Will not generally mitigate current impacts, land-use restrictions may impact the landholder.
Property acquisition	All for specific property owners Nil for broader community	$$$	Will reduce future conflict with the owners of acquired property.	Owners may not want to move, only improves amenity for those who fit criteria for acquisition, very expensive.
Do nothing	Nil	Nil	No resource expenditure.	Will not mitigate impacts and unlikely to be considered acceptable by the community.

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Level 2 actions				
Buffers through vegetation removal	Noise Smell Health/ wellbeing Property devaluation Lost rental return	$–$$	Will reduce impacts, promotes FF conservation, can be undertaken quickly, and limited maintenance costs.	Will impact the site, will not generally eliminate impacts, vegetation removal may not be favoured by the community.
Buffers without vegetation removal	Noise Smell Health/ wellbeing Damage to vegetation Property devaluation Lost rental return	$$	Successful creation of a buffer will reduce impacts, promotes FF conservation, can be undertaken quickly, options without vegetation removal may be preferred by the community.	May impact the site, buffers will not generally eliminate impacts, maintenance costs may be significant, often logistically difficult, limited trials so likely effectiveness unknown.
Noise attenuation fencing	Noise Smell Health/ wellbeing Property devaluation Lost rental return	$$	Will eliminate/significantly reduce noise impacts, will reduce other impacts, limited maintenance costs.	Costly, likely to impact visual amenity of the site, will not eliminate all impacts, may impact other wildlife at the site.
Level 3 actions				
Nudging	All	$$–$$$	If nudging is successful this may mitigate all impacts.	Costly, FFs will continue attempting to recolonise the area unless combined with habitat modification/ deterrents.
Passive dispersal through vegetation management	All at that site but not generally appropriate for amenity impacts only	$$–$$$	If successful can mitigate all impacts at that site, compared with active dispersal: less stress on FFs, less ongoing cost, less restrictive in timing with ability for evening vegetation removal.	Costly, will impact site, risk of removing habitat before outcome known, potential to splinter the camp creating problems at other locations (although less than active dispersal), potential welfare impacts, disturbance to community, negative public perception, unknown conservation impacts, unpredictability makes budgeting and risk assessment difficult, may increase disease risk (see **Section 6.1**), potential to impact on aircraft safety.
Passive dispersal through water management	All at that site but not generally appropriate for amenity impacts only	$$–$$$	Potential advantages as per with passive dispersal through vegetation removal, however likelihood of success unknown.	Potential disadvantages as per passive dispersal through vegetation removal, however likelihood of success unknown.

Management option	Relevant impacts	Cost	Advantages	Disadvantages
Active dispersal	All at that site but not generally appropriate for amenity impacts only (see **Section 8**)	$$$	If successful can mitigate all impacts at that site, often stated as the preferred method for impacted community members.	May be very costly, often unsuccessful, ongoing dispersal generally required unless combined with habitat modification, potential to splinter the camp creating problems in other locations, potential for significant animal welfare impacts, disturbance to community, negative public perception, unknown conservation impacts, unpredictability makes budgeting and risk assessment difficult, may increase disease risk (see **Section 6.1**), potential to impact on aircraft safety.
Early dispersal before a camp is established at a new location	All at that site	$$–$$$	Potential advantages as per other dispersal methods, but more likely to be successful than dispersal of a historic camp.	Potential disadvantages as per other dispersal methods, but possibly less costly and slightly lower risk than dispersing a historic camp. Potential to increase pressure on FFs that may have relocated from another dispersed camp, which may exacerbate impacts on these individuals.

8. Planned management approach

OEH identifies three levels of action that may be undertaken to manage a flying-fox camp (refer to http://www.byron.nsw.gov.au/flying-foxes). Level 1 actions should be attempted and the effectiveness reviewed before deciding if higher level actions are necessary.

When deciding on appropriate management actions the following factors were considered:

- which suite of actions is most likely to be efficient, effective and legally defensible with respect to balancing community concerns and neighbourhood amenity with environmental outcomes.
- a regional and long-term approach, including potential impacts on nearby land managers.
- current risks associated with the camps with consideration of flying-fox use of each site, current and future land use, proximity to residents, schools, child care centres, hospitals, aged care centres, businesses, equine facilities and public use areas.
- risk associated with management with consideration of potential impacts to each site, animal welfare, conservation of threatened species, likely resource requirements, effects on disease, potential to exacerbate impacts at the site or at other locations.
- estimated costs and who would contribute funding.

8.1 Consideration of active dispersal

Byron Shire Council's approach for this Plan takes into account scientific understanding of flying-fox behaviour and habitat requirements, practical experience with flying-fox camp management plans in NSW and the review of management options available. **If, after five years of implementation of the actions outlined within this Plan, improvements in the human flying-fox conflict have not been achieved, it is at this stage that level 3 actions such as active dispersal may be investigated further.** Improvements in the human-flying-fox conflict may be measured by a reduction in complaints to Council or a general satisfaction when the community is re-surveyed or at future community meetings. This measure of improvement may be determined by the future flying-fox working group.

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

- In all cases, dispersed animals did not abandon the local area[5].
- In 16 of the 17 cases, dispersals did not reduce the number of flying-foxes in the local area.
- Dispersed animals did not move far (in approximately 63% of cases the animals only moved <600 m from the original site, contingent on the distribution of available vegetation). In 85% of cases, new camps were established nearby.
- In all cases, it was not possible to predict where replacement camps would form.
- Conflict was often not resolved. In 71% of cases conflict was still being reported either at the original site or within the local area years after the initial dispersal actions.
- Repeat dispersal actions were generally required (all cases except where extensive vegetation removal occurred).
- The financial costs of all dispersal attempts were high, ranging from tens of thousands of dollars for vegetation removal to hundreds of thousands for active dispersals (e.g. using noise, smoke, etc.).

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

Ecosure, in collaboration with a Griffith University Industry Affiliates Program student, researched outcomes of management in Queensland between November 2013 and November 2014 (the first year since the current Queensland state flying-fox management framework was adopted on 29 November 2013). An overview of findings[6] is summarised below.

- There were attempts to disperse 25 separate roosts in Queensland (compared with nine roosts between 1990 and June 2013 analysed in Roberts and Eby (2013)). Compared with the historical average (less than 0.4 roosts/ year) the number of roosts dispersed in the year since the Code was introduced has increased by 6250%.
- The most common dispersal methods were extensive vegetation modification alone and extensive vegetation modification combined with other methods.
- In nine of the 24 roosts dispersed, dispersal actions did not reduce the number of flying-foxes in the LGA.
- In all cases it was not possible to predict where new roosts would form.
- When flying-foxes were dispersed, they did not move further than 6 km away.
- As at November 2014 repeat actions had already been required in 18 cases.
- Conflict for the council and community was resolved in 60% of cases, but with many councils stating that they feel this resolution is only temporary.
- The financial costs of all dispersal attempts, regardless of methods used were considerable, ranging from $7,500 to more than $400,000 (with costs ongoing).

A major risk with dispersal as a management action is the risk of moving the camp to other similar (potentially less desirable/ more sensitive) locations, which in turn only transfers the human/ flying-fox conflict. Such an outcome is not in line with the objectives of the Plan, which aims to reduce human/ flying-fox conflicts.

8.2 Proposed management actions for each flying-fox camp

Byron Shire Council is responsible for the actions outlined in the Plan. General actions that are applicable at all camps are provided in **Table 8.1**. Specific actions proposed for each camp are identified in **Table 8.2** to **Table 8.6**. Target objective refers to the objective numbers in **Section 1.2** of the Plan.

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

Table 8.1 Proposed management for all Byron Shire flying-fox camps

Action ID	Management action	Target issue	Target objective	Priority	Timing	Management action details	Performance indicators	Cost
Level 1 actions								
1.1	Appoint a Flying-fox Officer	All	1, 4, 6	High	Year 1	• Council appoint a part time Flying-fox Officer, to organise and facilitate at least the initial stages of the Plan implementation where a high level community engagement will be required, as well as establishing a working group to seek ongoing external funds and prioritise on ground works.	• Flying-fox Officer appointed. • Flying-fox Officer facilitates management actions. • Community confidence in Council's ability to management flying-fox camps increased	Annual: $55K Life of Plan: $287K
1.2	Information and awareness program	All	6, 9	High	Commence: Year1 Continue: Years 1-5 Benefit: Long term	Provide information to the community regarding disease risk and management, how to minimise flying-fox impacts at your home, flying-fox management actions being undertaken by Council, flying-fox ecology and legislative status. This includes: • Utilising existing flying-fox community information and awareness information published by Australasian Bat Society, OEH and DoEE. • Facilitating/ conducting talks in schools to staff and students regarding flying-foxes and health. • Updating Council website with up-to-date program of works being undertaken at each camp. • Regular media releases regarding works at each camp and trends of flying-foxes in the Shire. • Education to be delivered via public information sessions, targeted workshops, information on Council's website, information leaflets/fact sheets etc. • Providing on-going education to Council staff and decision-makers. • Documenting the management actions as they are completed in a video format to be published on Council's website. • Updating Council's website to include live raw data regarding flying-fox counts. • Provide information on products and modifications that residents can undertake to reduce flying-fox impacts (eg. first flush water tank diverters, removing washing before dusk, relocating clothes-lines from below food trees, netting fruit trees).	• Community has greater understanding of the long-term strategy for managing flying-foxes. • Complaints to Council regarding flying-foxes are reduced.	Use budget from Flying-fox Officer (see below)
1.3	Routine camp management	All	1, 5, 8, 9, 10	High	Implement: Years 1-5	Develop protocols and training for Council workers and other on-ground works organisations (such as Landcare groups and utility services contractors) when working near/ at flying-fox camps to minimise flying-fox disturbance and associated impacts (eg. noise) for surrounding sensitive receivers including residents and businesses. Protocols would include: • undertake an acclimatisation program prior to operational works allowing time for flying-foxes to become accustom to machinery and staff. For example operate truck/ chipper for two hours at a safe distance from the camp and move the heavy machinery slowly toward the camp until no agitation is evident; • if flying-foxes are present and heavy machinery such as chainsaws, whipper snippers and lawn mowers are required, monitor camp during use; • operational works within or adjacent to flying-fox habitat are timed outside the species reproductive time or times when flying-fox numbers are low*.	• Protocol developed and adopted. • Training provided to relevant Council staff.	Existing resources
1.4	Appropriate land-use planning	All	1, 2, 3, 7	High	Years 1-5 Benefit: Long term	• Ensure adequate distances are maintained between future residential developments and existing or historical flying-fox camps. • Investigate the preparation of a DCP to guide future development near flying-fox camps within the shire. DCP to include structural requirements or guidelines on new buildings within proximity to camp to minimise the risk of future conflicts from flying-fox noise, odours and droppings. • Ensure the mapping of flying-fox camps is available to increase awareness about flying-fox camps and potential property buyers are fully informed. • Investigate the possibility of including flying-fox camps on Section 149 certificates. • Ensure that minor residential additions aimed at providing protection from potential nuisance from faecal drop/ noise etc from flying-foxes (eg. car ports, sound proofing, covered outdoor areas etc) can be processed under the Exempt and Complying Provisions of Council's DCP.	• Conflicts are minimised through appropriate use of the site and awareness of new owners/ occupiers that a flying-fox camp is present nearby. • Appropriate developments are located near future flying-fox camps.	Existing resources
1.5	Integrated Vegetation Management Plan (VMP)	All	1, 2	High	Year 1	• An integrated VMP is required at all sites to complement the Plan. The VMP would encompass site specific bush regeneration or habitat creation actions, as well as the management of vegetation removal sites with the objective of minimising adverse vegetative or habitat impacts. For example, where riparian Camphor Laurel removal is required at Mullumbimby and Paddy's Creek camps, the VMP would include weed management and planting with appropriate low growing (<3 m tall) species to minimise degradation of other values of the site such as bank stability and water quality.	• Complaints to Council regarding flying-foxes are reduced. • Weed incursion is reduced. • Other ecological values of sites are maintained.	Life of Plan: $5K covering all camps
1.6	Alternative habitat creation	All	5, 7, 12	Medium	Commence: Year 2 Benefit: Long term	• Identify areas within Byron Shire that comprise preferred camp habitat characteristics and would therefore be suitable to plant out; providing alternate flying-fox roosting habitat away from conflict areas.	• Suitable areas are mapped. • Suitable areas are ground-truthed. • Suitable areas are planted with flying-fox roosting vegetation.	Planning: $10K Onground works: $30K for 1 ha
1.7	Protocols to manage incidents	Noise Flying-fox conservation	1, 3, 8, 10	Medium	Implement: Years 1-5	• Develop protocols for heat stress incidents (when the camp is subjected to extremely high temperatures leading to flying-foxes changing their behaviour and/ or dying). • Protocols to include conflict minimisation actions such as the management of pets at sites popular for walking dogs and closure of footpaths that intersect camps. • Council are familiar with and use http://www.animalecologylab.org/ff-heat-stress-forecaster.html	• Complaints to Council regarding flying-foxes are reduced. • Council are prepared for heat stress events. • Reduced numbers of flying-fox deaths reported during heat stress events. • Heat stress events are reported to http://www.animalecologylab.org/heat-stress-data-form.html	Existing resources
1.8	Improved access for flying-fox surveys	Improved knowledge	5	Medium	Years 1-5	• Seek written approvals from private landholders to access their property for the purpose of flying-fox surveys.	• Approval from landholders obtained.	Nil

Action ID	Management action	Target issue	Target objective	Priority	Timing	Management action details	Performance indicators	Cost
1.9	Update mapping	Improved knowledge	5	Medium	Year 2	• Update Council's internal *Geocortex* mapping to reflect maximum extent of known flying-fox camps.	• Council's mapping is up to date.	Existing resources
1.10	Establish a working group	All	1, 4, 6	Medium	Year 1	• Establishment of a flying-fox working group comprised of Council staff, community, Aboriginal land council, wildlife carers, and relevant government agencies such as Department of Lands.	• Working group formed and meets regularly.	Existing resources
1.11	Service subsidies for property cleaning equipment	Faecal drop	1, 2	Low	Year 3	• Council to purchase a high-pressure cleaner to be provided/ rented to affected residents to clean driveways/ verandas etc affected by faecal drop. • Exempt residents affected by flying-fox faecal drop from water restrictions to allow cleaning of essential pathways and structures.	• Complaints to Council regarding flying-foxes are reduced. • Pressure cleaner available by Year 3.	Life of Plan: $500

* The most appropriate time to conduct works within or around an occupied flying-fox colony to reduce impacts on the reproductive output of Grey-headed and Black Flying-foxes would be between May and July. It would be preferred to avoid disturbing flying-foxes between August – April as these months include the last trimester of pregnancy (when food resources are limited and additional stresses can cause flying-foxes to abort young), times when the young are not independent (young can be dropped by mothers as a result of the disturbances) and months when flying-foxes are weaning young (March - April).

NOTE: Costs for the 'Life of Plan' presented within **Tables 8.1-8.6** include CPI calculated at 2.1%

8.2.1 Beech Drive camp

Residential development directly bounds the Beech Drive flying-fox camp to the south, west and north. These proposed management actions attempt to address impacts from flying-foxes experienced by these sensitive receivers. The camp management actions listed in **Table 8.2** apply specifically to Beech Drive flying-fox camp and are in addition to those listed in **Table 8.1**. In addition to the community consultation findings, other key considerations when identifying site specific management actions at this site include:

- The camp supports relatively low numbers of flying-foxes and occupation is not consistent.
- The vegetation at the site is mapped as high environmental value.
- There are limited opportunities to 'nudge' the camp away from receivers due to the camp being surrounded by residential development.
- Residential housing is the main sensitive receiver surrounding the site.

Table 8.2 Proposed management for Beech Drive flying-fox camp

Action ID	Management action	Target issue	Target objective	Priority	Timing	Management action details	Performance indicators	Cost
Level 1 actions								
1.1	Modify access	Noise Faecal drop	1, 3	High	As required	Temporarily close the footpath from Beech Drive along the rear of houses on the southern side of Bottlebrush Drive when flying-foxes are roosting in close proximity to the southern side of the camp in numbers >500, so as to minimise disturbance to flying-foxes and subsequent impacts on surrounding residents (eg. noise).	• Complaints to Council regarding flying-foxes are reduced.	Existing resources and Flying-fox Officer
1.2	Bush regeneration	All	2	Low	Implement: Quarterly Benefit: Long term	Monitor and control weed infestations at the site. The site currently has low levels of weeds, and maintaining or further removing weeds would help conserve the amenity of the site.	• Complaints to Council regarding flying-foxes are reduced. • Weed incursion is reduced.	Annual: $3K Life of Plan: $15K
Level 2 actions								
2.1	Buffers through vegetation removal	Noise Smell Health/ well being	1, 2	High	Implement: Year 1 Benefit: Immediate Maintenance: Long term	Trim vegetation from Council land that over hangs private properties to the south of the camp in close consultation with residents (refer to **Plate 8.1** and **Plate 8.2**). This will create approximately 10 m of separation between dwellings and vegetation at the camp. *Note: while this option does not directly impact on the recorded camp footprint, it will help mitigate impacts should shifts in the roost footprint occur*	• Vegetation is trimmed. • Complaints to Council regarding flying-foxes are reduced.	$20K initial work (year 1), $4,000 maintenance per year (years 2-5), Life of Plan: $36,511
2.2	Buffers through vegetation removal	Noise Smell Health/ well being	1, 2	Medium	Implement: Year 2/3 Benefit: Immediate Maintenance: Long term	Trim vegetation from Council land that over hangs private properties to the west/ north of the camp in close consultation with residents (refer to **Illustration 8.1**). This will create approximately 5-10 m of separation between dwellings and vegetation at the camp. *Note: while this option does not directly impact on the recorded camp footprint, it will help mitigate impacts should shifts in the roost footprint occur*	• Vegetation is trimmed. • Complaints to Council regarding flying-foxes are reduced.	$20K initial work (year 1), $4,000 maintenance per year (years 2-5), Life of Plan: $36,511
2.3	Buffers without vegetation removal	Noise Smell Health/ well being	1, 2, 12	Low	Year 4/5 if required	Should conflicts with sensitive receivers continue after implementing the above actions, investigations into installation of targeted flying-fox deterrent devices (ie sprinklers in vegetation canopy) at targeted sensitive residents would be undertaken with the aim of maintaining a minimum 15 m buffer between housing and roosting flying-foxes, without pushing the camp into close proximity with other sensitive receivers. Sprinklers can be placed on automatic timers to activate periodically.	• Flying-foxes move towards vegetation core away from residents. • Complaints to Council regarding flying-foxes are reduced.	$10K installation plus operational costs to be borne by the subject resident.

Plate 8.1 View north along footpath at rear of Bottlebrush Crescent showing vegetation overhanging residential properties

Plate 8.2 View south along foot path at rear of Bottlebrush Crescent showing vegetation overhanging residential properties

8.2.2 Butler Street camp

Residential development is located in close proximity to the Butler Street flying-fox camp to the south, east and north along with localised commercial businesses. These proposed management actions attempt to address impacts from flying-foxes experienced by these sensitive receivers. The camp management actions listed in **Table 8.3** apply specifically to Butler Street flying-fox camp and are in addition to those listed in **Table 8.1**. In addition to the community consultation outcomes, other key considerations when identifying site specific management actions at this site include:

- The vegetation at the site is mapped as high environmental value.
- Existing buffers and separation between the camp footprint and sensitive receivers is in place.

Table 8.3 Proposed management for Butler Street flying-fox camp

Action ID	Management action	Target issue	Target objective	Priority	Timing	Management action details	Performance indicators	Cost
Level 1 actions								
1.1	Modify access	Noise Faecal drop	1, 3	High	As required	• Temporarily close the boardwalk to the general public by erection of a 'board walk closed sign' through the Cumbebin Wetland Sanctuary when flying-foxes are roosting within 10 m of the boardwalk so as to minimise disturbance to flying-foxes which causes subsequent impacts on surrounding residents (eg. noise).	• Complaints to Council regarding flying-foxes are reduced.	Nil
1.2	Appropriate land-use planning	All	1, 2, 3, 7,	Medium	Implement: Year 1/2 Benefits: Long term	• Consideration of future use of the previous Byron Bay Hospital site • Consideration in future developments • If Council, seek to develop north of Somerset Street/ west of Butler Street then buffer zones must be accounted for.	• Conflicts are minimised through appropriate use of the site and awareness of new owners/ occupiers that a flying-fox camp is present nearby.	Existing resources
1.3	Bush regeneration	All	2	Low	Bi-annually	• Control weeds at the site. • Support provided to Byron Environment Centre who manage Cumbebin Wetland Sanctuary.	• Complaints to Council regarding flying-foxes are reduced. • Weed incursion is reduced. • Flying-foxes move towards core away from periphery.	Annual: $3K Life of Plan: $15,643
Level 2 actions								
2.1	Maintain existing buffers	Noise Smell Health/ well being	1, 2	High	As required	• Maintain existing buffers along the northern side of the camp from the drainage line and cycle path to private property. • Maintain existing buffers along the southern side of the camp along the paper road/ utilities easement to private property (refer to **Illustration 8.2**). • Improve and maintain existing buffers along the eastern side of the camp along Burns Street. This will maintain approximately 5-15 m of separation between dwellings and vegetation at the camp to the south; 15 to 25 m separation between dwellings and vegetation at the camp to the north; and 20 m separation between dwellings and vegetation at the camp to the east. *Note: while this option does not directly impact on the recorded camp footprint, it will help mitigate impacts should shifts in the roost footprint occur.*	• Reduced conflicts at adjacent residential dwellings. • Complaints to Council regarding flying-foxes are reduced.	Existing budget

Plate 8.3 View east along northern boundary of camp showing existing buffer to be maintained

Plate 8.4 Existing habitat within core of camp to be maintained by bush regeneration

8.2.3 Middleton Street camp

Commercial development is located in close proximity to the Middleton Street flying-fox camp to the south, west and north. Residential housing occurs to the south and east. These proposed management actions attempt to address impacts from flying-foxes experienced by these sensitive receivers. The camp management actions listed in **Table 8.4** apply specifically to Middleton flying-fox camp and are in addition to those listed in **Table 8.1**. In addition to the community consultation outcomes, other key considerations when identifying site specific management actions at this site include:

- The risk of exacerbating impacts to other regional camps from dispersal and other similar actions (particularly the Butler Street camp and Beech Drive camp).
- Existing buffers and separation between the camp footprint and sensitive receivers are in place.
- Commercial businesses are the key sensitive receivers.

Table 8.4 Proposed management for Middleton Street flying-fox camp

Action ID	Management action	Target issue	Target objective	Priority	Timing	Management action details	Performance indicators	Cost
Level 1 actions								
1.1	Habitat enhancement	All	5, 7, 12	High	Implement: Years 1-2 Benefit: long term	• Plant suitable roosting trees in canopy gaps to increase roosting carrying capacity away for sensitive receivers (refer to **Illustration 8.3**).	• Complaints to Council regarding flying-foxes are reduced. • Flying-foxes move towards core away from periphery. • Weed incursion is reduced.	Initial: $5,000 + support from community groups
1.2	Bush regeneration	All	2	Medium	Quarterly	• Control of woody weeds such as Coral Tree, Camphor Laurel and Tobacco Bush to increase roosting carrying capacity of core and encourage flying-foxes away from fringes.	• Complaints to Council regarding flying-foxes are reduced. • Weed incursion is reduced. • Flying-foxes move towards core away from periphery.	Annual: $5,400 Life of Plan: $28,158
1.3	Partially/ fully subsidised property modification	Noise Smell Faecal drop Health/ wellbeing Property devaluation Lost rental return Impacts on businesses	1, 2, 5	Medium	Implement: Years 2/3 Benefit: Immediate	Where noise and smell is an issue: • Install double-glazed windows on facades facing the flying-fox camp. • Install insulation and air-conditioners. Where faecal droppings are an issue: • Cover vehicles parking areas. • Move or cover outdoor areas (e.g. BBQs and tables, walkways eg. on Middleton Street, etc) within close proximity to a camp.	• Modifications installed. • Complaints to Council regarding flying-foxes are reduced.	Low to high depending on the number of properties, extent of subsidy and type of work to be done (e.g. $5K to >$100K). The amount of the subsidy is to be determined by Council on a case by case basis.
1.4	Modify access	Noise Faecal drop Impacts on businesses	1, 5, 11, 12	Medium	Year 2	• Restrict informal pedestrian access through the camp by using bollards, large landscaping rocks or planting out informal tracks. • Install signage and physical deterrent at the southern edge of the courthouse off Middleton Street and the eastern edge of the courthouse (near the skate park) to direct pedestrians to the formal footpath to the north (refer to **Illustration 8.3**).	• Informal pedestrian access reduced.	Life of Plan: $10K
1.5	Manage public road corridor	Noise Impacts on businesses	1, 5, 8	Medium	Year 2	• Investigate transfer of the 6 m public road corridor on the southern boundary under s177 of the *Roads Act 1993* to Council. • Investigate consent for Council to maintain the public road corridor for the purpose of flying-fox camp management under s138 of the *Roads Act 1993.*	• Public road corridor transferred to be under Council management. • Formal agreement to manage the buffer to the south is obtained.	Existing resources and Flying-fox Officer
Level 2 actions								
2.1	Buffers through vegetation removal	Noise, faecal drop,	1, 2	High	Implement: Year 1 Benefit: Immediate	• Seek approval from NSW Aboriginal Land Council. • Trim vegetation overhanging courthouse carpark, southern side of courthouse building, footpath along Middleton Street.	• Vegetation is trimmed. • Complaints to Council regarding flying-foxes are reduced.	$10K initial work (year 1), $2,000 maintenance per year (years 2-5), Life of Plan: $18,255
2.1	Maintain existing buffers	Noise Smell Health/ well being	1, 2	High	As required	• Maintain existing buffer along the northern side of the camp to the courthouse. • Maintain existing buffer along the southern side of the camp including the public road corridor to private property (refer to **Illustration 8.3**). • Maintain existing buffers along the eastern side of the camp to rear of dwellings on Tennyson Street. This will maintain a minimum 5 m separation between the courthouse to the north; and 20 m separation to the south and east between dwellings/ businesses and vegetation at the camp. *Note: while this option does not directly impact on the recorded camp footprint, it will help mitigate impacts should shifts in the roost footprint occur.*	• Reduced conflicts at adjacent businesses and residents. • Complaints to Council regarding flying-foxes are reduced.	Annual: $1K Life of Plan: $5,214

Action ID	Management action	Target issue	Target objective	Priority	Timing	Management action details	Performance indicators	Cost
2.2	Buffers without vegetation removal	All	1, 2	Medium	Year 3/4 (if required)	• Seek approval from NSW Aboriginal Land Council. • Should flying-foxes roost in the trees within 10 m of Middleton Street, on the western side of the camp, and conflicts with sensitive receivers continue, investigations into installation of targeted flying-fox deterrent devices (eg. sprinklers in vegetation canopy) would be undertaken with the aim of maintaining flying-foxes a minimum 10 m buffer from the western side of the camp, without pushing the camp in close proximity of other sensitive receivers. Systems such as sprinklers can be placed on automatic timers to activate periodically.	• Flying-foxes move towards core away from Middleton Street. • Complaints to Council regarding flying-foxes are reduced.	Facilitation: Support from Council resources (ie Flying-fox Officer) Implementation: Contributions sort from business groups (eg. Chamber of Commerce)

Plate 8.5 View east between the courthouse and the northern side of the flying-fox camp

Plate 8.6 Informal access through the weedy understorey at Middleton Street camp

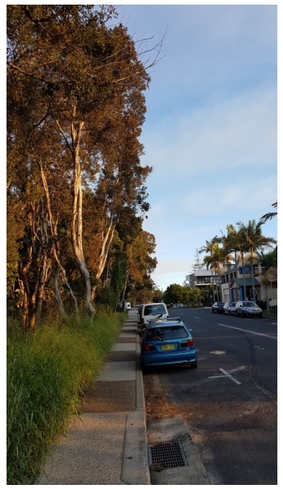


Plate 8.7 View south-west along Middleton Street showing proximity of camp habitat to parked cars

Plate 8.8 View north-west through a patchy section of camp habitat that is dominated by weeds and requires enhancement through planting and weed control

Plate 8.9 View west along the existing public road corridor showing the existing buffer to the southern side of the flying-fox camp

8.2.4 Mullumbimby camp

Residential development is located in close proximity to the Mullumbimby flying-fox camp. These proposed management actions attempt to address impacts from flying-foxes experienced by these sensitive receivers. The camp management actions listed in **Table 8.5** apply specifically to the Mullumbimby flying-fox camp and are in addition to those listed in **Table 8.1**. In addition to the community consultation findings, other key considerations when identifying site specific management actions at this site include:

- Land tenure (ie most of the camp in proximity to sensitive receivers is located outside of Council land)
- Management actions need to be sensitive to the riparian environment at the site, which includes threatened species habitat and EECs.
- Due to the urban context of the camp, there is a risk of shifting the flying-fox/human conflict towards other sensitive receivers (particularly in the short-term) if works are not implemented appropriately. This includes highly sensitive sites such as schools.
- Residential housing is the main sensitive receiver surrounding the site.

Table 8.5 Proposed management for Mullumbimby flying-fox camp

Action ID	Management action	Target issue	Target Objective	Priority	Timing	Management action details	Performance indicators	Cost
Level 1 actions								
1.1	Habitat enhancement	All	5, 7, 12	High	Implement: Years 1/2 Benefit: Long term	• Plant suitable roosting trees in canopy gaps to increase roosting carrying capacity away from sensitive receivers (refer to **Illustration 8.4**).	• Complaints to Council regarding flying-foxes are reduced. • Flying-foxes move towards core away from periphery. • Weed incursion is reduced.	$5,000 + support from community groups
1.2	Bush regeneration	All	2	Medium	Quarterly	• Control of woody weeds such as Coral Tree, Camphor Laurel and Tobacco Bush along the riparian corridor to increase carrying capacity of core and encourage flying-foxes away from fringes. • Formalise agreement with Rotary regarding management of Rainforest Park.	• Complaints to Council regarding flying-foxes are reduced. • Weed incursion is reduced. • Flying-foxes move towards core away from periphery.	Annual: $8K Life of Plan: $41,715
1.3	Partially/ fully subsidised property modification	Noise Smell Faecal drop Health/ wellbeing Property devaluation Lost rental return Impacts on businesses	1, 2, 5	Medium	Implement: Years 2/3 Benefit: Immediate	Where noise and smell is an issue: • Install double-glazed windows on facades facing the flying-fox camp. • Install insulation and air-conditioners. Where faecal droppings are an issue: • Cover vehicles parking areas. • Move or cover outdoor areas (e.g. BBQs and tables, walkways eg. foot bridge) within close proximity to a camp.	• Modifications installed. • Complaints to Council regarding flying-foxes are reduced.	Low to high depending on the number of properties, extent of subsidy and type of work to be done (e.g. $5K to >$100K). The amount of the subsidy is to be determined by Council on a case by case basis.
Level 2 actions								
2.1	Buffers through vegetation removal	Noise, faecal drop,	1, 2	High	Implement: Year 1 Benefit: Immediate	Council would support residents with administrative approvals for undertaking vegetation trimming/ removal around dwellings on private land where residents are directly (within 10 m) of the camp. Vegetation removal may include: • remove all vegetation >3 m tall (excluding threatened plants) within 5 m of dwellings, • remove/ manage weed species >3 m tall or that have potential to become future roost trees (e.g. Camphor Laurel) within 5-10 m of dwellings (refer to example buffers in **Illustration 8.4**). The exact extent of vegetation clearing would be determined in consultation with affected residents and give due consideration of the environmental constraints at the site (eg. waterways, slope, species etc). Council would also facilitate conversations/ negotiations between residents on properties where residents are not interested or unable to pay for the vegetation trimming; however adjoining neighbours that will benefit from the buffer are willing to contribute costs.	• Flying-foxes roost away from residents. • Complaints to Council regarding flying-foxes are reduced.	To be determined on a case by case basis between target private dwelling landowner, Council and neighbouring private land.
2.2	Buffers without vegetation removal	All	1, 2	Medium	Year 2/3 (if required)	Council would support residents where flying-foxes roost within 10 m of residences with administrative approvals for installing localised flying-fox deterrents (ie canopy mounted sprinkler) in locations where: • Vegetation buffers are not appropriate due to environmental constraints. • Residence preferences are for buffers without vegetation removal The objective is to create minimum 10 m buffers between housing and roosting flying-foxes, without pushing the camp towards other sensitive receivers. Camp wide co-ordination would be facilitated by Council to prevent adverse impacts towards residents or flying-foxes. Council would also facilitate conversations/ negotiations between residents on properties where residents are not interested or unable to pay for the deterrent devices; however adjoining neighbours that will benefit from the buffer are willing to contribute costs.	• Flying-foxes move towards core away from Middleton Street. • Complaints to Council regarding flying-foxes are reduced.	Installation costs to be determined on a case by case basis between target private dwelling landowner, Council and neighbouring private land. Operational costs to be worn by resident.

Plate 8.10 Rotary Rainforest Park provides flying-fox habitat and requires ongoing weed control

Plate 8.11 Riparian vegetation along Brunswick River

8.2.5 Paddy's Creek camp

Residential development is located in close proximity to the Paddy's Creek flying-fox camp to the east and west. These proposed management actions attempt to address impacts from flying-foxes experienced by these sensitive receivers. The camp management actions listed in **Table 8.6** apply specifically to Paddy's Creek flying-fox camp and are in addition to those listed in **Table 8.1**. In addition to the community consultation findings, other key considerations when identifying site specific management actions at this site include:

- Steep riparian corridor.
- Management actions need to be sensitive to the riparian environment at the site, which includes threatened species habitat and EECs.
- Due to the urban context of the camp, there is a risk of shifting the flying-fox/human conflict towards other sensitive receivers (particularly in the short-term) if works are not implemented appropriately. This includes highly sensitive receivers such as the Bangalow Community Child Care Centre.
- Residential housing is the main sensitive receiver surrounding the site.

Key considerations include the steep slopes and riparian landform.

Table 8.6 Proposed management for Paddy's Creek flying-fox camp

Action ID	Management action	Target issue	Target Objective	Priority	Timing	Management action details	Performance indicators	Cost
Level 1 actions								
1.1	Bush regeneration	All	2	High	Quarterly	• Weed control works are required within Council land north from Raftons Road. • Liaise with and provide support and guidance to the existing landcare group.	• Complaints to Council regarding flying-foxes are reduced. • Weed incursion is reduced. • Flying-foxes move towards core away from periphery.	Annual: $8K Life of Plan: $41,715
1.2	Habitat enhancement	All	5, 7, 12	High	Implement: Years 1-2 Benefit: long term	• Plant out the western side of Paddy's Creek leaving a 20 m wide buffer to residential properties (refer to **Illustration 8.6**). • Manage effects of legal and illegal poisoning of Camphor Laurel through replacement with low shrubby vegetation. • Liaise with private property owner located upstream along Paddy's Creek to the north of Council owned land regarding flying-fox habitat creation by planting flying-fox roosting habitat.	• Complaints to Council regarding flying-foxes are reduced. • Flying-foxes move towards core away from periphery. • Weed incursion is reduced.	$10,000 + support from community groups
1.3	Partially/ fully subsidised property modification	Noise Smell Faecal drop Health/ wellbeing Property devaluation Lost rental return Impacts on businesses	1, 2, 5	Medium	Implement: Years 2/3 Benefit: Immediate	Where noise and smell is an issue: • Install double-glazed windows on facades facing the flying-fox camp. • Install insulation and air-conditioners. Where faecal droppings are an issue: • Cover vehicles parking areas. • Move or cover outdoor areas (e.g. BBQs and tables, walkways eg. footbridge, etc) within close proximity to a camp.	• Modifications installed. • Complaints to Council regarding flying-foxes are reduced.	Low to high depending on the number of properties, extent of subsidy and type of work to be done (e.g. $5K to >$100). The amount of the subsidy is to be determined by Council on a case by case basis.
Level 2 actions								
2.1	Buffers through vegetation removal	Noise Smell Health/ well being	1, 2	High	Implement: Year 1 Benefit: Immediate	Undertake vegetation trimming/ removal on Council land in close consultation with all affected land holders, including: • Trimming overhanging vegetation at the northern and eastern edge of the Bangalow Community Child Care Centre back to tree trunks (ie top of creek bank). Trimming must avoid threatened flora such as Coolamon (*Syzygium moorei*) present along the drainage line north of Bangalow Community Child Care Centre. • Trim native vegetation on Council land that overhangs private property. • Remove weeds (Camphor Laurel) on top of the creek bank within 10 m of property boundaries (refer to **Illustration 8.5**). • Plant native vegetation to compensate for loss of habitat removed during creation of buffers.	• Flying-foxes roost away from residents. • Complaints to Council regarding flying-foxes are reduced.	$35K initial work (year 1), $4K maintenance per year (years 2-5), Life of Plan: $51,511
2.2	Buffers through vegetation removal	Noise Smell Health/ well being	1, 2	High	Year 1	• Bangalow Community Child Care Centre grounds contain trees that provide food resources for flying-foxes as well as roost trees. In consultation with the facility, Council would provide the centre with administrative approvals for removing this vegetation from their land.	• Potential for flying-fox encounters at the centre is further reduced. • Complaints to Council regarding flying-foxes are reduced.	Planning: Support from Council resources (ie Flying-fox Officer). Implementation: Bangalow Community Child Care Centre.

Action ID	Management action	Target issue	Target Objective	Priority	Timing	Management action details	Performance indicators	Cost
2.2	Buffers without vegetation removal	All	1, 2	Medium	Year 2/3 (if required)	Council would support residents where flying-foxes roost within 10 m of residences with administrative approvals for installing localised flying-fox deterrents (ie canopy mounted sprinkler) in locations where: • Vegetation buffers are not appropriate due to environmental constraints. • Residence preferences are for buffers without vegetation removal The objective is to create minimum 10 m buffer between housing and roosting flying-foxes, without pushing the camp towards other sensitive receivers. Camp wide co-ordination would be facilitated by Council to prevent adverse impacts towards residents or flying-foxes. Council would also facilitate conversations/ negotiations between residents on properties where residents are not interested or unable to pay for the deterrent devices; however adjoining neighbours that will benefit from the buffer are willing to contribute costs.	• Flying-foxes move towards core away from Middleton Street. • Complaints to Council regarding flying-foxes are reduced.	Installation costs to be determined on a case by case basis between target private dwelling landowner, Council and neighbouring private land. Operational costs to be worn by resident.

Plate 8.12 View south showing vegetation over hanging carpark of Bangalow Community Child Care Centre

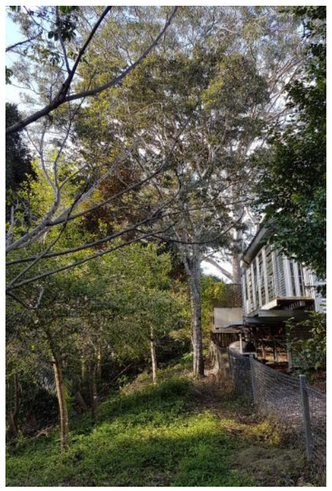


Plate 8.13 View north along rear property boundary of Colins Street showing overhanging vegetation

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 23/06/2017
Source of base data: SIX Maps and Byron Shire Council

Beech Drive
Flying-fox Camp Proposed Management Actions

0 25

North

GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1013

Illustration 8.1

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 23/06/2017
Source of base data: SIX Maps and Byron Shire Council

Butler Street
Flying-fox Camp Proposed Management Actions

0 60

North

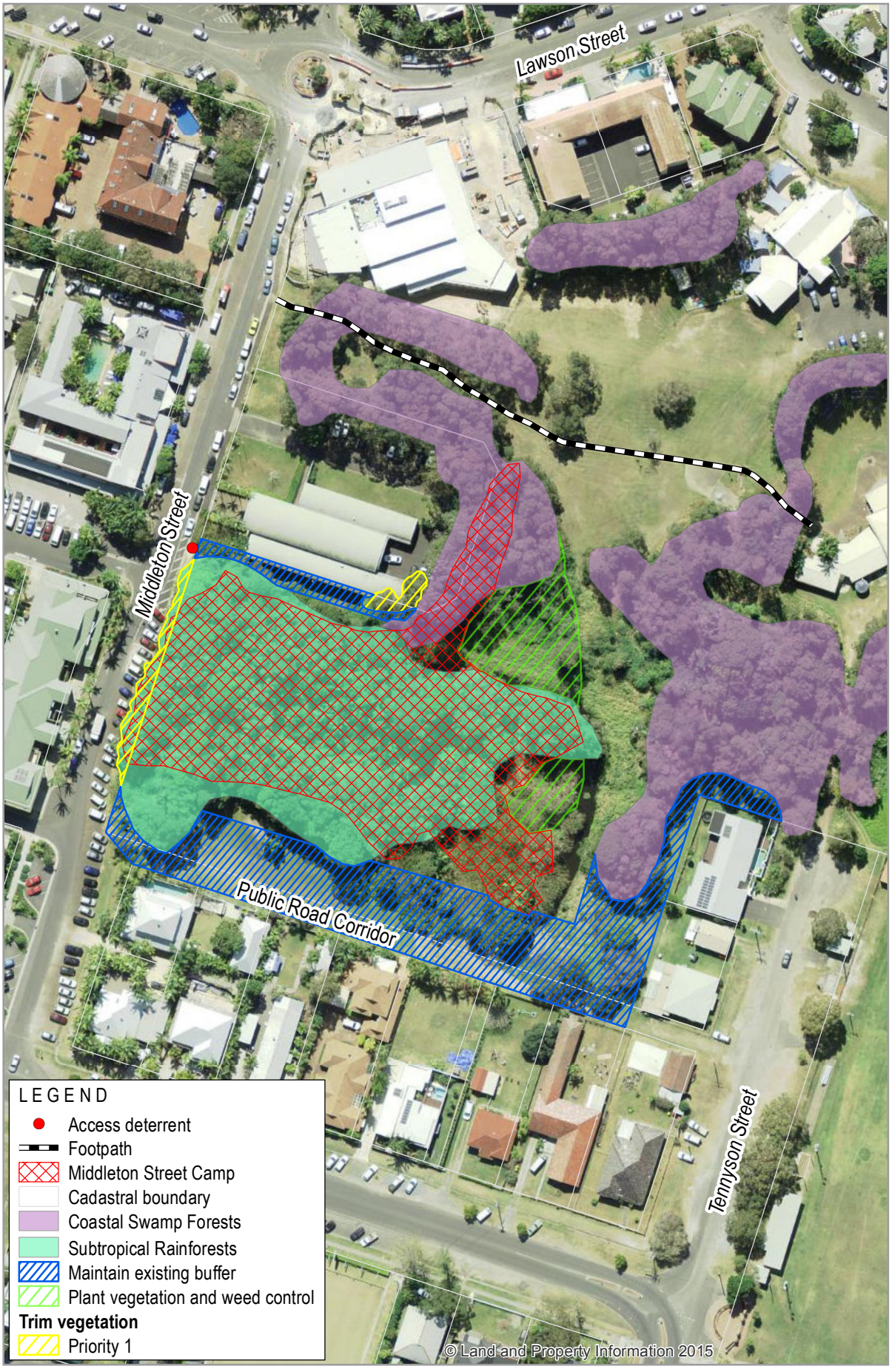
GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1014

Illustration 8.2

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 23/06/2017
Source of base data: SIX Maps and Byron Shire Council



Middleton Street
Flying-fox Camp Proposed Management Actions

0 30

North

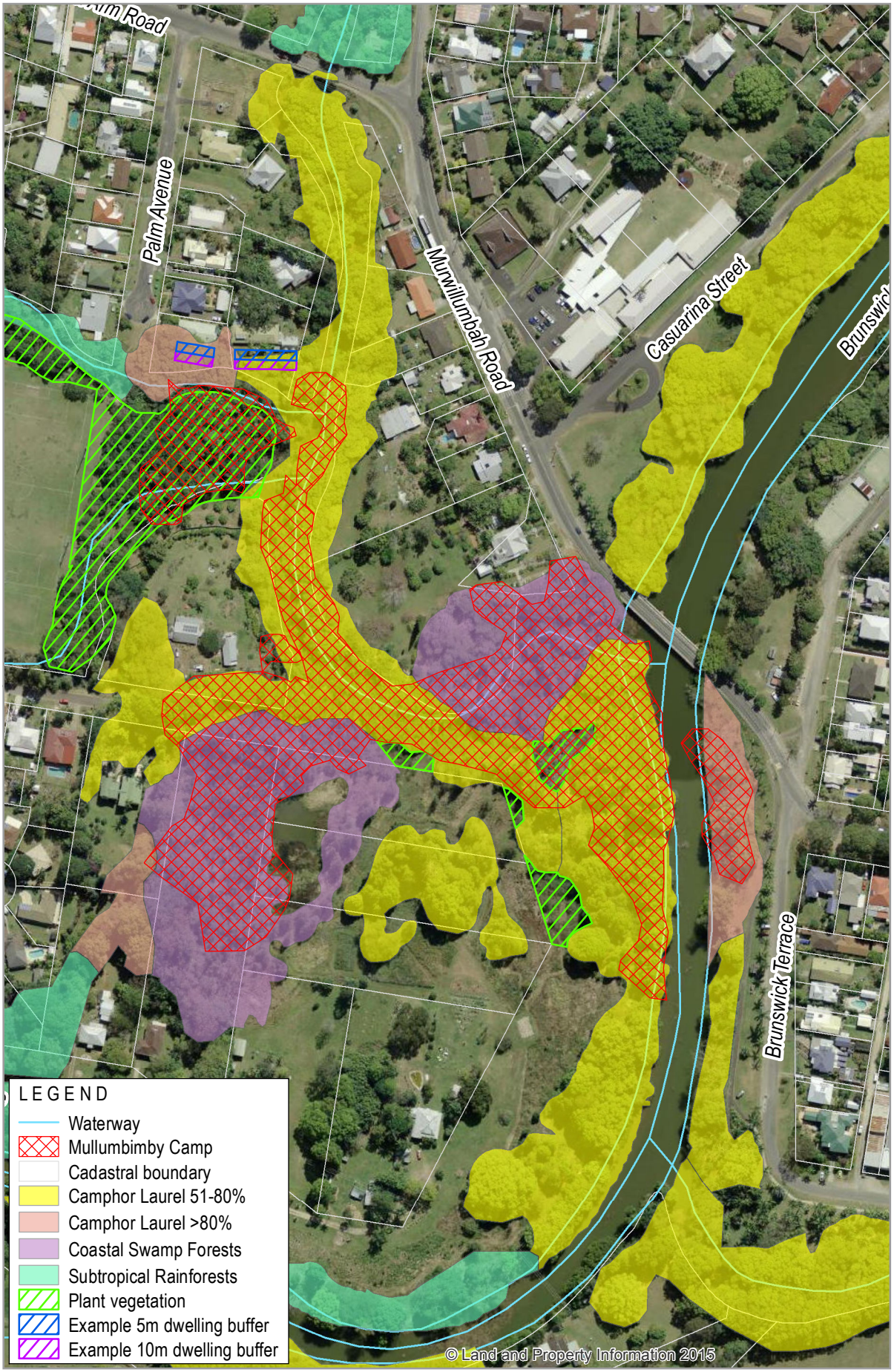
GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1015

Illustration 8.3

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 23/06/2017
Source of base data: SIX Maps and Byron Shire Council



0 60

North

Mullumbimby
Flying-fox Camp Proposed Management Actions

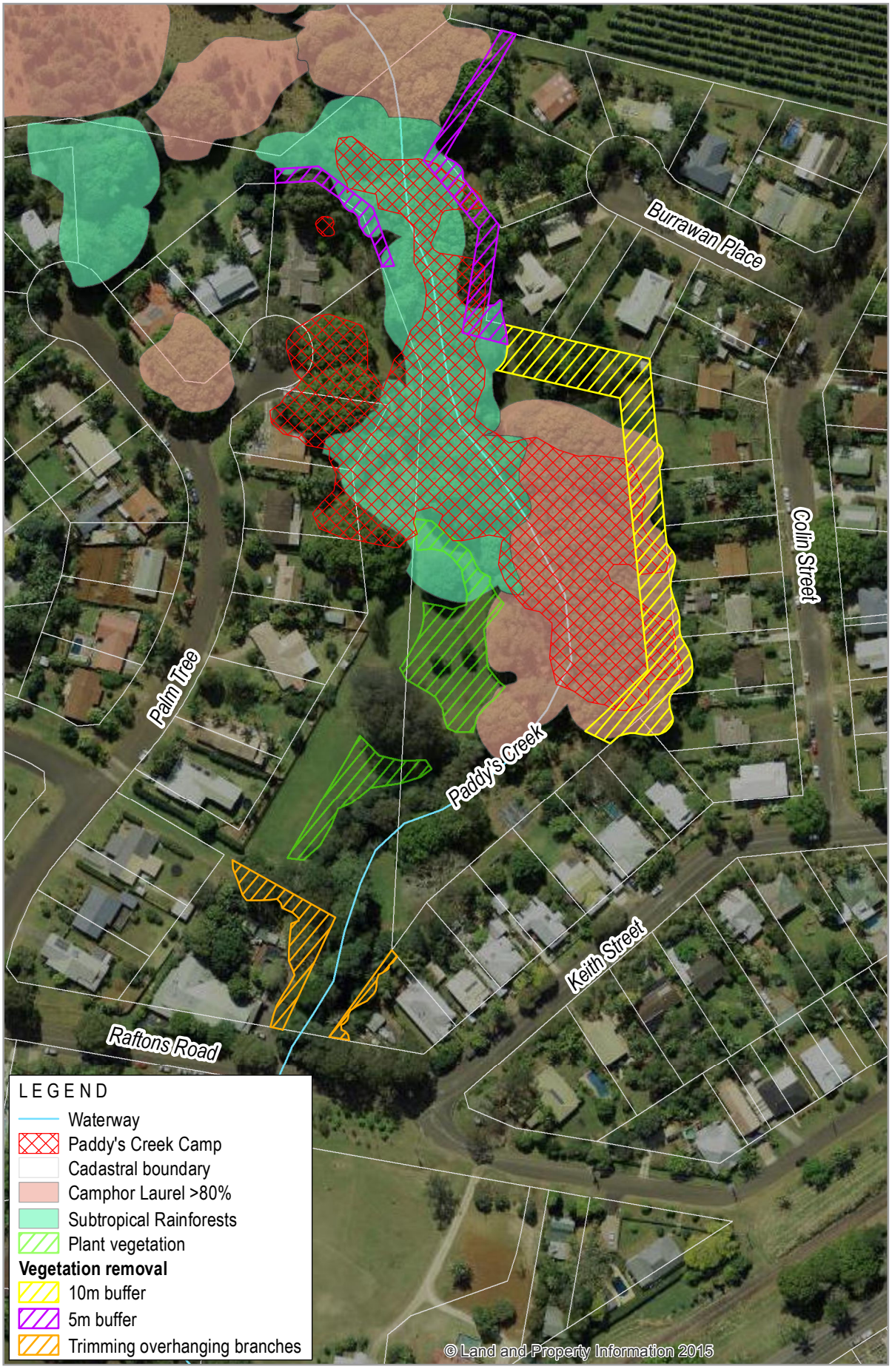
GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1016

Illustration 8.4

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 23/06/2017
Source of base data: SIX Maps and Byron Shire Council



Paddy's Creek
Flying-fox Camp Proposed Management Actions

0 40

North

GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1017

Illustration 8.5

8.3 Decision making process

A flow chart demonstrating the planned process for decision making including 'stop work triggers' is shown in **Figure 8.1**. As indicate in the flow chart, following approval of the Plan by OEH, implementation of management actions commences from the lowest level of management actions first.

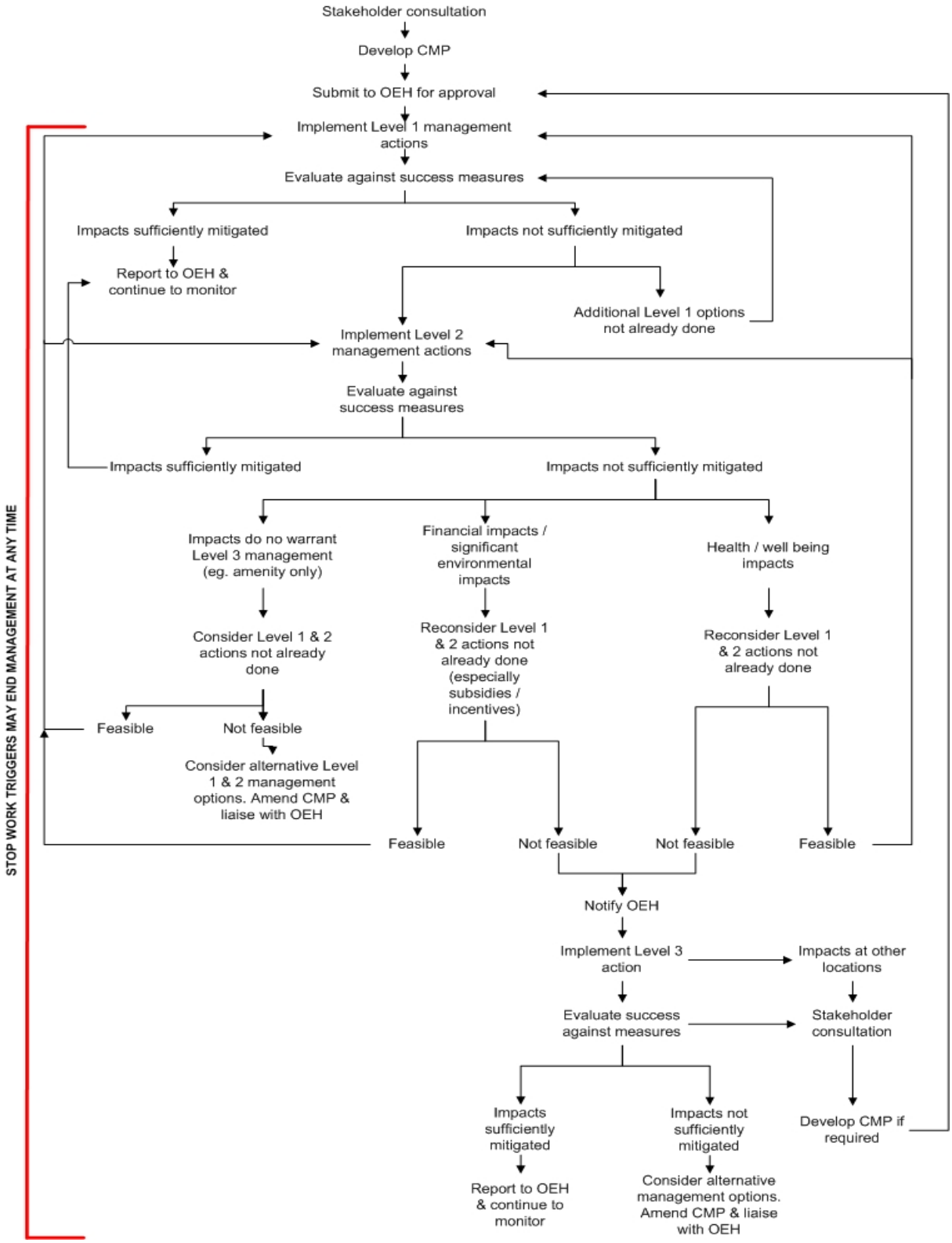


Figure 8.1 **Flow chart demonstrating the planned process for management decision-making**

8.4 Stop work triggers

The proposed management actions will cease and will not recommence or progress to subsequent levels without consulting OEH if:

- any of the animal welfare triggers occur on more than two days during the program, such as unacceptable levels of stress (refer to **Table 8.7**)
- there is a flying-fox injury or death
- a new camp/ camps appear to be establishing
- impacts are created or exacerbated at other locations
- there appears to be potential for conservation impacts (e.g. reduction in breeding success identified through independent monitoring)
- standard measures to avoid impacts (detailed in **Section 9.3**) cannot be met.

Management may also be terminated at any time if:

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

Table 8.7 Planned action for potential impacts during management

Welfare trigger	Signs	Action
Unacceptable levels of stress	If any individual is observed: • panting • saliva spreading • located on or within 2 m of the ground	Works to cease for the day.
Fatigue	In-situ management: • more than 30% of the camp takes flight • individuals are in flight for more than 5 minutes • flying-foxes appear to be leaving the camp.	In-situ management Works to cease and recommence only when flying-foxes have settled*/ move to alternative locations at least 50 m from roosting animals.
Injury/ death	• a flying-fox appears to have been injured/ killed on site (including aborted foetuses) • any flying-fox death is reported within 1 km of the dispersal site that appears to be related to the dispersal • females in final trimester • dependent/ crèching young present • loss of condition evident	Works to cease immediately and OEH notified AND rescheduled OR adapted sufficiently so that significant impacts (e.g. death/ injury) are highly unlikely to occur, as confirmed by an independent expert[#] OR stopped indefinitely and alternative management options investigated.

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

\# A person with experience in flying-fox behaviour will monitor for welfare triggers and direct works

9. Assessment of impacts to flying-foxes

Implementation of the management actions detailed in **Section 8** of the Plan would have the following impacts on flying-foxes or their habitat:

- Short-term habitat impacts:
  - Removal of known/ potential flying-fox roosting habitat on the edges of the camps at Beech Drive, Middleton Street, Mullumbimby and Paddy's Creek camps. Estimated quantities of vegetation to potentially be removed are provided in **Table 9.1** and **Table 9.2**.
  - Loss of available roosting opportunities through roost deterrent at Middleton Street, Mullumbimby and Paddy's Creek camps. Estimated areas are provided in **Table 9.1**.
  - Disturbance during on ground works (mitigated through implementation of safeguards of the Plan).
- Long-term impacts:
  - Reduced short-term habitat loss impacts through habitat restoration and weed control.
  - Increased available roosting habitat in the region through creation of habitat away from sensitive areas.

The proposed management actions at any of the subject flying-fox camps are considered unlikely to have a significant impact on the Grey-headed Flying-fox as:

- Potential roosting habitat larger than the maximum combined recorded camp extent (refer to **Table 9.1**) would remain available at all camps.
- The Plan would not result in the loss of significant areas of available foraging resources in the region.
- The Plan would be undertaken in accordance with the standard measures provided in **Section 9.1**.
- The Plan includes actions to compensate for loss of available roosting habitat at existing camps.

Table 9.1 Habitat Loss at Each Camp

	Beech Drive	Butler Street	Middleton Street	Mullumbimby	Paddy's Creek
Max. recorded camp extent (as at Feb 2017)	0.27 ha	1.5 ha	0.72 ha	2.5 ha	1.2 ha
Contiguous habitat remaining	0.6 ha	93.5 ha	0.4 ha	5 ha	0.6 ha
Approx. area of vegetation removal through buffer establishment (estimated at 15 m)	0.157 ha	0	0.02 ha	0.221 ha[1]	0.223 ha
Estimated loss of available roosting opportunities through roost deterrent	0	0	0.15 ha	0.1 ha	0.1 ha
Remaining available roosting habitat	0.713 ha	95 ha	0.95 ha	7.179 ha	1.477 ha
Habitat enhancement area	0	0	0.108 ha	1.194 ha (contains 1.015 ha of existing moderate density treed vegetation and 0.178 ha of light density treed land)	0.194 ha (contains light existing vegetation)

1 Mullumbimby vegetation clearing calculations are estimates only based on establishing a 10 m buffer around residents directly impacted by the camp.

Table 9.2 Vegetation Types

Vegetation Type[1]	EEC	Site	Area (m^2)
Camphor Laurel >80%	N/A	Paddy's Creek Mullumbimby	1,950
Camphor (51-80%)	N/A	Mullumbimby	1,410
Paperbark-Rainforest	N/A	Mullumbimby	100
Paperbark	N/A	Beech Street	1,570
Swamp Oak[2]	Swamp Oak Floodplain Forest	Mullumbimby	250
Rainforest[2]	Lowland Subtropical Rainforest EEC	Paddy's Creek	475
Riparian Vegetation (non-mapped)	Unknown	Paddy's Creek	255
Paperbark – Rainforest-Swamp Oak	N/A	Middleton Street	200
TOTAL NATIVE VEGETATION			**2,850**
TOTAL CAMPHOR LAUREL FORESTS			**3,360**
TOTAL			**6,210**

1 Vegetation types are based on Council's GIS mapping.

2 Non-vegetation removal buffers methods are preferred at EEC locations, rather than tree removal, acknowledging some trimming of overhanging branches may be required.

9.1 Standard measures to avoid impacts

The following mitigation measures will be complied with at all times during Plan implementation. The objective is to minimise impacts to flying-foxes and associated impacts to residents from flying-fox disturbance.

9.1.1 All management activities

The following list of measures is recommended to avoid impacts to flying-foxes during the proposed management activities:

- All personnel will be appropriately experienced, trained and inducted. Induction will include each person's responsibilities under this Plan.
- All personnel will be briefed prior to the action commencing each day, and debriefed at the end of the day.
- Works will cease and OEH consulted in accordance with the 'stop work triggers' section of the Plan.
- Large crews will be avoided where possible.
- The use of loud machinery and equipment that produces sudden impacts/ noise will be limited. Where loud equipment (e.g. chainsaws) is required, they will be started away from the camp and allowed to run for a short time to allow flying-foxes to adjust.

- Activities that may disturb flying-foxes at any time during the year will begin as far from the camp as possible, working towards the camp gradually to allow flying-foxes to habituate.
- Any activity likely to disturb flying-foxes so that they take flight will be avoided during the day during the sensitive Grey-headed Flying-fox/ Black Flying-fox birthing period (i.e. when females are in final trimester or the majority are carrying pups, generally August – December) and avoided altogether during crèching (generally November/ December to February). Where works cannot be done at night after fly-out during these periods, it is preferable they are undertaken in the late afternoon close to or at fly-out. If this is also not possible, a person experienced in flying-fox behaviour will monitor the camp for at least the first two scheduled actions (or as otherwise deemed to be required by that person) to ensure impacts are not excessive and advise on the most appropriate methods (e.g. required buffer distances, approach, etc.).
- Non-critical maintenance activities will ideally be scheduled when the camp is naturally empty. Where this is not possible (e.g. at permanently occupied camps) they will be scheduled for the best period for that camp (e.g. when the camp is seasonally lower in numbers and breeding will not be interrupted, or during the non-breeding season, generally May to July).
- Works will not take place in periods of adverse weather including strong winds, sustained heavy rains, in very cold temperatures or during periods of likely population stress (e.g. food shortages). Wildlife carers will be consulted to determine whether the population appears to be under stress.
- Works will be postponed on days predicted to exceed 35°C (or ideally 30°C), and for one day following a day that reached ≥35°C. If an actual heat stress event has been recorded at the camp or at nearby camps, a rest period of several weeks will be scheduled to allow affected flying-foxes to fully recover. See the OEH fact sheet on responding to heat stress in flying-fox camps.
- Evening works may commence after fly-out. Noise generated by the works should create a first stage disturbance, with any remaining flying-foxes taking flight. Works should be paused at this stage to monitor for any remaining flying-foxes (including crèching young, although December – February should be avoided for this reason) and ensure they will not be impacted. All Level 1 and 2 works (including pack up) will cease by 0100 to ensure flying-foxes returning early in the morning are not inadvertently dispersed. Works associated with Level 3 actions may continue provided flying-foxes are not at risk of being harmed.
- If impacts at other sites are considered, in OEH's opinion, to be a result of management actions under this Plan, assistance will be provided by the proponent to the relevant land manager to ameliorate impacts. Details of this assistance are to be developed in consultation with OEH.
- Any proposed variations to works detailed in the Plan will be approved, in writing, by OEH before any new works occur.
- OEH may require changes to methods or cessation of management activities at any time.
- Ensure management actions and results are recorded to inform future planning. See the OEH fact sheet on Monitoring, evaluating and reporting.

Human safety

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

- Details of the nearest hospital or doctor who can provide post-exposure prophylaxis will be kept on site.

Post-works

- Reports for Level 1 actions will be provided to OEH annually. Reports for Level 2 and 3 actions will be submitted to OEH one month after commencement of works and then quarterly for the life of the Plan (up to five years) (for all Level 3 actions and in periods where works have occurred for Level 2 actions). Each report is to include:
    - results of pre- and post-work population monitoring
    - any information on new camps that have formed in the area
    - impacts at other locations that may have resulted from management, and suggested amelioration measures
    - an assessment of how the flying-foxes reacted to the works, with particular detail on the most extreme response and average response, outlining any recommendations for what aspects of the works went well and what aspects did not work well
    - further management actions planned including a schedule of works
    - an assessment[7] of how the community responded to the works, including details on the number and nature of complaints before and after the works
    - detail on any compensatory plantings undertaken or required
    - expenditure (financial and in-kind costs)
    - Plan evaluation and review (see Section 12).

9.1.2 All Level 2 and 3 actions

Prior to works

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

Monitoring

- A flying-fox expert will undertake an on-site population assessment prior to, during works and after works have been completed, including:
    - number of each species
    - ratio of females in final trimester
    - approximate age of any pups present including whether they are attached or likely to be crèched

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

  - visual health assessment
  - mortalities.
- Counts will be done at least:
  - once immediately prior to works
  - daily during works
  - immediately following completion
  - one month following completion
  - 12 months following completion.

During works

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

9.1.3 Vegetation trimming/ removal

- Dead wood and hollows will be retained on site where possible as habitat.
- Vegetation chipping is to be undertaken as far away from roosting flying-foxes as possible (at least 100 m).

9.1.4 Canopy vegetation trimming/ removal

Prior to works

- Trees to be removed or lopped will be clearly marked (e.g. with flagging tape) prior to works commencing, to avoid unintentionally impacting trees to be retained.
- Threatened flora and EECs for retention within vegetation removal buffers would be clearly marked and communicated to the clearing contractor prior to commencing works.

During works

- Any tree lopping, trimming or removal is undertaken under the supervision of a suitably qualified arborist (minimum qualification of Certificate III in Horticulture (Arboriculture) who is a member of an appropriate professional body such as the National Arborists Association).
- Trimming will be in accordance with relevant Australian Standards (e.g. AS4373 Pruning of Amenity Trees), and best practice techniques used to remove vegetation in a way that avoids impacting other fauna and remaining habitat.
- No tree in which a flying-fox is roosting will be trimmed or removed. Works may continue in trees adjacent to roost trees only where a person experienced in flying-fox behaviour assesses that no flying-foxes are at risk of being harmed. A person experienced in flying-fox behaviour is to remain on site to monitor, when canopy trimming/removal is required within 50 m of roosting flying-foxes.
- While most females are likely to be carrying young (generally September – January) vegetation removal within 50 metres of the camp will only be done in the evening after fly-out, unless otherwise advised by a flying-fox expert.

- Tree removal as part of management will be offset at a ratio of at least 2:1. Where threatened vegetation removal is required, the land manager will prepare an Offset Strategy to outline a program of restoration works in other locations (in addition to existing programs). The strategy will be submitted to OEH for approval at least two months prior to commencing works.
- Vegetation would be directionally felled into cleared areas to prevent damage to adjacent retained vegetation.

9.1.5 Bush regeneration

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

9.2 Assessment of impacts to other threatened species or communities

The known or potential occurrence of other threatened species and EECs at subject camp is discussed in **Section 5** (and associated appendices). EECs and threatened flora are located at Mullumbimby and Paddy's Creek camps, while all camps support potential habitat for a range of threatened fauna species.

The main potential impacts of the proposal on other threatened species and communities include:

- Habitat loss/ modification at all camps (except Bulter Street camp). This includes removal of approximately 0.621 ha of available habitat (refer to **Table 9.1**).
- Potential loss/ modification of EECs, including:

  - Approximately 250 m^2 of Swamp Oak Floodplain Forest EEC; and

  - Approximately 475 m^2 of Lowland Subtropical Rainforest EEC.
- Potential direct or indirect impacts to threatened flora (eg. trimming or removal – safeguards have been provided to minimise the risk of such impacts).
- Indirect impacts through increased edge effects and onground work activities (noise, human presence, etc). Safeguards have been provided to minimise the risk and magnitude of such impacts.

The plan includes bush regeneration and habitat enhancement actions, as well as standard safeguards for onground works to reduce the impacts to threatened species and EECs. It is not expected that the proposed management actions at any of the subject flying-fox camps would affect other threatened species, populations or EECs such that a viable population would be placed at risk of extinction.

10. Plan administration

10.1 Funding and approvals

The following key steps would be undertaken to instigate implementation of the Plan:

- Obtain Biodiversity and Sustainability Panel endorsement.
- Obtain Byron Shire Council endorsement.
- Obtain OEH endorsement.
- Obtain funding through available grants.
- Review council biodiversity budgets and funding allocation options.

10.2 Evaluation and review

The Plan will have a scheduled annual review by the flying-fox working group, which will include evaluation of management actions against measures shown in **Section 8**.

The following will trigger a reactive review of the Plan:

- completion of a management activity
- progression to a higher level of management
- changes to relevant policy/ legislation
- new management techniques becoming available
- outcomes of research that may influence the Plan
- incidents associated with the camp such as flying-fox deaths or illegal actions.

Results of each review will be included in reports to OEH.

If the Plan is to remain current, a full review including stakeholder consultation and expert input will be undertaken in the final year (year 5) of the Plan's life prior to being re-submitted to OEH.

10.3 Monitoring of the camp

At a minimum, monitoring of each of the five subject flying-fox camps will continue to be undertaken by Council on a quarterly basis in line with the National Flying-fox Monitoring Program. Monitoring will continue for the life of the Plan and will include:

- Area and size of the flying-fox camp.
- Detailed flying-fox counts including species and number present, presence of pregnant females or females with young.
- Maintaining detailed records of the management activities and their outcomes.
- Recording details of timing, costs and staff resources utilised.
- Surveying affected neighbours and the local community after implementation of proposed management actions.

A flying-fox monitoring data sheet template is available from http://www.environment.nsw.gov.au/animals/flying-fox-monitor.htm

10.4 Reporting

Progress reports will be required periodically throughout the life of the Plan, and submitted through Council's relevant committees and panels, prior to Councillors.

Any reporting obligations related to licences or certificates associated with proposed works will be adhered to as per the licence conditions.

10.5 Management structure and responsibilities

Implementation of the proposed management actions requires a dedicated team. All relevant contact details, their roles and responsibilities to implement the Plan are provided within **Table 10.1.**

Table 10.1 Roles and responsibilities

Role	Name*	Required experience/ approvals	Responsibilities/ authority	Communication lines
Program Coordinator	Council staff	Project management Human resource management Community engagement Reporting	Inform and consult with stakeholders and interested parties Community engagement Evaluate program Submit reports to OEH Ensure all landowners have provided consent prior to works	Reports to: Council & OEH Direct reports: Project Manager
Project Manager	Council staff and/ or Contractor	Project management Team leadership and coordination Data management	Coordinate field teams and ensure all personnel are appropriately experienced and trained for their roles Induct all personnel to the program Collect and collate data Liaise with OEH Liaise with wildlife carers/veterinarians (for orphaned/ injured wildlife only)	Reports to: Program Coordinator Direct reports: Supervisor, Contractor
Supervisor	Council staff and/ or Contractor	Knowledgeable in flying-fox biology, behaviour and camp management ABLV-vaccinated Team training, leadership and supervision	Pre- and post-management monitoring Surrounding camp monitoring Coordinate daily site briefings Coordinate daily activities Monitor flying-fox behaviour Determine daily works end point Participate in management activities	Reports to: Project Manager Direct reports: Team members, Observers/ support
Team member	Council staff and/ or Contractor	Recommended ABLV-vaccinated (employer to assess risk) Ideally all team knowledgeable in flying-fox biology, behaviour and camp management however not required	Attend daily site briefings Participate in relevant management activities	Reports to: Supervisor Direct reports: Nil
Contractor Eg. arborist, bush regenerator	Council staff and/ or Contractor	Relevant licences and experience in field	Conduct specified activities (e.g. tree trimming) Adhere to all directions given by Supervisor	Reports to: Project Manager Direct reports: Nil

Role	Name*	Required experience/ approvals	Responsibilities/ authority	Communication lines
Observer/ support	Council staff and/ or Contractor, wildlife carers or community individuals	Approval to access site	Provide care of injured/orphaned wildlife (under licence) if required Monitor flying-foxes as part of National Flying-fox Monitoring Program	Reports to: Supervisor Direct reports: Nil
Flying-fox expert		• Knowledge of flying-fox habitat requirements and behaviour. • Ability to differentiate between breeding and non-breeding females. • Ability to identify females in final trimester. • Ability to estimate age of juveniles. • Experienced in flying-fox population monitoring.	On-site population assessment, monitor flying-fox behaviour and ensure compliance with the Plan.	Reports to: Supervisor Direct reports: Nil

* It is preferable that the Council staff or Contractor appointed is a dedicated Flying-fox Officer appointed by Council (refer to management action 1.11)

10.6 Adaptive management

Adaptive management is a procedure for implementing management while learning about which management actions are most effective at achieving the specified objectives. Council is committed to using adaptive management to improve on-ground management decisions for ecological, social and/ or economic outcomes. An adaptive management procedure includes all of the four elements shown in **Figure 10.1**.

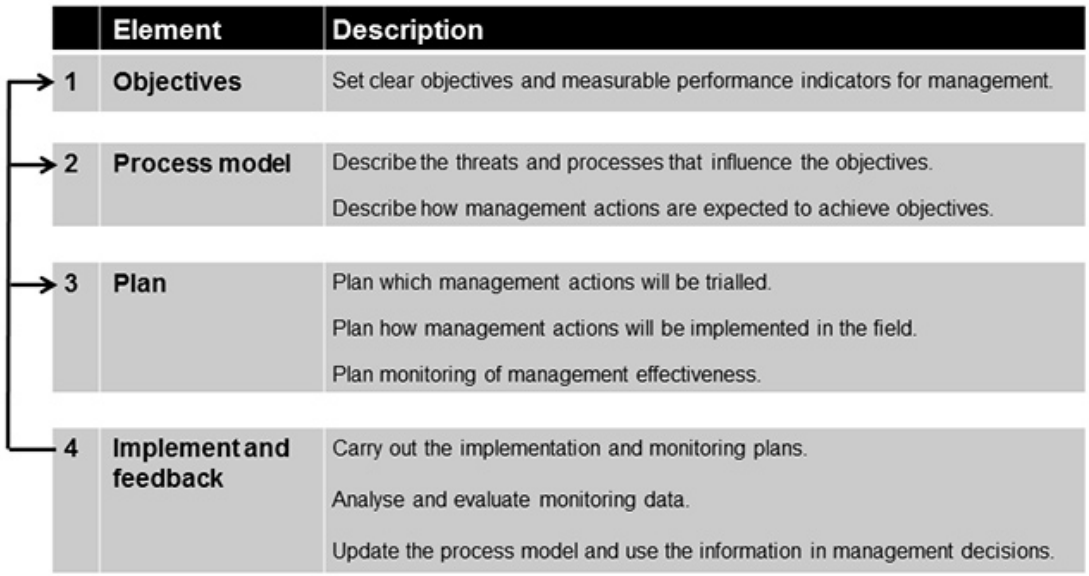


Figure 10.1 Adaptive management procedure

Adaptive management emphasises the importance of involving stakeholders (those that control or enable management) in all four elements, encouraging active partnerships between Council, other land management authorities, scientists and local community and other stakeholders.

10.7 Funding commitment

Costs have been included within the specific management action tables within **Section 8**. Cost sharing between stakeholders will be investigated during the pre-management consultation and consent period. Council will be seeking a commitment by landholders to maintain private property. Councillors are aware that funding commitment is required long term beyond the five year life of this Plan.

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Appendix A Camp history

A1 Beech Drive camp

Flying-fox numbers at the Beech Drive camp since May 2010, including the breakdown of Grey-headed or Black Flying-foxes is provided in **Figure A.1.**

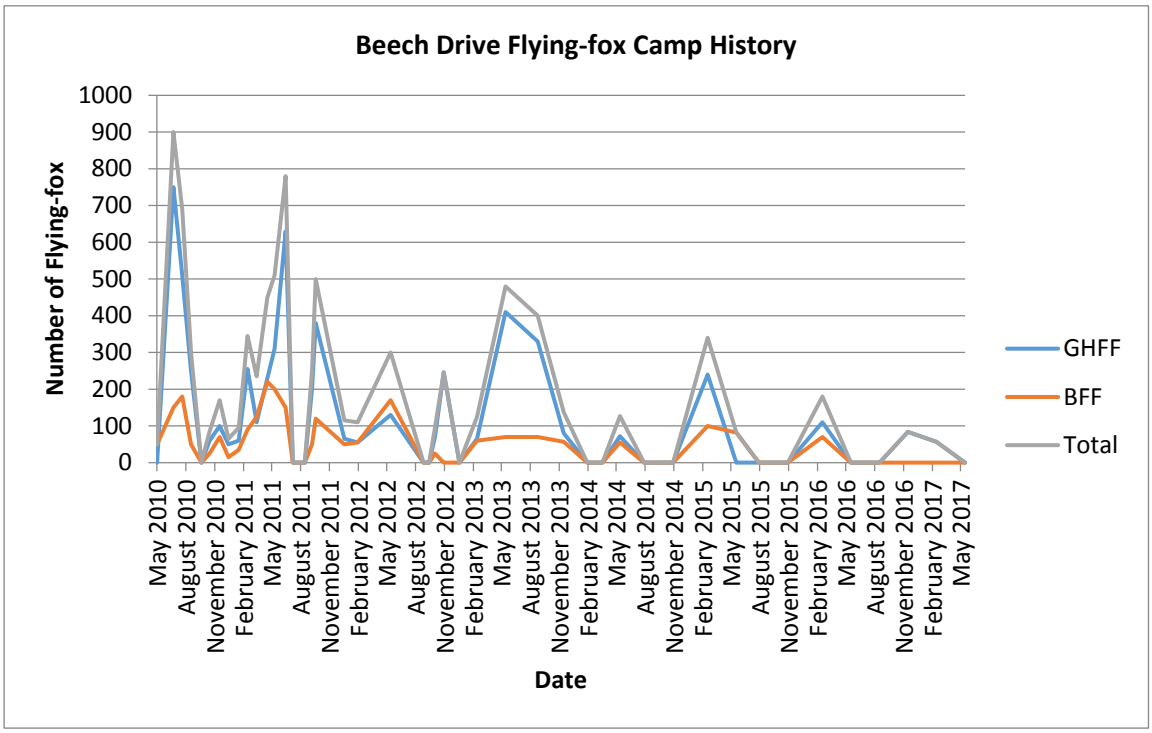


Figure A.1 Beech Drive Flying-fox Camp History

A2 Butler Street camp

Flying-fox numbers at the Butler Street camp since July 2008 including the breakdown of Grey-headed or Black Flying-foxes is provided in **Figure A.2.**

Flying-foxes at the Butler Street camp tend to occupy either one or two parcels of land immediately north of Gordon Street (Lot 230 DP 755695) and/ or on land immediately south of Byron Street (Lot 1 DP 758207, Lot 389 DP 728537, Lot 391 DP 728539 and Lot 392 DP 728539). When the flying-foxes occupy land immediately north of Gordon Street, they tend to occupy the central area of the land, on both sides of the Cumbebin Wetland Sanctuary boardwalk. When the flying-foxes occupy land immediately south of Byron Street they tend to occupy most of the land identified as Lot 389 DP 728537, Lot 391 DP 728539 and Lot 392 DP 728539.

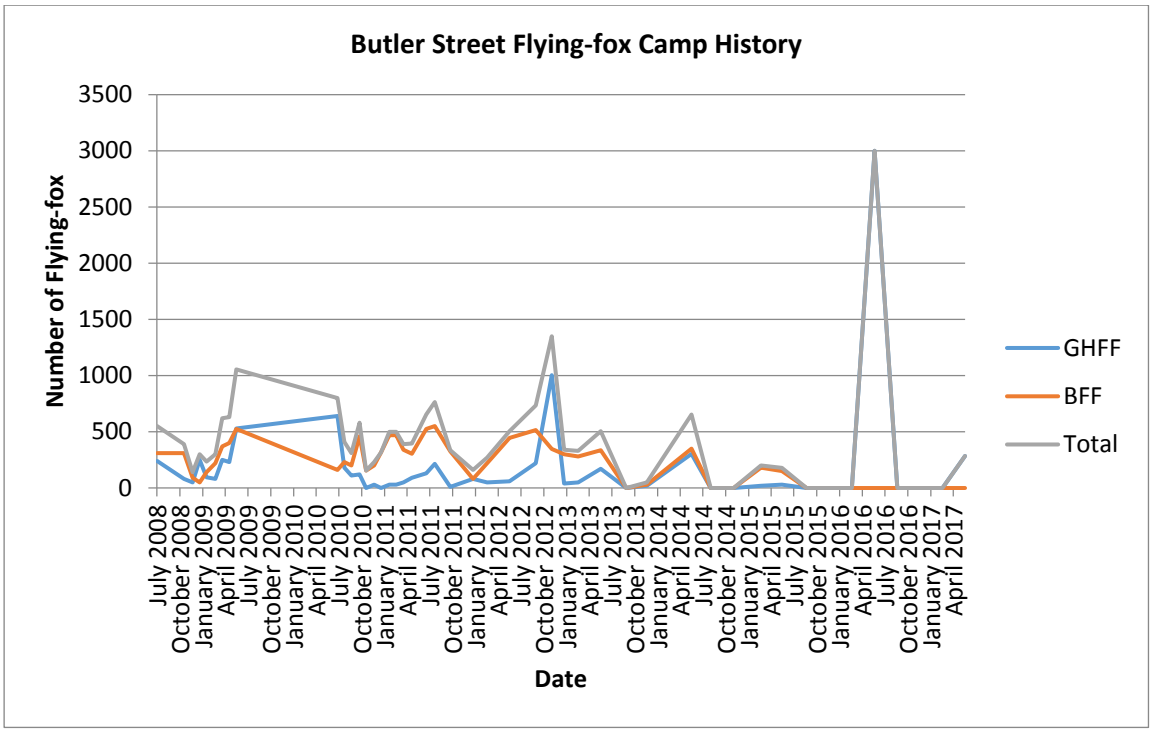


Figure A.2 Butler Street Flying-fox Camp History

A3 Middleton Street camp

Flying-fox numbers at the Middleton Street camp since September 2012, including the breakdown of Grey-headed or Black Flying-foxes is provided in **Figure A.3**.

Note: between 2014 and 2015, no formal monitoring was conducted but an opportunistic observation was made in March 2014 when the total number of flying-foxes recorded was 350 Grey-headed Flying-foxes. No Black Flying-foxes were observed at that time.

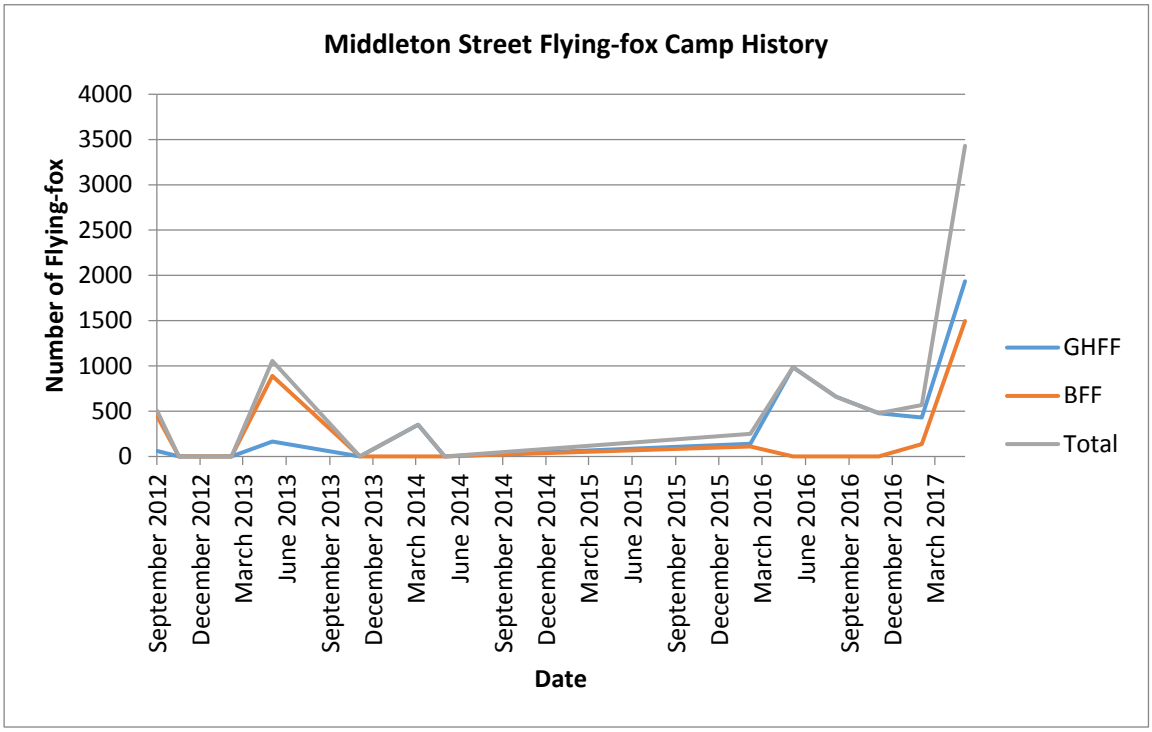


Figure A.3 Middleton Street Flying-fox Camp History

A4 Mullumbimby camp

Flying-fox numbers at the Mullumbimby camp since September 2010, including the breakdown of Grey-headed or Black Flying-foxes is provided in **Figure A.4**. Recordings of maternity activities (determined through observations of female flying-foxes with dependant young) have been recorded by Council at this site.

Byron Shire Council carried out formal monthly monitoring of the camp for the initial twelve months of the camps occupancy (ie September 2010-2011). Count variations between Council staff however are likely to be the result of a combination of counting errors and access to the camp area. From late 2011 to 2013, no formal monitoring was conducted, but opportunistic observations confirm the presence of the camp including the migration to the east of the site towards Federation Bridge during winter months.

An increase in the total numbers of flying-foxes in February 2015 included the northern movement of the camp along Chinbible Creek towards Palm Avenue.

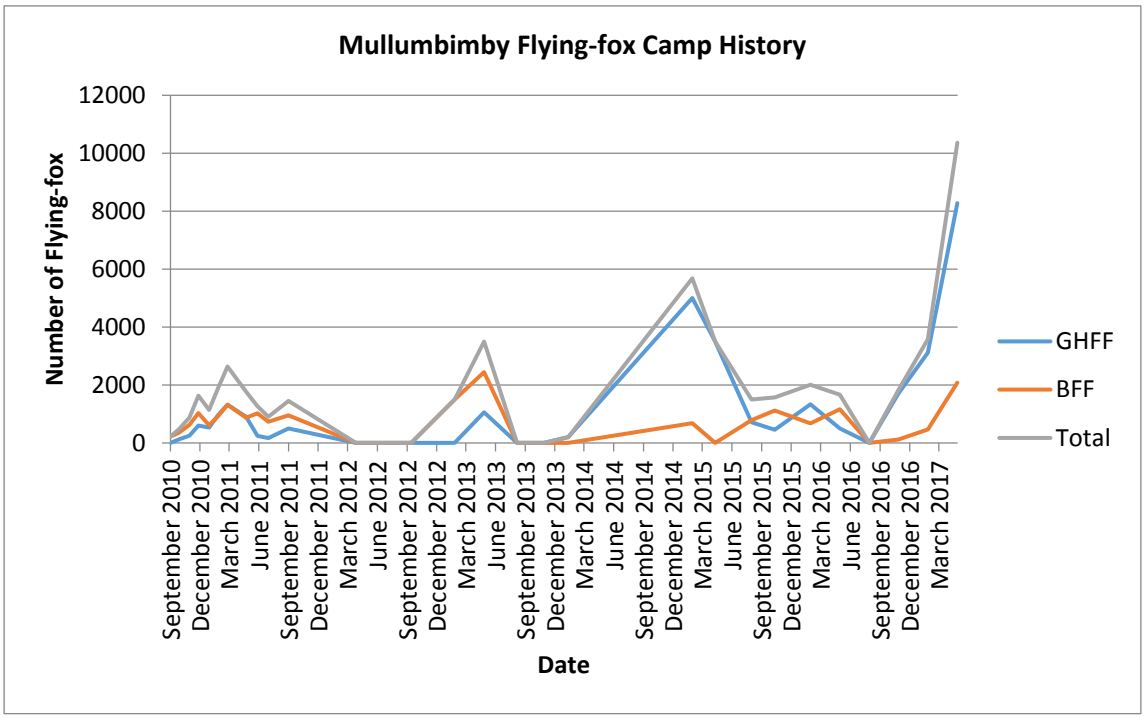


Figure A.4 Mullumbimby Flying-fox Camp History

A5 Paddy's Creek camp

Flying-fox numbers at the Paddy's Creek camp since February 2012, including the breakdown of Grey-headed or Black Flying-foxes is provided in **Figure A.5.** Recordings of maternity activities (determined through observations of female flying-foxes with dependant young) have been recorded by Council at this site.

The flying-foxes tend to occupy both banks of Paddy's Creek between Palm Tree Crescent and Colins Street and south along the creek for approximately 150 m. The extent of the camp however fluctuates considerably between and within seasons.

With the arrival of flying-foxes in late 2016, the extent of the camp stretched south along the creek for an additional 50 m, and with the increase of flying-foxes between November 2016 and February 2017 the camp continued to extend south to approximately 175 m north of Bangalow Community Children's Centre.

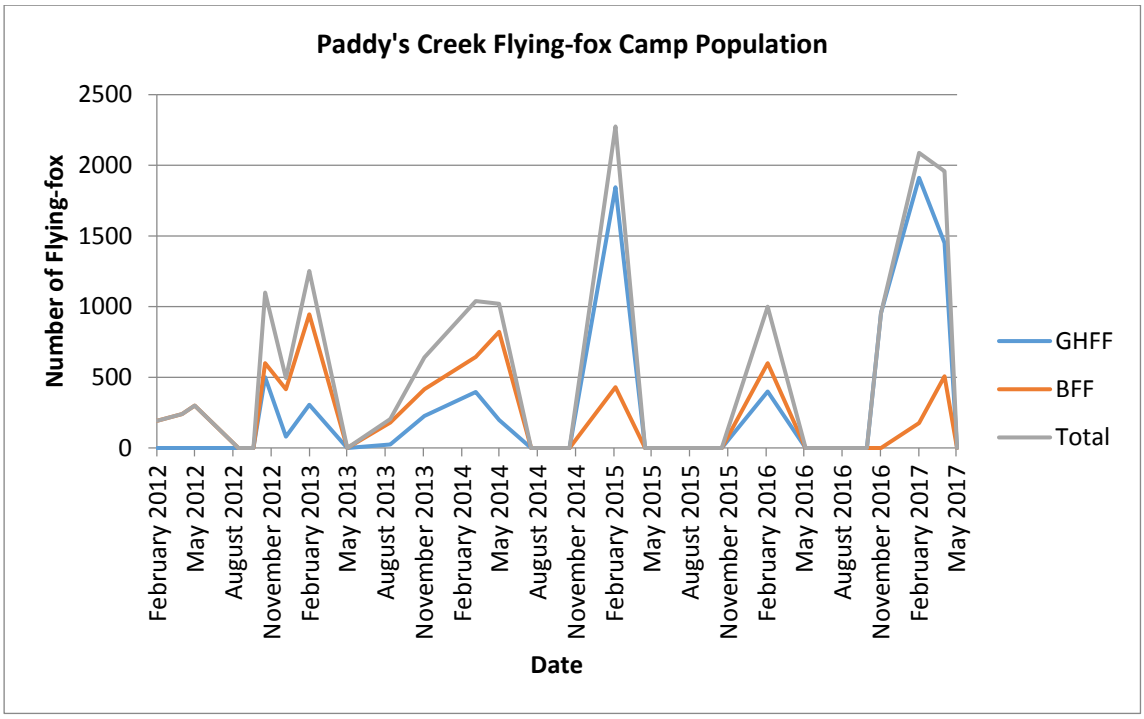


Figure A.5 Paddy's Creek Flying-fox Camp History

Appendix B Stakeholders

Table B.1 Stakeholders in the Camp and Plan

Stakeholder	Comment
Residents	Live near a camp. Are often negatively impacted by the issues raised above.
Tourists and visitors to the area	Temporary visitors to the area.
Business owners	Work near a camp. Businesses in the vicinity of Middleton Street camp and Paddy's Creek camp have reported being negatively financially impacted by the flying-fox camp (although not quantifiably investigated by Council).
Indigenous community	All of the five subject flying-fox camps are located on Bundjalung Country of the Arakwal people. Paddy's Creek camp is located upon land covered by Ngulingah Local Aboriginal Land Council (LALC). Mullumbimby, Butler and Middleton Street camps are located upon land covered by Tweed-Byron LALC. Beech Drive camp is located upon land covered by Jali LALC.
Schools	The following schools are within 150 m of camps: • Byron Bay Preschool • Sandhills Early Childhood Centre • Bangalow Community Child Care Centre • Byron Public School.
Equine facilities and vets	Equine facility managers and local vets should be aware of Hendra virus risk and appropriate mitigation measures.
Orchardists and fruit growers	Fruit growers may be impacted by flying-foxes raiding orchards. This issue was raised by only one farmer at the Byron camp community consultation.
Other/ adjoining landholders; these may include government departments such as Crown Lands, Transport for NSW/ Roads and Maritime Services, or neighbouring councils	Butler and Middleton Street camps are both located entirely on Crown land and therefore management actions require authorisation by Department of Industry –Lands. Mullumbimby is located partially on crown land however is managed by Byron Shire Council under an Operational Plan.
Local government	Local government has responsibilities to the community and environment of the area for which it is responsible in accordance with the *Local Government Act 1993*. Council is also responsible for administering local laws, plans and policies, and appropriately managing assets (including land) for which it is responsible.
Local Government NSW	Local Government NSW is an industry association that represents the interests of councils in NSW.
OEH	OEH is responsible for administering legislation relating to (among other matters) the conservation and management of native plants and animals, including threatened species and ecological communities.
Commonwealth Department of the Environment and Energy (DoEE) (relevant to camps with grey-headed flying-foxes or other matters of national environmental significance)	DoEE is responsible for administering federal legislation relating to matters of national environmental significance, such as the Grey-headed Flying-fox and any other federally-listed values of the camp site.
Wildlife carers and conservation organisations	Wildlife carers and conservation organisations have an interest in flying-fox welfare and conservation of flying-foxes and their habitat.

Appendix C Desktop ecological assessment

Table C.1 Results of ecological desktop assessment

Source	Links	Results
Protected Matters Search Tool (PMST)	www.environment.gov.au/epbc/protected-matters-search-tool	Searches were carried out of the EPBC Act PMST on 22 June 2017 for the area encompassing all of the five subject flying-fox camps. The protected matters search tool (PMST) identified 91 threatened species and two TECs listed under the EPBC Act as 'likely to occur' or 'may occur' within the search area, or have 'habitat that is likely to or may occur' within the search area.
NSW BioNet	www.bionet.nsw.gov.au/	Searches were carried out of the OEH BioNet Atlas of NSW Wildlife database on 15 June 2017 for the area encompassing all of the five subject flying-fox camps. Forty-four threatened flora and 65 threatened fauna species have been recorded within the search area. A potential occurrence assessment of these species is provided in **Table C.2**.
Critical Habitat Register – Office of Environment and Heritage	www.environment.nsw.gov.au/criticalhabitat/criticalhabitatprotectionbydoctype.htm	There are no areas of critical habitat within Byron Shire.
Vegetation Information System: Maps	www.environment.nsw.gov.au/research/PlantCommunityIDsoftware.htm	VIS was checked; however Byron Shire Council vegetation mapping is more relevant for this project.
Threatened Species Profile Database	www.environment.nsw.gov.au/threatenedspecies/	Threatened species profiles for those threatened species identified within the BioNet search and with potential to occur were checked.
State Environmental Planning Policy (SEPP) 14 & 26	data.nsw.gov.au/data/dataset/nsw-oeh-spatial-data-portal	None of the five subject flying-fox camps SEPP 14 or SEPP 26 mapped areas. The closest SEPP 14 Coastal Wetland is 248 m from the Beech Drive flying-fox camp. The closest SEPP 26 Littoral Rainforest is 1,245 m from the Middleton Street flying-fox camp

Appendix D Flying-fox ecology and behaviour

D1 Ecological role

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

It is estimated that a single flying-fox can disperse up to 60,000 seeds in one night (ELW&P 2015). Some plants, particularly *Corymbia* spp., have adaptations suggesting they rely more heavily on nocturnal visitors such as bats for pollination than daytime pollinators (Southerton *et al*. 2004).

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

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

Flying-foxes are considered ‘keystone’ species given their contribution to the health, longevity and diversity among and between vegetation communities. These ecological services ultimately protect the long-term health and biodiversity of Australia’s bushland and wetlands. In turn, native forests act as carbon sinks, provide habitat for other fauna and flora, stabilise river systems and catchments, add value to production of hardwood timber, honey and fruit (e.g. bananas and mangoes; Fujita 1991), and provide recreational and tourism opportunities worth millions of dollars each year (EHP 2012; ELW&P 2015).

D2 Flying-foxes in urban areas

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

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

D3 Under threat

Flying-foxes roosting and foraging in urban areas more frequently can give the impression that their populations are increasing; however, the grey-headed flying-fox is in decline across its range and in 2001 was listed as vulnerable by the NSW Government through the TSC Act.

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

The main threat to Grey-headed Flying-foxes in NSW is clearing or modification of native vegetation. This threatening process removes appropriate roosting and breeding sites and limits the availability of natural food resources, particularly winter–spring feeding habitat in north-eastern NSW. The urbanisation of the coastal plains of south-eastern Queensland and northern NSW has seen the removal of annually-reliable winter feeding sites, and this threatening process continues.

There is a wide range of ongoing threats to the survival of the Grey-headed Flying-fox, including:

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

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

Food shortages also threaten and influence the distribution of flying-fox camps and are primarily due to the ongoing loss of winter–spring food caused by vegetation clearing, particularly on the coastal plains of south-eastern Queensland and northern New South Wales. During food shortages, flying-foxes may alter roosting and feeding behaviours and may increase their use of garden plantings and establish new camps in areas beyond their usual range boundary while searching for food thus break into small roosting groups, close to feeding sites. In the past, temporary camps formed during food shortages have been abandoned once conditions improved. In recent years however, portions of these ‘temporary’ camps have persisted. This has led to an increase in the number of camps in urban areas and a more persistent presence in inland areas, particularly in rural cities and towns e.g. Mullumbimby camp. The loss of foraging habitat, particularly winter forage, is reported to be the primary threat to Grey-headed Flying-foxes (Australian Government 2017).

D4 Camp characteristics

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

preference and movement between camps, and have implications for long-term management strategies.

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

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

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

D5 Species profiles

D5.1 Black Flying-fox (*Pteropus alecto*)

Figure D.1 Black Flying-fox indicative species distribution, adapted from OEH 2015a

The Black Flying-fox (refer to **Figure D.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 Black Flying-fox (Webb & Tidemann 1995). This shift has consequently led to an increase in indirect competition with the threatened Grey-headed Flying-fox, which appears to be favouring the Black Flying-fox (DoE 2016).

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

Black Flying-fox 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).

Black Flying-fox 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.

D5.2 Grey-headed Flying-fox (*Pteropus poliocephalus*)

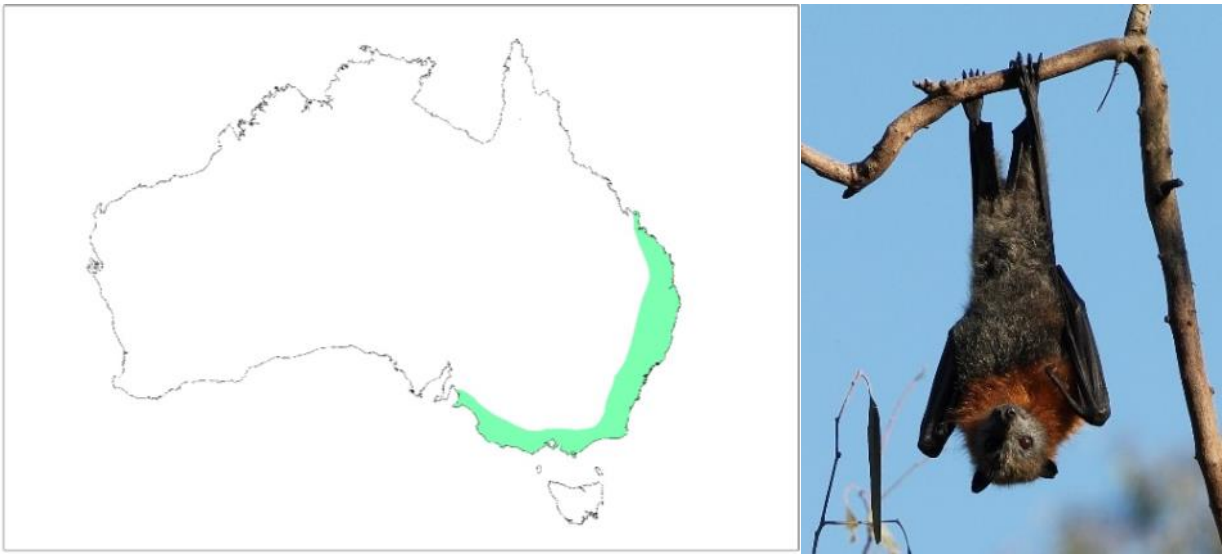


Figure D.2 Grey-headed Flying-fox indicative species distribution (adapted from OEH 2015a)

The Grey-headed Flying-fox (refer to **Figure D.2**) is found throughout eastern Australia, generally within 200 kilometres of the coast, from Finch Hatton in Queensland to Melbourne, Victoria (OEH 2015d). This species now ranges into South Australia and has been observed in Tasmania (DoE 2016). It requires foraging resources and camp sites within rainforests, open forests, closed and open woodlands (including melaleuca swamps and banksia woodlands). This species is also found throughout urban and agricultural areas where food trees exist and will raid orchards at times, especially when other food is scarce (OEH 2015a).

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

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

There is evidence the Grey-headed Flying-fox population declined by up to 30% between 1989 and 2000 (Birt 2000; Richards 2000 cited in OEH 2011). There is a wide range of ongoing threats to the survival of the Grey-headed Flying-fox, including habitat loss and degradation, deliberate destruction associated with the commercial horticulture industry, conflict with humans, infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, power line electrocution, etc.) and competition and hybridisation with the BFF (DECCW 2009). For these reasons it is listed as vulnerable to extinction under NSW and federal legislation (see **Section 4**).

D6 Reproduction

D6.1 Black and Grey-headed Flying-foxes

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

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

As such, the critical reproductive period for Grey-headed Flying-fox and Black Flying-fox 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 (refer to **Figure**).

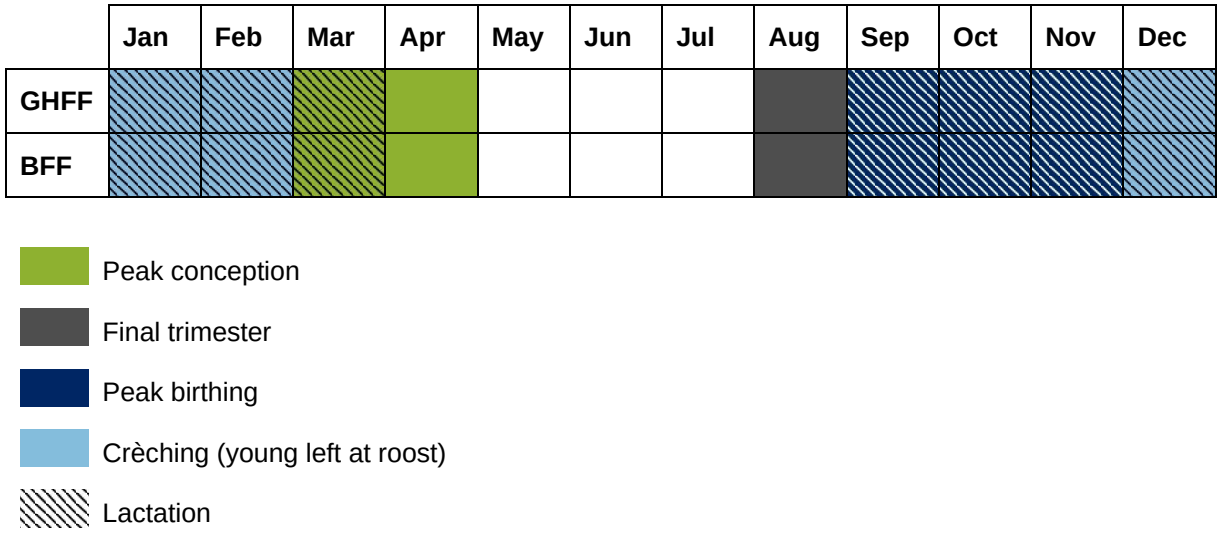


Figure D.3 Indicative flying-fox reproductive cycle

The breeding season of all species is variable between years and location, and expert assessment is required to accurately determine phases in the breeding cycle and inform appropriate management timing.

D7 Foraging

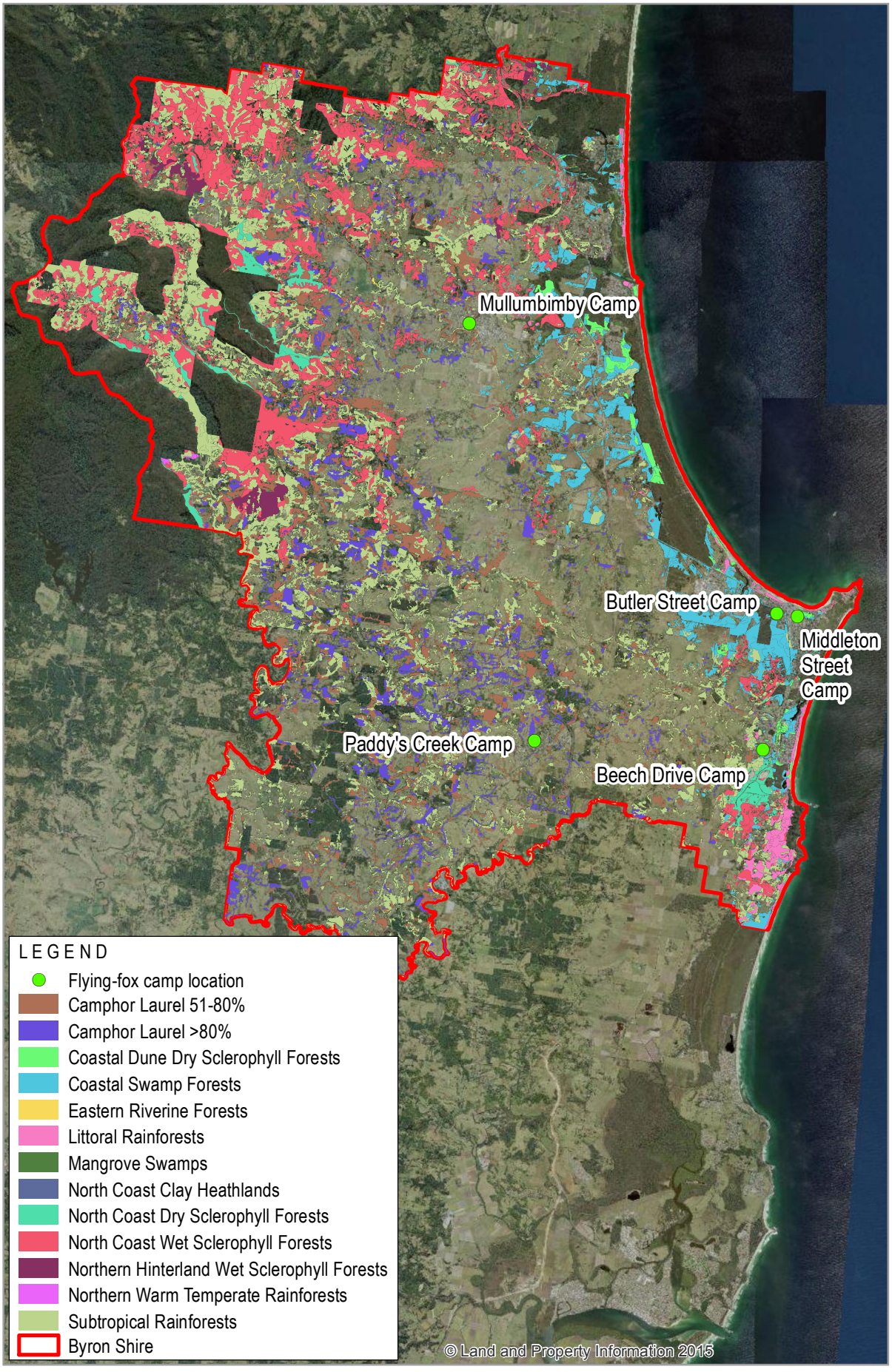
At night, flying-foxes navigate principally by sight (rather than echolocation as is the case with microbats), their sense of smell and spatial memory assisting them to locate food. Grey-headed Flying-foxes forage up to 50 km from camps, although >75% of foraging activity is within a 20 km radius (Eby 1991, Tidemann 1999). Black Flying-foxes also typically forage within 20 km from their roost (Markus and Hall 2004).

D8 Diet

Grey-headed and Black Flying-foxes are canopy feeding frugivores and nectivores; feeding primarily on blossom and fruit in canopy vegetation and occasionally supplement this with leaves (Ratcliffe 1931, Parry-Jones and Augee 1991, Eby 1995, Tidemann *et al* 1999, Hall and Richards 2000 in DECCW 2009). The majority of animals feed on nectar and pollen from Eucalyptus, Corymbias, Angophoras, Melaleucas and Banksias. They also feed on introduced tree species in urban areas and commercial fruit crops. The available foraging habitat for flying-foxes within Byron Shire is shown in **Illustration D.1**.

Information shown is for illustrative purposes only

Drawn by: GJM Checked by: DSA Reviewed by: VJS Date: 23/06/2017
Source of base data: SIX Maps and Byron Shire Council



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North

Byron Shire Flying-fox Foraging Habitat

GeoLINK environmental management and design

Byron Shire Flying-fox Camp Management Plan
2847-1018

Illustration D.1

Appendix E Additional human and animal health information

E1 Australian bat lyssavirus

ABLV is a rabies-like virus that may be found in all flying-fox species on mainland Australia. It has also been found in an insectivorous microbat and it is assumed it may be carried by any bat species. The probability of human infection with ABLV is very low with less than 1% of the flying-fox population being affected (DPI 2013) and transmission requiring direct contact with an infected animal that is secreting the virus. In Australia three people have died from ABLV infection since the virus was identified in 1996 (NSW Health 2013).

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

Transmission of the virus from bats to humans is through a bite or scratch, but may have potential to be transferred if bat saliva directly contacts the eyes, nose, mouth or broken skin. ABLV is unlikely to survive in the environment for more than a few hours, especially in dry environments that are exposed to sunlight (NSW Health 2013).

Transmission of closely related viruses suggests that contact or exposure to bat faeces, urine or blood does not pose a risk of exposure to ABLV, nor does living, playing or walking near bat roosting areas (NSW Health 2013).

The incubation period in humans is assumed similar to rabies and variable between two weeks and several years. Similarly, the disease in humans presents essentially the same clinical picture as classical rabies. Once clinical signs have developed the infection is invariably fatal. However, infection can easily be prevented by avoiding direct contact with bats (i.e. handling). Pre-exposure vaccination provides reliable protection from the disease for people who are likely to have direct contact with bats, and it is generally a mandatory workplace health and safety requirement that all persons working with bats receive pre-vaccination and have their level of protection regularly assessed. Like classical rabies, ABLV infection in humans also appears to be effectively treated using post-exposure vaccination and so any person who suspects they have been exposed should seek immediate medical treatment. Post-exposure vaccination is usually ineffective once clinical manifestations of the disease have commenced.

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

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

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

E2 Hendra virus

Flying-foxes are the natural host for Hendra virus (HeV), which can be transmitted from flying-foxes to horses. Infected horses sometimes amplify the virus and can then transmit it to other horses, humans and on two occasions, dogs (DPI 2014). There is no evidence that the virus can be passed directly from flying-foxes to humans or to dogs (AVA 2015). Clinical studies have shown cats, pigs, ferrets and guinea pigs can carry the infection (DPI 2015a).

Although the virus is periodically present in flying-fox populations across Australia, the likelihood of horses becoming infected is low and consequently human infection is extremely

rare. Horses are thought to contract the disease after ingesting forage or water contaminated primarily with flying-fox urine (CDC 2014).

Humans may contract the disease after close contact with an infected horse. HeV infection in humans presents as a serious and often fatal respiratory and/or neurological disease and there is currently no effective post-exposure treatment or vaccine available for people. The mortality rate in horses is greater than 70% (DPI 2014). Since 1994, 81 horses have died and four of the seven people infected with HeV have lost their lives (DPI 2014).

Previous studies have shown that HeV spillover events have been associated with foraging flying-foxes rather than camp locations. Therefore risk is considered similar at any location within the range of flying-fox species and all horse owners should be vigilant. Vaccination of horses can protect horses and subsequently humans from infection (DPI 2014), as can appropriate horse husbandry (e.g. covering food and water troughs, fencing flying-fox foraging trees in paddocks, etc.).

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

E3 Menangle virus

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

E4 General health considerations

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

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

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

Appendix F Flying-fox rescue protocol

Reference documents

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

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

Purpose

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

This work instruction provides rescuers with information regarding capture and first aid until a flying-fox is in the specialist care of a veterinarian or person qualified in wildlife rehabilitation.

Requirements

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

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

Human first aid

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

Equipment

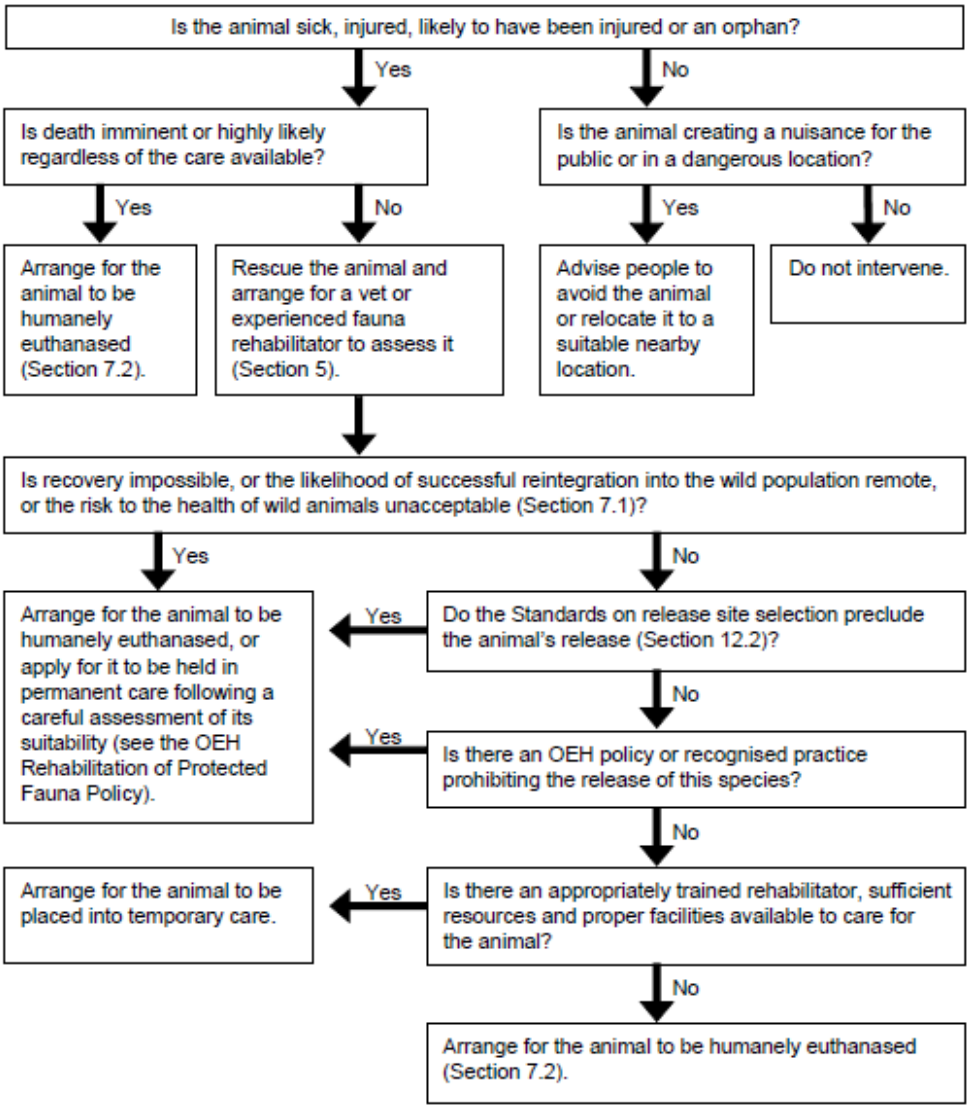
- lidded plastic carry basket or 'pet-pack' with bedding (juveniles) / transport container with hanging perch, tall enough for bat to hang without hitting its head (in accordance with Section 5.1 of the NSW Code of Practice for Injured, Sick and Orphaned Flying-foxes (OEH 2012))
- warm water bottle/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

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

Work instructions

Case assessment

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



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

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

Rescue instructions

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

> The objective is to rescue a flying-fox while minimising further stress and injury to the animal.
>
> Before a rescue attempt, rescuers must assess the risks to the flying-fox from environmental hazards and from capture.
>
> Rescuers must employ the correct rescue equipment for the condition and location of the flying-fox, and be trained in its use.

Example scenarios

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

Animal first aid

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

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

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

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

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

Transport to veterinarian / wildlife carer

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

Objective

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

Standards

- The transport container must be tall enough for the flying-fox to hang by its feet without hitting its head on the floor.
- The container must be designed, set up and secured to prevent injuries to the flying-fox. The sides of the container must prevent the flying-fox from poking its head or wings out.

- The container must be designed to prevent the flying-fox from escaping.
- The flying-fox must be allowed to hang by its feet from the top of the container or if it is unable to hang, wrapped in material (e.g. sheet or flannel) and placed in a sling so its feet are higher than its head.
- The container must be kept at a temperature which is appropriate for the age and condition of the flying-fox. A range of 25–27°C is appropriate for an adult. A temperature of 28°C is appropriate for an orphan. A cool or warm water bottle may be required.
- The container must be ventilated so air can circulate around the flying-fox.
- The container must minimise light, noise and vibrations and prevent contact with young children and pets.
- During transport, a container holding a flying-fox must have a clearly visible warning label that says ‘Warning – live bat’.
- A flying-fox must not be transported in the back of an uncovered utility vehicle or a car boot that is separate from the main cabin.

Guidelines

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

Appendix G Section 91 licence application form

Following Council endorsement, a section 91 licence application will be completed for the proposed management actions which involve potential impacts to Greg-headed Flying-foxes or their habitat.